India's Experience with Mobile Number Portability*

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The views expressed are the author's own.

Executive Summary

India is the second most populous nation, one of the BRIC (Brazil, Russia, India, and China) emerging economic powers, and the second largest and fastest growing mobile market in the world with nearly one billion subscribers. With a lack of physical infrastructure, evidenced by a low penetration of fixed telephony, most in India regard mobile communications as a critical element in today's environment. The Telecom Regulatory Authority of India (TRAI) introduced Mobile Number Portability (MNP) in early 2011. This paper describes the mobile telecommunications market in India, examines the implementation of MNP, and provides a brief comparison to the United States' MNP market, concluding that there are significant differences between the two countries' approach and results.

India's Mobile Telecommunications Market

The telecommunications market in India is unlike any other country. India has 15 mobile carriers in a highly competitive, predominantly pre-paid market that is largely driven by the subscriber's unremitting efforts to secure better pricing. About 96% of all mobile subscribers elect for a prepaid service, and those subscribers are constantly transitioning between mobile service providers to realize incrementally lower prices. Unlike most developed markets, including the United States, many mobile subscribers in India have the option of using devices with multi-service/SIM card capability. This allows the mobile subscriber to switch service providers simply by activating the SIM card associated with the most preferential rates at the time. It is reported that 57% of all handsets shipped in India in 2011 had multiple-service/SIM capabilities, which provide a choice of up to four mobile carriers within a single device.[1]

Consumers' propensity for rapidly switching service providers places significant challenges on mobile carriers in India. These take the form of high churn rates and declining revenue per subscriber. The monthly churn rate in India averages approximately 6%.[2] Airtel, the largest mobile operator in India, will see substantial customer churn, which in the aggregate equates to almost its entire customer base of 179 million subscribers, in a single year. The Average Revenue Per User (ARPU) in India is $3.10[3] a month, compared with about $50[4] a month in the United States.

Because India is overwhelmingly a prepaid market, there is little loyalty between subscribers and mobile carriers. As a result, one of the implications of the preponderance of multi-SIM device (in combination with no-contract pre-paid accounts) is that mobile carriers have little incentive to invest in the overall consumer experience, including that surrounding MNP. Mobile subscribers in India forgo the simplicity of retaining their identity through a single

[1] *See Indian Mobile Handsets Report [Multi-SIM handsets make up over 57% of total shipments, Smartphones only 6.2%], available at* http://www.pluggd.in/indian-mobile-handsets-report-multi-sim-handsets-make-up-over-57-of-total-shipments-297/ (last visited Apr. 24, 2012).
[2] Calculated based on the blended monthly churn for Bharti Airtel, Reliance Communications, and Vodafone India. *See* BMI India Telecommunications Report, 2Q 2012, pp. 49-51.
[3] Calculated based on the blended ARPU for Bharti Airtel, Reliance Communications, and Vodafone India. *See* BMI India Telecommunications Report, 2Q 2012, pp. 49-51.
[4] Calculated based on the blended ARPU for Verizon Wireless, AT&T Mobility, Sprint-Nextel, and T-Mobile. *See* BMI Unites States Telecommunications Report, 2Q 2012, pp. 40-43.

telephone number that is relevant far beyond personal identification for voice calls or text messages.

India's Mobile Number Portability System

Mobile Number Portability (MNP) enables subscribers to keep their telephone numbers when switching from one mobile provider to another. It has the potential to convey significant benefits to the consumer by lowering barriers to competition. MNP was licensed in India in April 2009, and was launched in January 2011.[5] By the time India fully embraced MNP, over 70 countries worldwide had already implemented portability solutions. The local regulator, TRAI, adopted an unconventional, multiple-administrator solution for MNP, making India one of only two countries worldwide to adopt such an approach. Two MNP administrators are dually responsible for orchestrating the transfer of telephone numbers between mobile carriers, each using a distinct platform and infrastructure in distinct service areas (zones).

As described in detail below, India's MNP system has the following attributes:

- The MNP system is limited in scope in that it only allows mobile subscribers to transfer their telephone numbers when moving to a new mobile carrier. Similar services do not extend to fixed wireline or voice over Internet protocol (VoIP) services.
- The MNP process is initiated by the new mobile carrier at the request (via SMS) of the subscriber.
- Information is downloaded to all carriers and access providers in all circles[6] via periodic file transfers to enable updated routing.
- TRAI requires that the entire process for subscribers to switch carriers be completed within seven days.
- The process tolerates the subscribers to be out of service for up to two hours during the transition to their new mobile carrier.

After the first year of MNP, provisional conclusions can be drawn as to its success. The number of subscribers opting for MNP as a percentage of overall churn is relatively small, suggesting that MNP has had limited impact on competition. Furthermore, evidence has emerged of significant subscriber dissatisfaction with the process, as measured by long delays and high volumes of complaints to the regulator. Over 25% of consumers' requests to transfer their telephone numbers between January 2011 and November 2011 were rejected or

[5] *See generally* Government of India, Ministry of Communications & Information Technology, Department of Communications, *MNP-Related Issues*, *available at* http://www.dot.gov.in/as/MNP/MNPindex.htm (last visited Apr. 24, 2012).
[6] The Indian mobile phone market is made up of 22 service areas, often referred to as "circles."

abandoned.[7] TRAI acknowledged that there was very high porting rejection rates and directed the operators to address the issue.[8]

Comparison of Number Portability in the United States and India

The number portability environment for the United States is significantly different from that in India. The combination of substantial adoption of fixed, mobile, and VoIP communications; a largely post-paid subscriber base; and a strong consumer interest in number portability contributes to a wholly different experience in the United States when compared with India.

To illustrate the differences, consider the following:

- Number portability in the United States spans network technologies, allowing subscribers to transfer their telephone numbers among fixed line, mobile, and VoIP services.
- Mobile and simple fixed line ports are generally completed within a single day or less.
- In the vast majority of cases, the subscriber experiences no disruption of service during the transfer of her number to a new carrier.
- The LNP registry in the United States is also used to preserve national numbering resources, *i.e.*, to transfer smaller inventory ranges between carriers for more efficient utilization.
- The LNP registry can also be used by service providers to perform important network management activities (*i.e.*, technology migrations, load balancing, and emergency preparedness/disaster recovery).

Most critically, portability makes up a significantly larger percentage of overall subscriber churn in the United States' mobile market – about four times larger than in India.[9] Evidence bears out that a subscriber in a post-paid contract with richer services (3G/4G, smart phones, etc.) tends to maintain a higher affinity for their telephone number than does a pre-paid subscriber who carries multiple SIM cards for a single device. The data implies that portability in the United States is far more critical to sustaining expected levels of competition, and furthermore, that any disruptions or issues with the porting process would have a far more deleterious effect for the consumer.

The differences between the United States and India are evidence of the fact that communications markets and the drivers of consumer demand are not the same worldwide. The United States and India are both large democracies with growing telecom markets, but the experience of one communications market with number portability is not transferable to another

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[7] *See 68 lakh mobile users not been able to port numbers, available at* http://businesstoday.intoday.in/story/68-lakh-moble-users-not-been-able-to-port-numbers/1/21554.html (last visited Apr. 24, 2012).

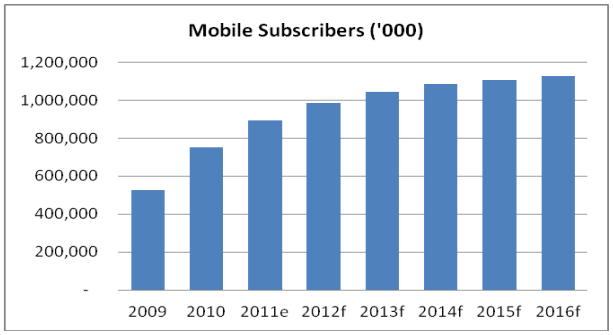
[8] *See TRAI Direction on Cancellation/Withdrawal of MNP Request by Donor Operators, available at* http://www.trai.gov.in/Content/Directions.aspx?qid=83.

[9] Calculated from TRAI Press Release 72/2012, April 7, 2012, Company sources, and blended churn of top carriers in India and Unites States.

market. Indeed, the factors leading to a successful mobile number portability experience could not be more distinct between the two countries. One need only compare the post-paid and pre-paid nature of the two marketplaces. As such, regulators and service providers should rely on the characteristics of their respective markets when making decisions regarding number portability in the future.

I. India's Mobile Telecommunications Market

India is the world's largest democracy with a population of over 1.2 billion people. Unlike the United States and other developing countries, India suffers from poor private and public infrastructure. This, along with ranking second behind China as the most populated country in the world and other factors, has led to a proliferation of mobile phone growth with nearly one billion subscribers in India today.[10]

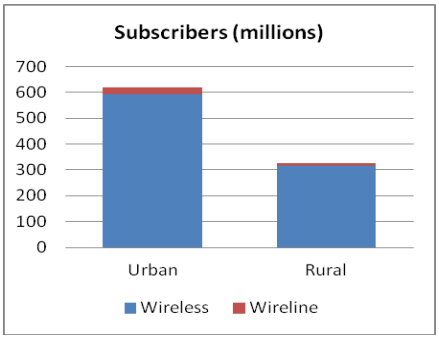


Source: TRAI, Operators, BMI India Telecommunications Report Q2 2012, p.27
e= estimate, f = forecast

As described below, the mobile telecommunications market in India is very different than the market in the United States.

A. India: An Urban Wireless Market

The Indian mobile phone market is made up of 22 service areas, often referred to as "circles." Calls between circles are categorized as long distance calls. Currently, there are 15 mobile carriers in India though not all of these carriers serve all of the geographic "circles."[11]



Source: Telecom Regulatory Authority of India, Press Release No. 72/2012, April 7, 2012, p. 1

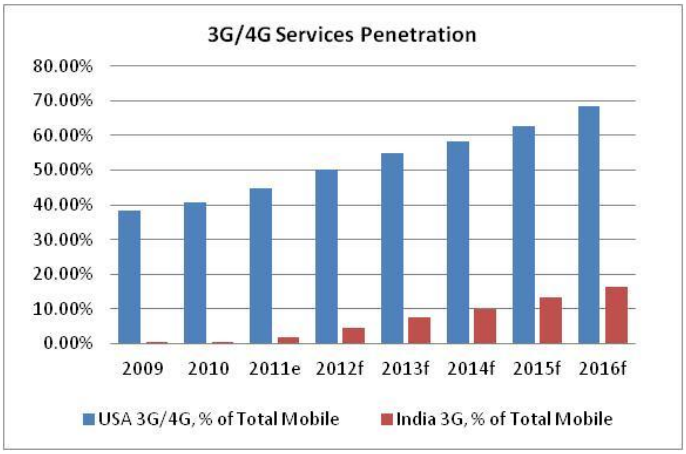
[10] *See* Telecom Regulatory Authority of India (TRAI), Annual Report 2010-11, page 4 of overview. The TRAI is the telecom regulator in India and is the source of much of the data on the telecom industry. The TRAI works closely with other governmental agencies in India, such as The Department of Telecommunications (DoT), which issues licenses and collects licensing fees from carriers.
[11] There are currently 246 circle-carrier combinations.

The subscriber base in India is predominately urban (65.20%) and mobile (96.57%) due to, among other factors, poor private and public infrastructure.[12] Only 3.43% of subscribers have wireline service, and this percentage is declining as subscribers are dropping wireline service and replacing it with mobile service.[13]

By comparison, in the United States, the number of residential wireline service connections is about 98 million (connecting about 80% of the population[14]) due to the reliable physical infrastructure that has been put in place for a significant number of years. Moreover, in the United States, the percentage of individuals who have both wireline and mobile service is also much higher than in India.

B. 2G Wireless Domination in India

In India, mobile subscribers have access to predominantly 2G services and feature phones. As depicted below, the penetration of 3G mobile phone subscribers in India is in its infancy compared to the United States market. An expansion to 3G/4G services tends to stabilize and increase ARPU. It is projected that by 2016, 3G penetration in the United States will be approximately 68% compared to about 16% in India.

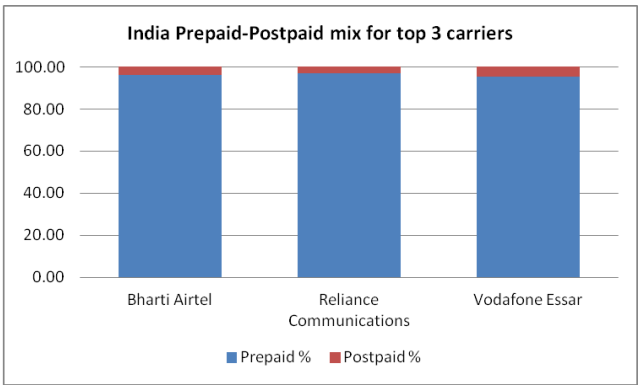


Source: Calculated from Business Monitor International, Quarter 2, 2012, India Telecommunications Report, p. 27, Business Monitor International, 2Q, 2012, United States Telecommunications Report, p. 17. e=estimate, f=forecast

[12] Calculated from data from TRAI Press Release No. 72/2012, April 7, 2012, p. 1.
[13] Business Monitor International, India Telecommunications Report, Q2, 2012, p.31.
[14] Calculated based on an average family size of 2.59 and approximately 98 million wireline service connections in the United States. *See* Business Monitor International United States Telecommunications Report, 2Q 2012, pp. 17, for wireline service connections and United States Census, 2010 for average family size. Accordingly, approximately 254 million people have access to residential wireline connections.

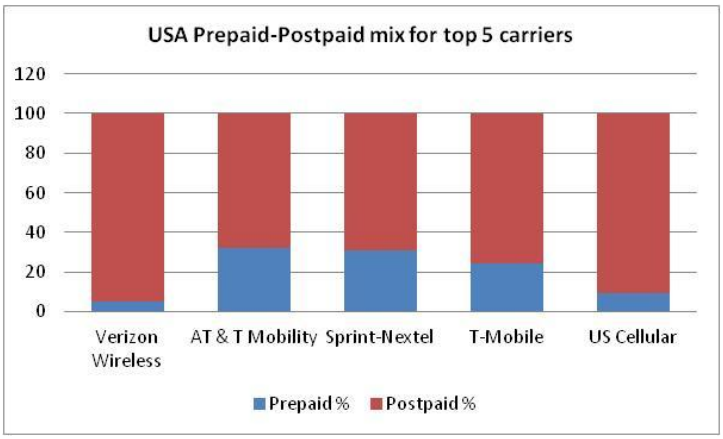
C. Prepaid Subscribers in India

In India, mobile subscribers are predominantly prepaid, typically consuming voice and SMS bundles. For GSM, which comprise nearly 87% of all subscribers, and CDMA services, the percentage of prepaid subscribers was 96.9% and 93.8%, respectively, in September 2011.[15] Mobile subscribers in India choose prepaid because they like to pay-as-they-go, are price-sensitive, and enjoy the freedom to switch carriers.



Source: Business Monitor International, India Telecommunications Report, 2Q 2012, pp. 49-51

The prepaid experience in India is in sharp contrast to the United States mobile market. In the United States, approximately 78.3% of mobile services are post-paid contracts whereby subscribers are locked into the same carrier because these service contracts often link steep discounts for mobile devices to the length of the contract. Long-term service contracts often result in low churn, high retention, and high ARPU for the carriers.



Source: Computed from Business Monitor International, United States Telecommunications Report, 2Q 2012, pp. 40-45

[15] Telecom Regulatory Authority of India, Indian Telecom Services Performance Indicators, July-September 2011, pp. 41, 46.

D. Multi-SIM Card-Enabled Devices

Unlike mobile devices in the United States, many mobile devices in India accommodate two SIM cards. Some of the newer models accommodate as many as four SIM cards, which may be a combination of GSM and CDMA technology. The growth in multi-SIM card phones has been phenomenal. In the second quarter of 2009, multi-SIM card phones were less than 1% of all handsets shipped in India, increasing to 38.5% in the second quarter of 2010.[16] In 2011, 57% of the total shipments of phone handsets were capable of holding multi-SIM cards.[17]

Subscribers in India use multiple SIM cards to facilitate switching from one carrier to another, as prepaid subscriptions terminate. In essence, multi-SIM card phones, in combination with prepaid and unlocked service, lead to low ARPU and low barriers to exit for subscribers. Their use highlights a low subscriber affinity for retaining a single phone number. In contrast to the United States market, where a phone and phone service tend to be sold as a bundled product typically by the operator, the handset and the phone service are sold unbundled in India. In addition, the United States bundled product is sold for a 'lock-in' duration; two year contracts are usual. This tends to tie the United States' subscriber to the carrier for the period of the contract.

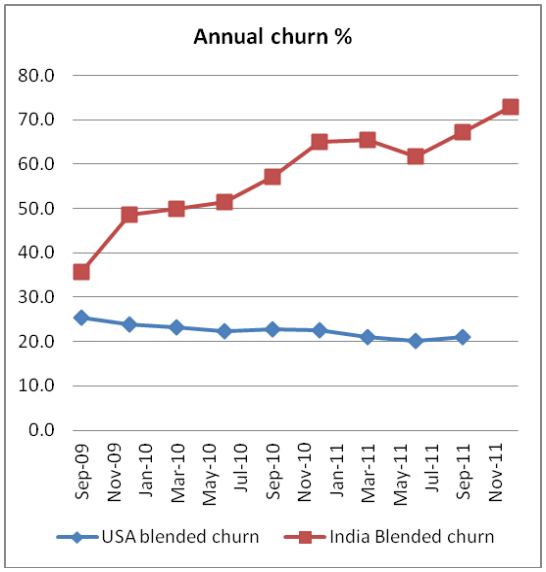
E. High Churn in India

Mobile carriers in India experience tremendous churn by subscribers every month. A key catalyst for increasing churn in India is aggressive price competition, facilitated by the large proportion of prepaid customers. The following chart depicts the monthly mobile churn for the top three and four mobile carriers in India and the United States, respectively, from September 2009 – September 2011.[18]

[16] *See ICT Statistics Newslog - Multi SIM Mobile Phones Account for 38.5% of Indian Phone Sales, available at* http://www.itu.int/ITUD/ict/newslog/Multi+SIM+Mobile+Phones+Account+For+385+Of+Indian+Phone+Sales.aspx (last visited Apr. 24, 2012).

[17] *See Indian Mobile Handsets Report [Multi-SIM handsets make up over 57% of total shipments, Smartphones only 6.2%], available at* http://www.pluggd.in/indian-mobile-handsets-report-multi-sim-handsets-make-up-over-57-of-total-shipments-297/ (last visited Apr. 24, 2012).

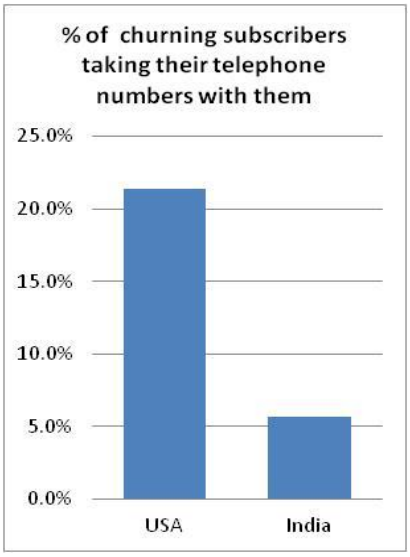
[18] Unites States annual churn is calculated by taking the weighted average of blended monthly churn of AT&T. - Business Monitor International, India Telecommunications Report, Q2 2012, pp. 49-51. Mobility, Verizon Wireless, Sprint-Nextel, and T-Mobile measured every quarter - Business Monitor International, United States Telecommunications Report, Q1 2012, pp.40-41, 43-44. India annual churn is calculated by taking the weighted average of blended monthly churn of Bharti Airtel, Reliance Communications, and Vodafone India measured every quarter



Source: Calculated from Business Monitor International, India Telecommunications Report, Q2 2012, pp. 49-51 and Business Monitor International, United States Telecommunications Report, Q1 2012, pp.40, 41, 43, 44

As an example, Bharti Airtel had an annual uncompounded churn rate of 94.8% and a compounded yearly churn rate of 149% based on the monthly churn rate of 7.9% in December 2011. This means that a carrier's whole customer base can more than turn over in a single year, although many carriers show positive net adds per year (meaning the numbers of customers leaving are replaced by churning in customers plus some more).

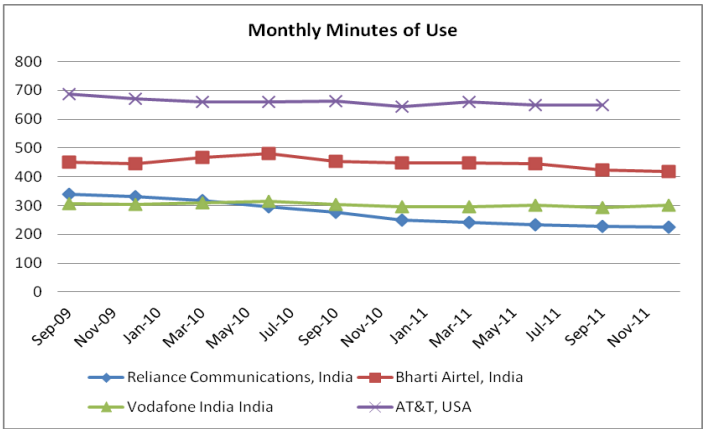
Subscribers that churn are the potential candidates for number portability, and in India, a subscriber is permitted to port their number every 90 days if they wish. However, when one looks at the proportion of churning subscribers that take their telephone numbers with them, it is evident how insignificant MNP is to the mobile subscriber in India. This appears to be a fundamental difference in how the subscribers in the two markets react to MNP. In contrast to the United States, in India subscribers are moving to new mobile carriers without taking their phone numbers with them.



Source: Calculated from TRAI Press Release 72/2012, April 7, 2012, Company sources, and blended churn of top carriers in India and Unites States

F. Minutes of Use and ARPU

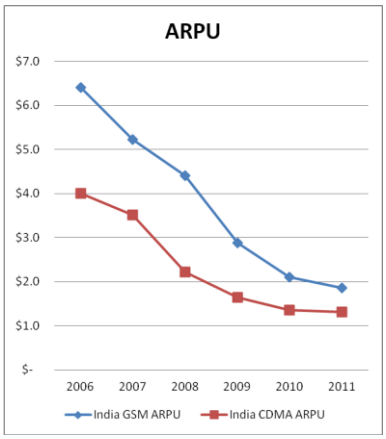
A mobile subscriber in India can prepay for service for as low as $1 and get 500 minutes of use. Mobile phone service in India only entails paying for outgoing calls (as opposed to paying for both incoming and outgoing calls as in the United States), with calls being billed by the second (as opposed to being billed by the minute in the United States). With typically shorter call durations, a $1 prepay can last for quite some time. As shown in the chart below, the average minutes of use for a typical subscriber of AT&T is about 1.5 times that of Airtel and about 2.8 times that of Reliance.



Source: Business Monitor International, India Telecommunications Report, Q2 2012, p. 49-51 Business Monitor International, United States Telecommunications Report, Q1 2012, p. 41, 46

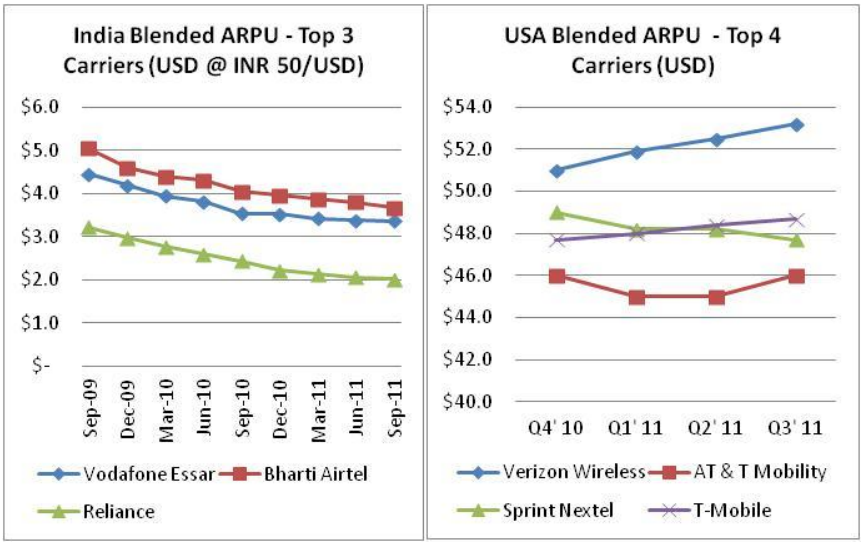
The ARPU in India has declined rapidly over the last five years - by 71% and 66% for GSM and CDMA services respectively. This is mainly due to aggressive price competition

among mobile carriers, high penetration of prepaid customers, and lack of 3G infrastructure and services.



Source: Business Monitor International, India Telecommunications Report, Q2, 2012, p. 29

In the United States, for the larger mobile carriers, ARPU has been increasing and overall the blended ARPU is approximately 16 times higher than that of the larger mobile carriers in India (using the exchange rate of 50 rupees to the dollar). This is partly attributed to subscriber adoption of data services.



Source: Computed from Business Monitor International, India Telecommunications Report, Q2, 2012, pp. 49-51 and Business Monitor International, United States Telecommunications Report, Q1 2012, p. 31

G. Summary

The preceding discussion demonstrates that the telecommunications market in India is significantly different than that in the United States. The table below highlights some of these differences.

Characteristic	**India**	**United States**
Urban Population	30.30%	82.20%
Mobile Phone Penetration	96.57%	76.67%
3G/4G Penetration by 2016	16.2%	68.3%
Prepaid Mobile Share of Phones	96.2%	21.3%
Churn Rate/Year (not compounded)	73%	21%
Number of SIM Cards/Phone	One to Four	One
Minutes of Use/Subscriber/Month	320	650
Average Revenue/User/Month	$3.10	$50
Cost to subscriber for calls	Per Second	Per Minute
Charging Model	Outgoing Only	Incoming and Outgoing

Source: *See* Appendix 2.

II. India's Mobile Number Portability System

Mobile Number Portability enables subscribers to keep their telephone numbers when switching from one mobile provider to another. MNP raises the level of competitiveness among carriers to retain their subscribers with the best network quality, price, and other offers.

By the time India fully embraced MNP, over 70 countries worldwide had already implemented portability solutions. Of all the worldwide number portability implementations, India is only one of two countries in the world where MNP is licensed to two vendors (the other being Sweden). TRAI selected Syniverse to provide MNP services in Zone 1 (North/West regions) and selected MITS, a joint venture with Telcordia (now owned by Ericsson) to provide MNP services in Zone 2 (South/East regions). After a series of delays (that were partly related to unanticipated security concerns) MNP was made available nationally on January 20, 2011.

A. Key Steps in the Mobile Number Portability Process

Subscribers cannot begin the porting process without first procuring a Universal Porting Code (UPC) from their regional MNP administrator (MITS or Syniverse), and presenting that code to their new mobile carrier. The UPC is delivered via SMS. Only upon verification of subscriber identity (which in most cases requires a photo ID) will the new mobile carrier formally initiate the porting request to the MNP administrator. The photo ID requirement and flaws in the SMS process are contributing factors that impact the success rates of MNP.[19]

Upon successful initiation of the port request, the MNP administrator orchestrates a series of information exchanges between the new and existing mobile carrier[20] to transfer the telephone number. When that is completed, the information is then downloaded to all carriers and access providers in all circles via a periodic file transfer that ultimately enables updated routing. The end-to-end process tolerates subscribers being completely out of service for up to two hours during the transition to their new mobile carrier.

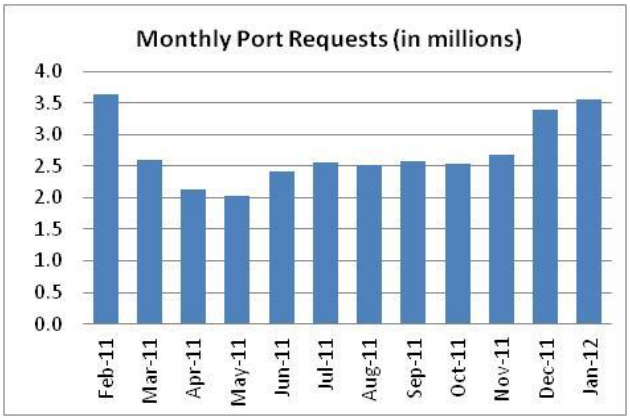
The entire process for subscribers to switch carriers is required by TRAI to be completed within seven days in most service areas[21], although evidence suggests that it has taken weeks to successfully complete switching to the new mobile carrier.

B. Slow Rollout of MNP

At the time MNP was launched, only 200,000 subscribers in all of India requested their number be moved to another carrier. In the first twelve months (from February 2011 through

[19] *See Switching operators is not that easy, available at* http://www.thehindubusinessline.com/industry-and-economy/info-tech/article3336553.ece?ref=wl_industry-and-economy (last visited Apr. 26, 2012).
[20] *See* Appendix 1.
[21] *See* http://india.gov.in/howdo/otherservice_details.php?service=29 (last visited Apr. 26, 2012).

January 2012) requests for numbers to be ported grew to 17.4 million in Zone 1 and 15.3 million in Zone 2, resulting in a cumulative port rate of 3.66%[22] far less than the TRAI projection.[23]



Source: Telecom Regulatory Authority of India, 2011 and 2012 Monthly Press Releases

While it is too early to definitively predict the growth of MNP, evidence suggests that the majority of prepaid subscribers "are not concerned about retaining their number and change between networks for short-term gains as their credits run out."[24] Once the majority of the already small post-paid pool is accounted for, this would imply low porting rates going forward. Port rates in India are expected to be low because of the low penetration of post-paid subscribers.

C. Why is MNP Not Fulfilling Industry Expectations in India?

Although MNP was recently introduced, a number of variables appear to be influencing the way MNP adoption is shaping up in India.

Subscriber, Device, and Social Factors in India

Indian subscribers frequently switch carriers to achieve better pricing. Prepaid plans with few lock-in requirements and wide adoption of multiple SIM devices have influenced the subscriber away from attaching importance to telephone numbers. Furthermore, subscribers are unlikely to wait for seven days or more to retain their telephone numbers when they can switch providers in minutes by giving up their telephone number.

[22] Calculated from Requested Ports of ~32.7 million (adjusted for over 25% rejects) and Active mobile subscriber base ~660 million as of Jan 2012. *See* TRAI Press Release 60/2012, April 7, 2012.
[23] *See TRAI Telecommunication Mobile Number Portability Per Port Transaction Charge And Dipping Charge regulations, 2009, p.14, available at* http://www.trai.gov.in/Content/RegulationUser.aspx?id=0&qid=9 (last visited May 1, 2012)
[24] *See MNP: Why The Uptake Is Slow, available at* http://www.lightreading.in/document.asp?doc_id=215867 (last visited Apr. 24, 2012).

Carrier Reject Factors and Rejected Ports

According to TRAI in a report to the Indian Parliament, 25.8 million MNP requests had been made by November 2011. Of these requests, 19 million (or 73.6%) subscribers had successful ports of their numbers to their new carrier – implying 6.8 million requests (or over 25%) had been rejected, abandoned, or not completed.[25] Mobile carriers are empowered to reject the port requests for a number of reasons. The top reasons for port rejection are incorrect unique porting code, ports requested within restricted 90 day period, and existing contractual obligations and outstanding dues.[26]

D. Subscriber Complaints

The complexity and uncertainties with the overall porting process have led to a variety of complaints by subscribers.[27] The reject rate referenced above – over 25% in the first ten months of porting – has resulted in a significant number of subscriber complaints. Furthermore, in light of subscriber complaints, the TRAI, in recent months has initiated actions, including court proceedings, against major mobile carriers to address the issue and improve the subscriber experience.[28]

[25] *See 68 lakh mobile users not been able to port numbers, available at* http://businesstoday.intoday.in/story/68-lakh-moble-users-not-been-able-to-port-numbers/1/21554.html (last visited Apr. 24, 2012).
[26] Telecom Regulatory Authority of India, Press Release No. 16/2011, March 9, 2011, p. 2.
[27] *See Mobile Number Portability Complaints-TRAI to* intervene**,** available *at* http://www.techlineinfo.com/mobile-number-portability-complaints-trai-to-intervene/ (last visited Apr. 24, 2012); *TRAI Gets Maximum MNP Rejection Complaints Against Airtel, available at* http://telecomtalk.info/trai-gets-maximum-mnp-rejection-complaints-against-airtel/83686/ (last visited Apr. 24, 2012).
[28] *See TRAI drags three telco bigwigs to court, available at* http://indiatoday.intoday.in/story/trai-drags-three-telco-bigwigs-to-court/1/178894.html (last visited Apr. 26, 2012); *TRAI moves court against Airtel, Idea, Loop, available at* http://timesofindia.indiatimes.com/business/india-business/Trai-moves-court-against-Airtel-Idea-Loop/articleshow/12362217.cms (last visited Apr. 26, 2012).

III. Comparison of Number Portability in the United States and India

The MNP environment for the United States is significantly different from that in India. The combination of market saturation, a large post-paid subscriber base, and a consumer-focused legislative mandate has created high affinity for consumers and businesses with respect to their telephone numbers (as evidenced by comparably high port-to-churn ratios). Noting this, and recognizing that disruptions in portability have a significant impact on competition, the United States communications industry, in cooperation with the FCC, has placed a high premium on the porting experience. For example:

- Number portability in the United States can span network technologies, allowing customers to transfer their telephone numbers at will between fixed, mobile, and VoIP carriers.
- Mobile and simple fixed line ports are completed in the United States within a single day or less, and, in the vast majority of cases, there is zero service disruption when a number ports to a new carrier (as contrasted with the "break before you make" paradigm in the India market).
- The portability infrastructure in the United States is also used to preserve national numbering resources, as the registry can be used to engender more efficient utilization of large number ranges.
- The United States registry is also used by service providers to perform important network management activities (*i.e.*, technology migrations, load balancing, and emergency preparedness/disaster recovery).

The United States portability environment is governed in an ongoing fashion by a series of technical and policy committees ultimately answerable to the FCC. These committees (the Local Number Portability Working Group and the North American Numbering Council) are designed from the ground up to be transparent and open to all parties with a role to play in LNP – notably service providers, software and network vendors, consumer advocacy groups, and state/federal regulators. The goals of these consortia are to maintain a high level of operational performance, flexibility, and neutrality with regard to number portability, and to ensure that innovations in the communications market are proactively reflected in the porting experience itself.

In India, competition in communications is driven by a relentless drive for incrementally lower pricing. It appears therefore that many of the items that receive a high level of focus in the United States (*e.g.*, a rapid and reliable porting experience, flexibility for carriers, a growth-focused architecture) may be less critical for India, which leads to different priorities for the regulator and service providers in India. Many decisions related to the deployment of MNP, including, but not limited to the reliance on multiple LNP administrators, also reflect the fact that performance and innovation are not the highest driving concerns.

Conclusion

Communications markets are not the same worldwide, and the experience of one communications market with portability is not likely to produce anything transferable to another market. The United States and India are both large democracies with growing telecom markets, but the factors which drive a successful mobile number portability experience could not be more distinct between the two countries. Therefore, regulators and service providers should rely solely on the characteristics of their respective markets when making decisions regarding number portability in the future.

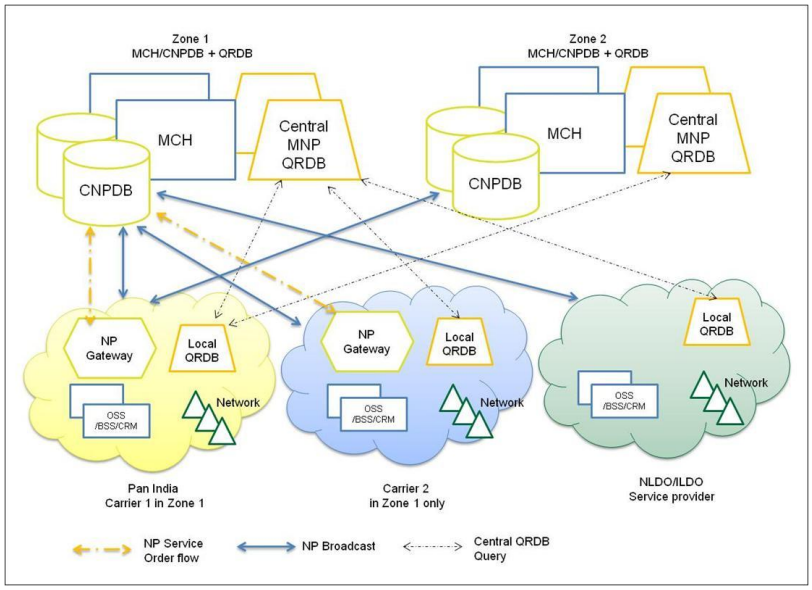
Appendix 1

MNP Architecture

India implemented the centralized MNP architecture with All Call Query/Direct routing capability. All Unified Access Services Licensee carriers (UASLs/Cellular Mobile Service Providers (CMSPs) have implemented MNP, *i.e.*, support the porting of mobile numbers between mobile carriers and route calls to ported numbers. All other access providers and long distance (national and international) carriers support the routing of calls to ported numbers.

Number Porting Clearinghouse Architecture

MNP in India is implemented as a clearinghouse architecture (MCH-Mobile Number Portability Clearinghouse) that allows porting requests to be processed between the donor and recipient mobile carriers within circles (intra circle porting) in each of the two zones. The clearinghouse supports port ordering, processing, notification, and administration of ported numbers between mobile carriers.



Source: D.O.T, TRAI India

A database (NPDB) serves as the repository of the resulting porting information in India. It stores information regarding porting history, *i.e.*, statistical summaries of ports initiated, ports completed, and ports rejected for tracking, auditing, and accounting purposes. The database service also includes providing the download of ported numbers and their associated routing information to all UASLs and CMSPs The NPDBs provide downloads as per specified times. For a new carrier, complete downloads are provided via file transfer while for those carriers who have downloaded the database earlier, incremental database updates are provided via file transfer upon request. Other telecom ecosystem players such as application and content providers get

downloads of ported numbers and associated routing information in order to deliver their services to subscribers.

There are two MCH/NPDB pairs in India, one each for the North/West zone and the South/East zone. Each licensed vendor also administers and operates an online disaster recovery site of this NP clearinghouse/data base at a separate geographic site located in a different seismic zone.

A MNP Query Response Database (QRDB) System, which is a real-time database for each zone with number portability corrected routing data, is additionally provided to allow access providers to query during call setup to get the routing number of the recipient carrier based on the dialed number.

Number Portability Operator Gateway

The Number Portability Operator Gateway (Gateway) is a carrier based workflow system for processing and managing MNP port transactions with the clearinghouse and carrier back-end systems, *e.g.*, order and provisioning systems. The Gateways accept port requests, passes them on to the clearinghouse, and coordinates ported number updates from the clearinghouse to back-end systems in the carrier's network. The Gateway also provides management and reporting functions to allow the carrier to monitor the porting process flows. Gateways are licensed to the carriers by vendors including Telcordia (now owned by Ericsson), Syniverse, and Huawei, among others. All the carriers and access providers have local databases (QRDB) available in their networks that are near replica images of the query number portability database. For ensuring correct routing of calls to ported numbers, the carriers query their respective local database. The database download is provided by the central Number Portability database.

Port Activation

The porting type in India follows the "Break before Make" rule, *i.e.*, the donor carrier stops serving the subscriber once the port negotiation is completed and after which the recipient carrier will start serving the subscriber. The process tolerates the subscribers being out of service for up to two hours during the transition to their new mobile carrier.

Call Routing

All mobile, international, and national long distance carriers that deliver calls to MNP circles implement direct routing, *i.e.*, the all call query method, to route calls to ported numbers. Unique carriers codes (a Local Routing Number-LRN) are provided by the Indian Department of Telecommunication to enable call routing to ported numbers. This unique routing number (RN), assigned to each access services carrier, enables routing to the ported number.

Each mobile carrier maintains their own local database query system for which downloads are provided by the central database system in predefined time windows. The wireline carriers/national long distance carriers (NLDC)/international long distance carriers

(ILDC) have the option to either maintain their own local databases or use the central number portability database online for the routing of each and every call.

Appendix 2

India and United States Telecom Market - Differences

Characteristic	India	United States
Urban Population	30.30%[i]	82.20%[ii]
Mobile Phone Penetration	96.57%[iii]	76.67%[iv]
3G/4G Penetration 2016	16.2%[v]	68.3%[vi]
Prepaid Mobile Share of Phones	96.2%[vii]	21.3%[viii]
Churn Rate/Year (not compounded)	73%[ix]	21%[x]
Number of SIM Cards/Phone	One to Four[xi]	One
Minutes of Use/Subscriber/Month	320[xii]	650[xiii]
Average Revenue/User/Month	$3.10[xiv]	$50 [xv]
Cost to subscriber for calls	Per Second[xvi]	Per Minute
Charging Model	Outgoing Only[xvii]	Incoming and Outgoing

[i] BMI, India Telecommunications Report, 2Q 2012, p. 129, 2010 data.

[ii] BMI, United States Telecommunications Report, 2Q 2012, p. 85, 2010 data.

[iii] Calculated from TRAI Press Release, No. 72/2012, April 7, 2012, p. 1.
Wireless Subscribers/ (# Wireless + # Wireline Subscribers) = 911.17M/943.49M = 96.57%

[iv] Calculated from BMI, United States Telecommunications Report, 2Q 2012 pp. 17, 19 (2011 estimate).
Wireless Subscribers/(# Wireless + # Wireline Subscribers) = 322,490,000/420,600,000 = 76.67%.

[v] Calculated from BMI, India Telecommunications Report, 2Q 2012, p. 27.
#3G Subscribers/#Total Subscribers = 182,560,000/1,127,700,000 = 16.2%.

[vi] BMI, United States Telecommunications Report, 2Q 2012, p. 17.

[vii] Calculated from BMI, India Telecommunications Report, 2Q 2012, pp. 49-51.
#Prepaid Subscribers/#Subscribers for Bharti Airtel, Reliance Communications, and Vodafone India = 455,536,000 /473,479,000 = 96.2%,

[viii] Calculated from BMI, United States Telecommunications Report, 2Q 2012, pp. 40-45.
#Prepaid Subscribers/(#Prepaid Subscribers + Postpaid Subscribers) for Verizon Wireless, AT&T Mobility, Sprint-Nextel, T-Mobile, and US Cellular = 59,311,000/218,617,000 = 21.3%.

[ix] Calculated from BMI, India Telecommunications Report, 2Q 2012, pp. 49-51.
Weighted Average = 6.07% x 12 = 72.9%, calculated as a subscriber weighted average of the monthly churn rates (times 12) of mobile subscriber shares of Bharti Airtel, Reliance Communications, and Vodafone India.

[x] Calculated from BMI, United States Telecommunications Report, 2Q 2012, at pp. 40-43.
Weighted average = 1.73% x 12 = 20.8%, calculated as a subscriber weighted average of the monthly churn rates of Verizon Wireless, AT&T Mobility, Sprint-Nextel, and T-Mobile.

[xi] *See Indian Mobile Handsets Report, available at* http://www.pluggd.in/indian-mobile-handsets-report-multi-sim-handsets-make-up-over-57-of-total-shipments-297/ (last visited Apr. 26, 2012).

[xii] Calculated from BMI, India Telecommunications Report, 2Q 2012, pp. 49-51.
Weighted Average = 320.4 , calculated as a subscriber weighted average of monthly minutes of use/subscriber of the mobile subscriber shares of Bharti Airtel, Reliance Communications, and Vodafone India

[xiii] BMI, United States Telecommunications Report, 2Q 2012, p. 41.
AT&T Mobility monthly minutes = 650 per subscriber

[xiv] Calculated from BMI, India Telecommunications Report, 2Q 2012, pp. 49-51.
Weighted Average = 155.05/50 = $3.10 Calculated as a subscriber weighted average of ARPUs (divided by 50 rupees per dollar exchange rate) of the mobile subscriber shares of Bharti Airtel, Reliance Communications, and Vodafone India

[xv] BMI, United States Telecommunications Report, 2Q 2012, pp. 40-43.
Weighted Average = $49.90, calculated as a subscriber weighted average of the ARPUs of Verizon Wireless, AT&T Mobility, Sprint-Nextel, and T-Mobile.

[xvi] *See TRAI makes per second billing mandatory, available at* http://articles.economictimes.indiatimes.com/2012-04-20/news/31373933_1_second-billing-tariff-plan-service-providers (last visited Apr. 26, 2012).

[xvii] *See TRAI Telecommunication Interconnection Regulation 1999, available* at http://www.dot.gov.in/Acts/legislation/17sep99.pdf - Annexure A (last visited, Apr. 26, 2012).