Broadband in India: Strategic investment opportunities

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Abstract

India is one of the top five mobile communications markets in the world. A wave of structural reforms in the Indian telecommunications industry during the past decade has fueled this growth. Following the introduction of competition, removal of entry barriers, and increasing foreign direct investment, the mobile sector has enjoyed unparalleled success. In contrast, broadband Internet services have not witnessed similar development, and the spread of broadband services in India is slow compared to some of the developing nations in the same region. This paper outlines the success factors (social, economic, and technological) that have contributed to the growth of the mobile communications industry. Based on its success, this paper proposes strategic investment opportunities for service providers, governments, and corporate organizations in the field of broadband services. It also touches on major areas that are outside the telecom arena but contribute to its success.

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1. Introduction

Broadband Internet services have been labeled as one of the major catalysts for growth of the economy, infrastructure, and Internet traffic of a country [1–7]. Due to the interconnected nature of a country’s information superhighway, the development and deployment of information and communication technologies are crucial for increasing and improving awareness and productivity [8,9]. With newer technologies and improving telecommunications infrastructure, domestic market segments are becoming part of small businesses, enterprises, and government markets. This is enabling close collaboration between previously loosely bound entities to provide a plethora of services connecting more communities socially as well as technologically.

India is one of the leading emerging markets in the world today [10]. Developed economies view India as a major destination for offshore research and development (R&D). Companies want to invest in setting up R&D initiatives in telecommunications, automobiles, software development, business processing outsourcing...
(BPO), and knowledge process outsourcing (KPO) [10]. In the last decade, the Indian economy has grown at a rapid pace, posting an average growth rate of 7% since 1994; in 2004–2005, the growth rate was 7.5% [11].

India is one of the first countries to benefit from telecommunication services [12]. The Telegraph Act of 1885 was a major milestone in the history of Indian telecommunications, and since that time India’s telecom industry has continued to adopt new technologies. Nevertheless, the adoption and proliferation of telecom services has always lagged behind other developing countries. This can be attributed to many reasons, but a few stand out, such as war with other nations, and strict monopolistic rules and regulations concerning telecommunications. These regulations hampered the provision of basic telephony services and failed to connect communities as well as rural areas to urban centers. According to Dyanidhi Maran, Minister of Communications and IT for India, it is expected that by the end of 2007, there will be 250 million telephone lines (fixed and mobile) in India, with a teledensity of 22% [13]. India has become the fifth largest telephone network in the world, behind China, the US, Japan, and Germany [13].

It was not until 1990 that the Department of Telecommunications (DOT) began purchasing new digital equipment and was able to add new phone lines. Demand has always overwhelmed supply, but this was the first ray of growth in the telecom sector. The government realized that telecommunications services contribute to economic growth whether a country is developed or developing. This changed outlook occurred as the government adopted ideas for reforms, with the objective of putting India on the world map as a hub of business opportunities. To achieve these objectives, the government undertook several initiatives: streamlined the foreign direct investment (FDI) process; worked to attract FDI in industries like telecommunications, software, and electronics; opened new investment avenues; created software technology parks; and identified new profitable sectors. These efforts ensured that India would become part of the global economy.

The Indian telecom market has three major policies: National Telecom Policy 1994 (NTP ’94), National Telecom Policy 1999 (NTP ’99), and Broadband Policy 2004 [14–16]. With the implementation of NTP ’94, the government embarked on improving India’s infrastructure, competitiveness, exports, and its attractiveness to foreign investors via growth in telecommunications [15]. When the NTP ’94 policy was tabled, telephone density in India was approximately 0.8 per 100 people, compared with the world average of 10, and lower than neighboring China, Pakistan, and Malaysia [15].

An important point to consider is that until NTP ’99, the government did not recognize the relationship between telecommunication infrastructure development and social and economic growth of the country. When the intended results were not achieved, the government began to realize the importance of telecom services; also that its policies should be forward-looking. They were meant not only for the development of the IT industry but were intended to have widespread impact on the entire country.

When setbacks and obstacles arose, the government decided to revisit its telecom policy framework and out of that desire arose the new National Telecom Policy (NTP ’99). For the first time in the history of Indian telecom, the government welcomed corporate involvement in providing paging services, cellular mobile telephone services (CMPTS), and later, fixed telephone services (FTS). In addition, 100% of FDI was allowed when providing Internet services. With NTP ’99, the government decided to separate policy from licensing and service provisions, as a precursor to corporatizing [16,17]. Table 1 summarizes the achievements of NTP ’99.

These policies helped India to engage competitively in the information highway market and to increase somewhat the penetration of telecom services. However, penetration still lags far behind major developing economies. In the last 50 years, the total teledensity growth rate has been 1.92% [18,19]. According to TRAI’s press release of 10 April 2006, the gross number of telecom subscribers reached 140 million, of which fixed subscribers were 49.5 million and mobile subscribers 90 million [20]. At that point, teledensity had reached 12.73% [20]. But considering India’s population, this is not a high percentage (1.02 billion, according to Census 2001 [21]). Nonetheless, it is a sign of expected future growth with an objective of bridging societies. This was made possible due to forward-looking initiatives undertaken by government and regulatory bodies.

Internet services in India were launched and operated in 1995 by centrally owned Videsh Sanchar Nigam Limited (VSNL) [22]. In 1998, the government gave licenses to private operators to offer Internet services in India. The DOT provides licenses for provisioning of Internet services. Internet service providers (ISPs) are categorized into three groups: Group A operators can provide services all over India; Group B operators are limited to state and specific metro areas only; and Group C provides services for medium and small cities throughout the country [22]. According to TRAI June 2006 report, at the end of second quarter, 153 ISPs were
operational. At the end of September 2006, the Internet subscriber base reached 8.10 million [25]. The majority of broadband subscribers are located in large urban areas where telecommunications infrastructure is well-positioned. This was possible due to the existence of more than 10,000 cyber-cafes and an increase in leased lines connections (11,547 for quarter ending June 2005 [24]). Table 2 shows the market structure of top five ISPs in India.

It has been argued and proved by researchers that diffusion of Internet service has a profound impact on the growth of an economy and associated societies [26]. In India, Internet services have not experienced high growth rates as compared to the proliferation of fixed and mobile services. Based on a recent TRAI press release, total Internet connections in India reached 6.8 million, and total broadband connections (>256 kbps) reached 1.3 million [20]. Simultaneously, according to the 17th Survey Report on Internet development in China, published in January 2006 [27], total Internet connections in China reached 111 million [28]. Breaking it down in terms of access methods, approximately 29.1 million use leased lines, 51 millions use dial-up, and 63 millions use broadband. Considering the fact that India and China are the fastest growing economies, and rivals in the IT and IT-related sectors, China is ahead in terms of proliferation of Internet services and has been successful in networking societies.

The goal of the paper is to learn from the explosive growth in the Indian mobile sector and identify key areas and strategic investment opportunities in the Indian telecom landscape to usher in the widespread acceptance of broadband services.

2. Mobile market in India

Cellular services were launched in India in the early 1990s under a fixed license-fee regime for 10 years [29]. Initial licenses were provided in major metro areas under a duopoly market structure. With the introduction of privatization and other liberal approaches, 19 licenses were granted by the government of India in 1995 [29].
With NTP ’99, the involvement of the private sector and FDI were deemed necessary. The cellular market and its related sectors opened up; licenses were issued to 8 Cellular Mobile Telephone Services (CMTS) operators in 4 metro areas; 14 CMTS operators in 18 state circles; 6 BTS operators in 6 state circles; and licenses to paging operators in 27 cities across 18 states circles. Under the NTP ’99 framework, Cellular Mobile Service Provider (CMPS), Fixed Service Providers (FSP), and Cable Service Providers are referred to as “Access Providers” [16]. The FSP was permitted to establish “last-mile” linkages to provide fixed services and carry long-distance traffic within its service area without seeking additional licenses. Furthermore, CMPS is permitted to provide last-mile linkages and switched services within its service areas of operation and to operate media services, which are essentially one-way, entertainment-related services.

According to Cellular Operators Association of India (COAI), the Indian mobile market has recorded unparalleled growth in the last decade. Mobile subscriptions have grown from 1.5 million subscribers in 1999 to 101.17 million as of May 2006 [31]. According to TRAI’s June 2006 report, over 4 million subscribers are added to the network every month [32].

Critical success indicators such as employment, competition, revenues, network coverage, and tariff trends are some of the factors that our research indicates have contributed to the success of the mobile sector. These critical success factors are discussed below.

2.1. Critical success factors

2.1.1. Employment

Growth in the telecom sector has created employment opportunities. According to TRAI’s March 2006 report, 429,400 jobs directly related to the telecom sector were generated. Furthermore, at the end of 2005, one public sector employee has been employed per 158 subscribers as compared to 1678 for the private sector [33].

2.1.2. Competition

The Indian mobile market has moved from a duopoly market structure to a competitive market. Currently, there are at least four service providers in the market providing mobile services (voice and data). According to TRAI’s 2006 report, the Indian mobile market is more competitive compared to the Chinese market [33].

2.1.3. Gross domestic product (GDP)

The Indian telecom sector contributes 2.71% to the total GDP [33].

2.1.4. Revenues

The public sector telecommunications companies contributed 52% to the government as compared to 40% contributed by private sector companies during 2005–2006 [33].

2.1.5. Foreign direct investment (FDI)

Research shows that FDI inflow is strongly associated with telecommunications growth. In the case of India, FDI has been the major contributor to teledensity. One of the initiatives has been to raise the FDI ceiling in telecom from 49% to 74% in basic, cellular, and related services [34,35]. One hundred percent FDI investment in telecom equipment manufacturing is now allowed [34,35]. As of September 2005, total FDI-approved investment for the telecom sector was Rs 41,551 crore. As of January 2006, the telecom sector attracted 4.68% of the total FDI (inflow) [34,35].

2.1.6. Capital investment

The telecom sector registered a total investment of Rs 200,666 crore in 2005–2006. Government companies contributed 64% and the rest came from private companies. Furthermore, in mobile services, capital employed per subscriber stood at $147 [33].
2.1.7. **Tariff trends**

According to the Economic Survey Report of 2005–2006, for cellular services the minimum effective charge for a local call has dropped from Rs 2.37 per minute in June 2003 to Rs 1.20 per minute at the end of September 2005 [34,35].

2.1.8. **Network coverage**

According to COAI’s 2005 annual report [36], cellular services were available in 5000 cities and towns and over 100,000 villages across the country.

2.1.9. **Mobile phones versus fixed phones**

Mobile subscribers have outnumbered fixed-line subscribers by almost two to one. According to TRAI’s 9 June 2006 press release [31], total fixed-line subscribers were 47.40 million and mobile subscribers exceeded 100 million. This is largely due to the mobile sector registering continuous steady growth, offering cheaper services, increased affordability, greater choice in selection of service provider, easy availability of handsets, and local manufacturing of handsets. Mobile phones are convenient to use, offer higher mobility, and privacy. The boom in IT and IT-related fields has led to professionals preferring mobile services over fixed phones. Furthermore, the availability of handsets from so-called gray markets has also helped to drive down the cost of handsets.

Second, with the big markets (Europe, USA) reaching a saturation level, handset manufacturers find emerging markets key drivers of the industry [37]. This has ensured the customer has higher bargaining power, lowering the cost of phones.

The above-mentioned factors are critical elements that have contributed to India’s unparalleled and continuous growth. However, for a nascent market like India, there are still some obstacles that have to be overcome to maximize the benefits of technology.

3. **Strategic investment and growth opportunities**

To maintain growth in mobile services and its related sectors, operators, governments, and entrepreneurs have to think about investing in strategic markets. With the presence of multiple mobile service providers in urban markets, growth will reach a stabilizing point. According to a recent report, recent growth in mobile services was led mainly by CDMA operators while GSM service was flat [38]. The report also observed that current average revenue generated by broadband services is barely enough to sustain wireless service providers [39].

Nowadays, mobile phones are not used only for voice communications. The impact of wireless technologies is far-reaching in its ability to connect societies. For example, wireless technologies make it possible to exchange data in real time over wireless networks. Wireless technologies offer cost-effective alternative to wired technologies; in countries where wired networks are not well positioned, wireless networks offer cheaper infrastructure, faster deployment, and the possibility of integrating voice and data services to resolve coverage issues. In India, where Internet penetration rates are low compared to China, South Korea, and Japan, wireless technologies can usher in further growth in the broadband arena.

Based on our research and private conversations held with engineers, brokerage firms, and market analysts in India, we suggest five key investment areas that would enhance broadband acceptance.

3.1. **Rural telecommunications**

Several studies have shown how telecommunications facilitate bridging in society [23,26]. India is no exception. Seventy percent of the population resides in rural areas, and these markets present challenges for growth and investment opportunities. With NTP ‘94, the government set forth clear objectives to provide telecommunications services for and within the reach of all, to achieve universal service covering all villages as early as possible, and to provide a range of products and services to customers at a reasonable price [15]. However, by the end of 1997, only 310,000 villages were connected compared to the target of 600,000. NTP ‘99 set revised targets so that by 2002, 522,000 villages had voice capability out of 607,000 villages [16]. But
targeted rural teledensity was not achieved. According to TRAI’s June 2006 report [42], market share of private operators in rural Direct Exchange Lines (DELs) is approximately 0.37% as compared to that of the incumbent operator (Bharat Sanchar Nigam Ltd.), which is 99.63%. At the end of March 2006, approximately 91% of the 607,000 villages were provided with Village Public Telephone (VPTs).

These facts call for more comprehensive rural development, with greater and more active participation from both the public and private sectors. As of September 30, 2006, the total rural DELs stood at 12.56 million, but this pales in comparison to the 27.92 million DELs in urban areas [25]. Thus, service provision has been quite uneven, especially since the vast majority of India’s population resides in rural areas. As of December 2005, fixed lines were provided by five licensed private operators in addition to BSNL and MTNL, with BSNL having an all-India presence and others operating in select states. However, BSNL has a 1.6 million waiting list for fixed lines and 1.35 million customers waiting for mobiles [43]. This calls for greater focus on using alternative technologies such as wireless to help connect remote areas—where provisioning of services using traditional means are not viable—to urban centers. Second, collaboration between public and private operators should be established in order to provide more services.

As of September 2006, there were as many as 10 projects in operation, all run by the government, non-profit organizations, and corporate companies to increase telecom penetration in rural areas. Some of the key projects are ITC e-Chaupal, N-Lounge, MS Swaminathan Center in Pondicherry, Akshaya in Kerala, Gyaandoot in Madhya Pradesh with focus on e-governance, Bhoomi in Karnataka, E-server in Godavari district in Andhra Pradesh, Warana in Maharashtra by NIC, Aksh Broadband, and Jagriti in Punjab. Common to all of these is the use of satellite services, microwave, fiber connectivity, or a combination of these technologies. According to a TRAI report on “Growth of Telecom Services in Rural India (2004),” these models may not be sustainable on their own if implemented countrywide.

Undertaking large-scale investment in rural telecom offers enormous challenges to investors, given the uncertainties of return on investment and future growth rates. Therefore, a more cohesive business model is needed to ensure the sustainability of current and future projects. In today’s competitive telecommunications market, interdependency among market players is inevitable. Thus, we advocate the idea of exploring a public–private partnership model in which operators would share the cost of building the network. The downside to this approach, however, is that competition will be reduced. But with urban markets stabilizing, average revenue per user reducing, and operators offering various promotions to lure subscribers, most operators will be fighting for a decreasing margin of profits. In the near future, to ensure larger growth potential, the possibility of providing new markets, new services, and access to more customers makes a public–private business model highly desirable. Providing connections and devices is not the end in itself; active development of knowledge-based content for rural markets is key to increasing acceptance among rural Indians. Such a model would put the requisite developed infrastructure in place to function optimally. Today, the sole objective of mobile service providers can be summed up in this statement: “Access to Customers is the Key to Success.” It is said that success in the Indian market is volume-driven, not deployment-driven [39].

3.2. Community/public wireless networks

With the availability of several terrestrial and satellite-based solutions, potential service providers have a wider array of technologies to choose from based on the target audience. Cellular technologies have existed for more than two decades, and have matured from providing only voice solutions to now being able to support applications supported by wireline technologies. In India, wireless subscribers now exceed the number of wireline subscribers [20]. Cellular technologies offer mobility, low-cost handsets, innovative pricing schemes, and most important, the availability of choice among service providers. This is possible because of competition in the market. According to Gartner Research [44], India’s wireless voice revenues will reach Rs 82,321.4 crore, while wireless data revenues will reach Rs 27,021.4 crore by 2010. Furthermore, according to Outlook Business-ACNielsen 2006 survey [44], 60% of respondents indicate they are looking to invest in the wireless sector over the next 2 years.

In India, leading Internet service providers Sify, BSNL, Pronto Networks, and Dishnet Wireless have setup Wi-Fi networks in airports, coffee shops, and other locations in metropolitan areas. For example, WiFiNet [45] has installed a city-wide Wi-Fi network in Mysore, the largest Wi-Fi hotspot center in India with coverage
of 130 km². Intel has teamed up with Pune municipality in an initiative to provide a city-wide Wi-Fi network of 400 km² [46]. Creation of community wireless networks through a mix of technologies, providers, government, and societies can reap faster results.

Service providers can react quickly to demand and provide services to housing, community centers, enterprise markets, corporations, and they can roll out networks in crowded business areas where it is difficult to lay wired solutions. For societies, this can lead to greater interaction among communities, enhanced educational benefits, increased availability of critical information, and, most important, a broadening of the society’s horizon.

3.3. Enterprise markets

Wireless data services have become an important source of revenue for service providers. Benefits associated with wireless data services for the enterprise market are gaining importance. In developed countries, enterprises have adopted the services to improve productivity, efficiency, and communications. They also have helped organizations to realize a wire-free world and reduce the capital expenditure needed to maintain wired networks. In India, companies located in software/technology parks frequently adopt wireless technologies for business. With the inherent benefits associated with wireless technologies, companies can streamline the flow of business information and increase interactions among employees. For example, LG Electronics India has installed a Wi-Fi network in one of its manufacturing plants, which in turn has helped the company to improve productivity and efficiency [47]. Enterprises can either build their own private network or lease the services from a service provider who provides enterprise solutions, which also helps companies reduce capital and operational expenses.

3.4. Development of local manufacturing units

Infrastructure is necessary for the economic development of the country. According to the Economic Survey of India 2005–2006, an infrastructure deficit continues to haunt India [35]. It has been estimated that India has the potential to absorb US$150 billion of FDI in the next 5 years in the infrastructure sector alone [35]. As far as the telecommunications sector is concerned, the FDI cap has been raised from 49% to 74% in certain areas such as basic, cellular, unified access services, national/international long distances, VSAT, and PMRTS [35]. FDI up to 74% is also allowed in the areas of Internet services with gateways, infrastructure providers (Category II), and radio paging services [35]. A total of Rs 41,551 crore FDI was approved for the telecom sector through September 2005 [35]. Furthermore, since the first 5-year national plan in 1951, the government has allocated an average of 3.5% of national outlays to the communications industry [48]. From August 1991 to September 2005, the telecommunications sector has attracted a cumulative inflow of Rs 12,076 crore (US $2863 million), which amounts to 9.60% of the total FDI inflows, although less than the electrical equipment sector (16.62%) [35]. Between August 1991 and August 2004, looking at service/item actual inflows of FDI into the telecom sector, cellular mobile telephone services have attracted 28.87%, holding companies 47.13%, basic telephony services 3.83%, manufacturing & consultancy 15.36%, and cable TV network and internet 1.69% [48].

From 1993–1994 to 2005–2006, the production of telephone instruments in India stands at 4.84 million [48], which means not enough equipment is being manufactured to meet demand. Having indigenous equipment manufacturers would help reduce equipment costs as well as monthly rental costs, ensure faster delivery of goods, improve quality of services, and overall, increase the faith of consumers who buy the goods.

3.5. Content, software, and security solution providers

Since the evolution of mobile services, voice service has been the major source of revenue for operators in developed and developing markets. The important differentiating factor in services is going to be application content. In the future, especially in nascent markets like India, providing data content over wireless networks is critical. In a developing market, building infrastructure will not alone suffice to achieve the proliferation of broadband services. The application/content riding over the network holds the key to the future.
According to a National Association of Software and Service Companies (NASSCOM) report on Internet users, subscribers, and PC sales, India had approximately 12 personal computers per 1000 people as of March 2005 [51]. In the case of user-to-subscriber ratio, there were 13 users per business (48 million users) and 1.5 users per household (4.4 million users), totaling approximately 53 million users. Considering India’s population of more than 1 billion, these numbers indicate that computer awareness is low. This reiterates the need for creation not only of computer awareness but also development of local content. Operators should consider collaborating with content providers to develop applications tailored for various user segments. In one example, collaboration between Cingular Wireless USA and media provider Motricity helped Cingular increase its mobile games services by 25% [49].

With regard to broadband services for the mobile user segment, operators could develop gaming, video streaming, video pictures, location-based services, transit information, banking, and other value-added services, thus benefiting users as well as the operator. In the home-user segment, people can access a wealth of information through the Internet with the establishment of wireless networks.

4. Social challenges

For sustained economic growth, education, health, and quality of life are very important.

India’s key advantage is the availability of skilled, intelligent, cost-effective manpower, and a large English-speaking community. The Indian software industry is an excellent example. Some of the key statistics of India’s ICT manpower are the following [50]:

- The IT and ITES-BPO industry employs more than 800,000 professionals in companies related to software exports, software-domestic, software-captive in user organizations, and ITES-BPO.
- The overall median age of the software professional is about 27.5 years.
- Eighty-one percent of all software professionals have graduate or higher degrees: 13% are M.Tech, MBA, CA, ICWAs, 67% are B.Tech, BE or MCA, 20% are diploma-holders or graduates [51].

But these professionals can be found only in areas where employment opportunities are plentiful, infrastructure is well-developed, and business opportunities are abundant—cities such as Mumbai, Bangalore, Delhi, Noida, Calcutta, and Pune.

The United Nations Development Program’s global Human Development Report for 2005 ranks India 127th out of 177 countries in terms of the composite Human Development Index (HDI) for 2003 [52]. According to Census 2001 results, India registered a literacy rate of 64.84%. For a country with a population of more than a billion, this is not a bad indicator, but the country lags behind China’s literacy rate of 95.1% [21,54]. Furthermore, only 9–13% of total country expenditures have been devoted to education [48]. This can be attributed to the fact that the social sector falls within each state’s portfolio and not under the central government. According to results of the 60th round of NSSO survey (January–June 2004), about 72% of households are in rural India, and they accounted for nearly 75% of the total population. In rural areas, about 66% of usually employed males and 84% of usually employed females are engaged in the agricultural sector [35].

Empowering villages with broadband services can have cascading effects. Broadband will ensure that the agricultural community will have faster access to information for issues related to crops. Broadband can help farmers to learn newer technologies and farming methodologies, which would help increase productivity. Broadband can facilitate improved communications with government agencies, buyers, and dealers [30]. To ensure that these requirements are achieved, the agricultural community needs to be educated to take advantage of broadband.

Arming academic institutions with broadband connection would facilitate better communication and information exchange between administration, teachers, and students [9].

In the support of these arguments, a recent study titled “The Strength of Internet Ties” suggested that Internet and e-mail aids in maintaining social networks and helping people deal with major decisions [26]. It said: “The Internet creates a new base for community. Rather than relying on a single community for social
support, individuals often actively seek out a variety of appropriate people and resources for different situations."

5. Discussion

India is a huge market with tremendous resources and human power. Reforms, new policies, the introduction of competition, privatization, raising FDI limits, and growth in IT and IT-related services have helped India make a mark for itself in the global market. With the developed markets becoming saturated, India can attract international service and equipment providers. The key is that the manufacturers have a huge low-end market to which they can cater. The telecommunications business is one of the most volatile and risky businesses, and entering into nascent markets is challenging for both public as well as private investors.

We have advocated the concept of a public–private partnership model. Government agencies have invested in developing markets, and have improved infrastructure and accessibility. But all of this has been done in urban areas, and other markets have been neglected. We argue that the development of infrastructure alone will not solve the problem. Rather, development of knowledge-based content is required in order to drive the acceptance of broadband services. But even with such development, there are challenges that fall outside the telecommunications sector: power failure, lack of Internet services (whether dial-up, broadband, or cable), and disparity between demand and supply. Furthermore, people want to make smart choices when purchasing expensive items such as PCs and related peripherals. But people will only buy if they know about but lack access to local content. This reiterates our belief that creating awareness is necessary for social as well as overall economic growth, and to achieve that the availability of power and other essentials is crucial.

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References

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