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Telecom Regulatory Authority of India

Consultation Paper

On

Review of Interconnection Usage Charge (IUC)

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Telecom Regulatory Authority of India
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Preface

With its sustained growth and dynamism the telecommunications sector has been, for the last few years, a key catalyst for the growth of the economy. With their complementary relationship, telecommunications and economy has egged each other on the road to faster development. In the phase of economic development that India finds itself, telecommunications growth is not a matter of option, it is an imperative element.

Telecommunication networks are intrinsically different from other infrastructure like roads and power because of the network externalities involved. The value of the network to the users increases as more customers join the network. Interconnection with other networks increases this value further by increasing the number of people the subscribers of this network can call and the range of services they can access.

The performance of the telecommunications sector in the last 5 years (2003-08) since the inception of regulated IUC regime has been impressive, to say the least. With about 374 million telephone connections as of November 2008, the Indian telecommunications sector has grown to become the world's second largest market after China. Competition has been key to growth and innovation in the telecommunications market and interconnection has been the key ingredients for the viability of such competition. The issue of interconnection has therefore become one of the most important and engaging issue for the regulators as well as the service providers.

Telecommunications users cannot communicate with each other or connect with services they demand unless necessary interconnection arrangements are in place. Ideally the customers should remain blissfully unaware that it is an intricate set of interconnections that make it possible for the telecommunications network nationally and globally act as a single seamless network. It is the responsibility of both the regulator and the service providers to make this happen. While efficient interconnection makes possible services like international dialing, Internet-based services, e-commerce and m-commerce possible lack of it imposes costs and technological problems on operators and is against the interest of consumers, businesses and the national economy.

Interconnections provided by service providers to one another involve costs for which the service providers need to be fairly compensated. The establishment of Interconnect Usage Charges (IUC) is therefore an activity of far reaching consequences. It would not be incorrect to say that the IUC regime determines not only the revenue accruals but also how this revenue is distributed among various networks and services and promotes their development in correct measures. A cost based IUC promotes competition among operators and reduces wastage of economic resources. It gives the operators sufficient flexibility in fixing its tariff for its customers and offer innovative tariff plans. It promotes welfare of the customer, sustained growth of telecommunications and economic development of the country.

Some service providers may see interconnection as a threat to their market share while others as a necessity to be in business. It is for this reason that interconnections may not happen freely and fairly under all circumstances. Regulators therefore have to play a crucial role by providing an enabling interconnection environment and balancing the need for regulatory certainty with the need for maximization of subscriber benefit, promoting competition and allowing stakeholders to enjoy the benefits of technological innovations. It is worth mentioning that the simplicity, resilience and implementability of the IUC regime that TRAI put in place have had major role in the growth of the sector in terms of infrastructure, competition, revenue and customer welfare.

The prevailing IUC regulation was notified on 29th October 2003 and came into effect from 1st February 2004. This was well accepted by the industry and has been instrumental in growth of the industry and reduction in tariff. A review was conducted through a consultation paper of 17th March 2005 and a revised IUC regime was introduced on 23rd February 2006, which has been implemented from 1st March 2006. In this regulation, the Authority decided to put a ceiling on carriage charges

A number of factors had gone into fixing of IUC charges that are currently effective. With increasing competition, massive growth of subscribers and reduction in tariff the calling pattern, the total traffic and its dispersion might have undergone change. The cost of providing services may also have altered by downward or upward movement of some of the constituents. It would be necessary to consider how these changes would affect IUC. Besides, a number of policy and regulatory changes have happened since the

IUC regulation was first issued in 2003, and amended in 2006, that could have a bearing on one or more of these charges. Passive infrastructure sharing has brought about a change in the CAPEX/OPEX structure of the service providers. Issue of fresh licences and allocation of spectrum to new companies would see infusion of capital in the sector based on their perception of viability of operations. It would also be necessary to take the strides of technology into account. Competition is bringing in compulsion of handling traffic more efficiently. More and more service providers are embracing Internet Protocol (IP) networks in a bid to reducing their network CAPEX and OPEX and perhaps keeping eventual migration to NGN in sight. Auction of relevant spectrum and subsequent deployment of 3G services is round the corner therefore it would necessary to understand the views of the service providers on whether both 2G and 3G voice termination should be treated similarly.

Finding the right level of interconnection charges is by no means a simple exercise. Any determination should strike a balance among a number of factors, some of which may conflict with each other. Sustainability of service providers' operations, consumer interest, growth of telecom sector, ease and flexibility of introducing innovative tariff plans by the service providers are some of the factors that would be necessary to address.

The IUC review being a complex exercise that could only be completed with close co-operation of the service providers, the Authority considered it appropriate to engage the service providers in a comprehensive pre-consultation process. The general response was in favour of reviewing all the components of the IUC regime. However the opinion on methodology and correct level of charges is divided.

Public consultations through this consultation paper seek to take forward the process started with the preconsultation by opening the discussions to all stakeholders. This review not only seeks to discuss the various components of the IUC and how they should be fixed, but also expects feed back on how the new development like 3G, WiMax, VoIP and NGN should be dealt with. It is expected that the while giving their opinion the stakeholders would give priority to conducive growth and certainty of the market. A more informed and objective opinion would assist TRAI in taking a final view that would be beneficial to the industry as a whole.

The aim of the consultation paper is to provide background information on all the related aspects of the subject to enable stakeholders to provide informed comments for the issues raised. Any details, concepts or expression of opinion provided in the document should not be read as conclusive views of the Authority nor taken as prejudicial to any determination that would have been made by the Authority in another context.

The paper has been placed on the Authority's website (www.trai.gov.in). Written comments on the issues raised for consultation may please be furnished to Principal Advisor (FN), TRAI by 30th January, 2009. The comments may be sent in writing and also preferably be sent in electronic form (E-mail: traifn@yahoo.co.in or arvindtrai@gmail.com). For any further clarification on the matter please contact Sh. Lav Gupta, Pr. Advisor (FN) at e-mail: pradvfn@trai.gov.in , lavgupta@gmail.com , Tel.: 011-23216930, Fax: 011-23235270 or Sh Arvind Kumar, Jt Advisor(FN) at email: arvindtrai@gmail.com , traifn@yahoo.co.in Tel:011-23220209

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Chapter 1

Introduction

1.1 Dynamism of the Indian telecom sector

Indian telecom sector has grown to become the world's second largest market after China. It surpassed the number of connections in US in March 2008. It took 25 years, after independence to reach the 1st 1 million mark; today we add almost 9 million phones in a month, the highest monthly additions in the world. The number of lines has grown from a low of 14.88 million in 1997 to about 374 million in November 2008. Such has been the growth that the target of 250 million subscribers to be achieved by the end of 2007 was achieved before time in October 2007, teledensity target of 7 to be achieved by 2005 was achieved in March 2004 and of 15 to be achieved by 2010 was surpassed in 2005. It is expected that the next target to cross the 500 million-subscriber mark by 2010 would be exceeded substantially. Broadband connections have also shown a high growth rate with 5 million subscribers in Nov 2008 starting from scratch in January 2005. The growth has been 100% in last one year while India stands at no 18 in the world. It is expected that India would grow at a rate of about 480% and have about 24 million connections by 2013 and be among top 10 broadband countries. Internet users including those on wireless hovers around 90 million. With these growth projections India is expected to become a US$ 40-45 billion telecom market by 2010

If one looks at the performance of last 5 years (2003-08), since the inception of regulated IUC regime, telephone connections have gone up from 53.9 million in 2003 to about 374 million in November 2008 with a CAGR of about 47%. The revenues have grown from about US$ 10 billion to US$ 31 bn at CAGR of 25%. The traffic has also grown manifold. It was seventh largest network in 2003 and now it is the second largest network globally.

It is said that a vibrant telecom sector and a sustained growth in that sector has contributed to the economic growth of the country during the last few years. The telecom sector has been a key catalyst for the growth of the economy the latter

has helped in increasing demand and growth of the telecom services thus creating a virtuous circle. The main factors driving and sustaining telecommunications growth have been favourable macro-economic fundamentals and demographics, favourable investment climate, strong economic growth , rising incomes and progressive and consistent policy and regulation.

1.1.1 Key milestones

Significant policy and regulatory initiatives have led to the Indian telecom sector undergo a major process of transformation. The reforms focused on competition and investment facilitation overseen by an independent regulator. Reforms began in the 1980s with "Mission-Better Communication". In 1984 C-DoT was established for the development of indigenous technologies leading to eventual fall in switching equipment procurement prices. In the same year private parties were allowed to run PCOs, a scheme which became very popular and created new employment avenues. Private manufacturing of CPE was allowed and created new manufacturing capability in India. In 1986 two large corporate entities MTNL, VSNL were spun off from the Department of Telecommunications (BSNL later came into existence in 2000). In 1989 Telecom Commission was set up with the powers of the government for fast decision making. Telecom equipment manufacturing was delicensed in 1991. The reforms paced up with when radio paging, cellular mobile and other value added services were opened to the private sector in 1992. The government programme was formalised on a telecom policy statement with the announcement of National Telecom Policy was announced in 1994. An independent statutory regulator was established in 1997. New Telecom Policy 1999 ushered in new generation of reforms. Telecom was recognized as an important driver of economic growth. Opening of NLD and ILD sectors in 2000 and 2002 respectively for further competition and lowing prices. In 2002 Reference Interconnect Order were the key developments, Internet Telephony was allowed and licence fee was reduced. In 2003 Calling Party Pays Regime and Unified Access Licensing were the hallmark. In 2004, Intra-circle merger guidelines, Internet / recommendations on increasing broadband penetration were released. In 2005, Quality of Service regulation and recommendations on Rural Telephony were the important events. In 2006, recommendations on Mobile Number Portability, recommendation on

convergence were the highlights. In 2007, regulations on cable landing station regulation and Domestic Leased Circuit, and recommendations on resale of international bandwidth and growth of broadband. In 2008 phasing out of ADC, recommendation on growth of broadband, recommendations on 3G and BWA and MVNO were the milestones. All these events have created an impressive forward momentum in *Indian telecom resulting in vigorously competitive and a fast growing sector. As we shall see in a later section, since 1997 TRAI had been instrumental in guiding as well as creating regulatory environment for implementation of the policies. In particular the simplicity, resilience and implementability of the IUC regime that TRAI put in place have had major role in the growth of the sector in terms of infrastructure, competition, revenue and customer welfare.*

1.1.2 Plans

In the early decades of planned development of India investment in telecommunications as a percentage of GDP was low. In the first six five-year Plans since 1950 investment hovered between 1.4 and 2.7 percent of the Gross Domestic Product (GDP). The total combined investment was less than Rs4900 cr while in the 7th(1985-90) plan alone a little more than Rs 8000cr was allocated! In terms of operational outlay the amount was Rs 84,783.90crore and Rs. 86,984.00 crore in the 10th (2002-07) and 11th(2007-2012) plan respectively.

At the end of 9th (1997-2002) plan the number of connections increased to 45 million and teledensity tripled to 4.4%. Performance of the government sector was better than that of private. At the end of 10th five year plan, the total connections were 206.83 while the mobile connections grew to 166 million (much higher than 40.77 million fixed connections). Private sector contributed more to growth with public sector contributing only about 25%. 79.6% mobile phones provided were by the private sector. Teledensity increased from 4.29% to 18.31%. *It was during the 10th plan that the regulated IUC regime was instituted by TRAI.*

In the ongoing **11th five year plan (2007 –2012) a massive investment** of ~ Rs267,001 crore is projected amounting to 13.2% sectoral share. About 68.7%

investment is to come from the private sector. The target is to achieve telecom subscriber base of 600 million including 200 million rural telephone connections, a total of 150 million broadband connections including 50million wireline based broadband and 100 million wireless broadband, 3G services to towns with more than 0.1 million population, broadband connectivity to every secondary school, health centre, Gram Panchayat on demand in two years, mobile TV.

The ambitious plan calls for progressive policy and effective regulations to create an atmosphere conducive for investment and growth. More specifically, appropriate charges for operators to interconnect their networks for offering a wide-range of services would play an important role in achieving the targets.

1.1.3 Policies

Historically, the telecom network in India was owned and managed by the Government considering it to be a strategic service that would be best under the State's control. However in 1990's, the Indian policy makers decided to give highest priority to the development of telecom services in the country to improve India's competitiveness in the global market, attracting foreign direct investment and stimulating domestic investment. Even with the original modest targets of the 8th plan (1992-97) the resource gap was Rs. 7,500 crores which became Rs. 23,000 crores after aligning the targets with the National Telecom Policy announced in 1994. Private investment and association of the private sector was considered absolutely necessary to bridge the resource gap. The policy frameworks are briefly discussed below:

National Telecom Policy 1994 (NTP94): When this policy was conceived the situation of telecommunications in India was poor by world standards. There were only 8 million lines for a population of about 900 million giving a density of 0.88% which compared poorly with the world average of 10%! To make matters worse there was a waiting list of 2.5million people. There were only 1 lakh Public Call Offices in urban areas. On the rural front matters were more precarious. Only 1.4 lakh out of 5.76 lakh villages were covered.

The policy defined certain important objectives including availability of telephone on demand by 1997, provision of world-class services at reasonable prices, ensuring India's emergence as major manufacturing/export base of telecom equipment and universal availability of basic telecom services to all villages. It enunciated that all value-added services available internationally should be introduced in India to raise the telecom services in India to international standard. It acknowledged that private investment and involvement of the private sector was required to bridge the resource gap. Private sector participation was invited in a phased manner initially in 1992 for value added services such as Paging Services and Cellular Mobile Telephone Services and thereafter for Fixed Telephone Services. Other areas liberalized were VSAT services, Internet Service Provision (ISP) and Global Mobile Personal Communications by Satellite (GMPCS) allowed in basic and long distance licences.

Achievement of physical targets was not very encouraging. Though 8.73 million lines were provided against a target of 7.5 million the policy could not generate results in many areas. The telephone was not available on demand by 1997 as envisaged. The private sector participation in fixed was poor, in mobile it was slower than expected, the main reason, according to the cellular and basic operators, has been the fact that the actual revenues realized by these projects were far short of the projections and the operators were unable to arrange financing for their projects and therefore complete their projects. Only 3.1 lakh villages were covered against a target of all inhabitable villages above 100 population (around 5.48 lakhs). The private sector entry was slower than what was envisaged in the NTP 1994. The government viewed the above developments with concern and realizing that it would adversely affect the further development of the sector decided to take a fresh look at the policy framework.

New Telecom Policy 1999(NTP99): In addition to some of the objectives of NTP 1994 not being fulfilled, and also far reaching developments in the recent past in the telecom, IT, consumer electronics and media industries world-wide. Convergence of both markets and technologies was a reality that was forcing realignment of the industry. At one level, telephone and broadcasting industries

were entering each other's markets, while at another level, technology was blurring the difference between different conduit systems such as wireline and wireless. Less than satisfactory achievements on many of the fronts and other developments led to announcement of a new policy. This policy aimed at creating a modern and efficient telecommunications infrastructure and propels India into becoming an IT superpower; make telecom sector competitive in both urban and rural areas providing equal opportunities and level playing field for all players; balance between universal service and the high-level services capable of meeting the needs of the country's economy; strengthen R&D efforts in the country and provide an impetus to build world-class manufacturing capabilities; achieve efficiency and transparency in spectrum management.

In terms of specific targets achievements were satisfactory. Teledensity of 7 was achieved by March 2004 against target of achieving by 2005 and 15 by 2005 which was planned to be achieved by 2010. Rural teledensity of 5.78 was achieved by March 2007 against targeted 4% by 2010. Targeted growth for end 2007 of 250 million was achieved in October 2007. Targeted growth for 2010 is 500 million connections that is also likely to be substantially exceeded.

Broadband policy 2004 defined broadband and set targets of 6million, 18 million and 40 million Internet connections and 3 million, 9 million and 20 million broadband connections by end of 2005, 2007 and 2010.

To let the benefit of information economy percolate far and wide and benefit all requires vision and planning. These get embodied into the country's policies. These policies carry forward the national agenda with the help of a strategic plan. To be successful implementation of these policies require ownership and commitment on the part of the most important stakeholders i.e the people for whom they are meant. Regulators must balance the need for regulatory certainty with the need for maximization of subscriber benefit, promoting competition and allowing stakeholders to enjoy the benefits of technological innovations to make the policies deliver.

1.1.4 India's rural area – the next growth frontier

The rural economy contributes nearly half of the country's GDP. About 70% household and 72 % population are in rural areas. Nearly 50% of very rich and well off households are in rural. More than 50 percent of the sales of FMCG and 55% of Consumer Durable companies come from the rural areas. According to The McKinsey report (2007) in 20 years the rural Indian market will be almost four times the size of today's urban Indian market and larger than the total consumer markets in countries such as South Korea or Canada today.

It is a universally accepted fact that higher the teledensity, higher is the GDP. Greater telecom availability leads to more economic development that in turn leads to more demand creating a virtuous circle. Impact of telecom growth is well documented in literature. It spawns new industry in rural and urban areas, creates job opportunities and stops migration. It contributes to economic development indirectly by reducing cost and improving the coverage of basic services like health, education and environment protection. It reduces the information gap, more information about agricultural prices, markets, technology, regulations and economic opportunities even beyond their geographical horizon enables them to increase productivity, improve crop yield and livestock production, optimize pricing plan and get higher earnings. It reduces the disadvantages that come with remoteness from cities and make it less expensive and more efficient for firms to locate in rural places.

With urban areas inching towards saturation, the rural areas improving in buying power and increasing awareness of utility of telecom in rural inhabitants, the telecommunications companies estimate large part of growth of the targeted 500million connections upto 2010 would be from rural areas. *Any regulatory stipulation would acknowledge this shift and ensure that the elements of IUC have built into them incentives for an all pervasive development while keeping the retail tariff at affordable levels.*

1.1.5 Regulatory initiatives

To quote from a 2005 report titled "The Indian Telecom Industry" produced by IIM Calcutta, "*Indian telecommunications today benefits from among the most enlightened regulation in the region, and arguably in the world. The sector, sometimes considered the 'poster-boy for economic reforms' has been among the chief beneficiaries of the post-1991 liberalization… Despite several hiccups along the way, the Telecom Regulatory Authority of India (TRAI), the independent regulator, has earned a reputation for transparency and competence*".

TRAI has carried out the job of **increasing competition and easing entry of competitive service providers** in all seriousness. Measures that might have seemed tough at the time later proved to be key for growth of the industry. Some of the regulations/recommendations worth mentioning are: Recommendations regarding Mobile Virtual Network Operators of August 2008; Domestic leased circuits regulations of September 2007; International Telecommunication Access To Essential Facilities At Cable Landing Stations Regulations issued in June 2007; Recommendation on Infrastructure Sharing sent in April 2007; Recommendations on resale in International Private Leased Circuits (IPLC) in March 2007; Recommendations on Mobile Number Portability in March 2006; Intelligent Network Services in Multi Operator and Multi Network Scenario Regulations in November 2006; Recommendation on growth of Telecom services in Rural India Oct 2005; Recommendations on 'Accelerating Growth of Internet and Broadband' April 2004; Inception of Interconnect Usage Charges(IUC) regime, January 2003; Recommendation on opening of the 'International Long Distance Service' in Nov 2001; Recommendation on introduction of competition in 'National Long Distance Communications' Dec 1999.

These regulations had the desired impact as indicated by increase in number of service providers: UASL/CMTS from 6 in 1997 to 12 by Sept 2008, BSO from 2 to 7, NLD from 1 to 23, ILD from 1 to 17 and active ISPs from 2 to 141. Increasing competition has led to greater availability, efficient utilization of resources, greater innovation and lower tariffs.

In addition to the above regulations/ recommendations that brought about increase in competition those mentioned below contributed to increase in Subscriber-base and teledensity. Recommendation of TRAI on Unified Licensing October 2003; Recommendations of TRAI on the Issue of Fresh Licenses to Cellular Mobile Service Providers (CMSPs), February 2003; Recommendations on Universal Service Obligation (USO) October 2001; Recommendations of TRAI on Issues Relating to Licensing of Fixed Service Providers August 2000; The Telecommunication Tariff Order 1999 fixing cost based tariff for all telecom services/ forborne tariff for some services Mar 1999

Bridging rural-urban divide has been a priority for the regulatory authority. In addition to a number of recommendations the Authority has engaged the industry in brainstorming sessions for improving rural tele-density. Some of the recommendations: Recommendation on Infrastructure Sharing April 2007; Recommendation on growth of Telecom services in Rural India Oct 2005; Recommendations on Universal Service Obligation (USO) Oct 2001

TRAI has been conscious of **the potential of new services like** Internet/Broadband in the economic development of the country. Recommendations on Review of Internet Services May2007; Recommendations on improvement in the effectiveness of National Internet Exchange of India (NIXI) March 2006; Recommendations on 'Accelerating Growth of Internet and Broadband' April 2004; Recommendations on Growth of Internet in the Country September 2002; Regulation on Quality of Service Dial-Up and Leased Line Internet Access Service December 2001.

1.2 Interconnection and Interconnection Usage Charge

When users make calls within a country or to international destinations, they are not concerned with how many networks the calls pass through, who owns them, how they are interconnected and what they pay to each other. They would like end-to-end service as if it were a single seamless network. Both the regulator and the service providers have responsibility to make this happen.

While interconnection is crucial in implementing public policies, opening competitive opportunities, it has been issue of controversy. Whether they are non-competing or cooperating networks like access and long distance or competing networks like two access service providers in the same area, the tendency of strategic and opportunistic behaviour forces them to transfer network cost, realize as much revenue as possible, impede competition, maintain or increase their market share as best possible. Regulator may intervene with IUC determinations to curb these tendencies and ensure that competition flourishes. In the initial days tariffs were regulated but subsequently after emergence of competition these were brought under forbearance except roaming, domestic leased circuits and rural fixed line, so that they can be decided by the market forces and IUC were specified for inter-operator payments. The TRAI has therefore followed its mission of nurturing conditions for growth and protecting consumer interest by taking timely action on matters of contemporary and prospective importance.

1.2.1 What is Interconnection?

Interconnection is the lifeline of telecommunications. Interconnection allows subscribers, services and networks of one service provider to be accessed by subscribers, services and networks of the other service providers. In a broader sense the term interconnection refers to the commercial and technical arrangement under which service providers connect their equipment, networks and services to enable their customers to have access to the customers, services and networks of other service providers. A number of issues must be agreed upon by the operators, *or determined by the regulator*, in order that these arrangements can be finalized in an appropriate and timely manner. Commercial negotiations between two interconnecting parties proceed with the help of established framework for interconnection by the Regulatory Authority. Regulatory intervention is a possibility wherever necessary. In India this framework has been established by TRAI through its regulations and directions.

1.2.2 Why to interconnect?

Even before competition emerged within nations, interconnection has been important for telecommunications providers with carriers in other countries so that their customers could make long distance international calls. As competition

emerged within countries and networks have reached the state they are currently in, like in India with plurality of operators and services, the importance of interconnection has increased for a variety of reasons. Telecommunications users cannot communicate with each other or connect with services they demand unless necessary interconnection arrangements are in place. For voice services, termination being a terminating networks monopoly, interconnection would be a must for a service provider to economically terminate calls on subscribers of the other networks. Besides the cherished goal of any subscriber being able to call any other subscriber irrespective of the network or location, networks would interconnect with each other for increasing the value of telecommunications services or the range of services that a service provider can provide or to expand or improve services that are valuable to customers. For example, subscriber of a voice network cannot access Intelligent Network(IN) platform and services of another service provider if there is no interconnections between the two for such services. A broadband subscriber cannot access *applications* and *content* located on another service providers network if there is no interconnection arrangement for such access. With recent technological developments the range of services that depend on interconnection has increased. Efficient interconnection has become an essential input to all types of voice calls, data services, Internet, messaging, broadband and a wide range of applications and content services.

Interconnection of a large number of different types of networks has brought tremendous benefits to consumers and businesses around the world, particularly in the last few years. Without efficient interconnection arrangements, services such as direct international dialing, Internet based services, e-commerce and m-commerce would not be possible. Increasing network interconnection will continue to improve the convenience and utility of telecommunications service for users around the world in the time to come. Inadequate interconnection arrangements not only impose unnecessary costs and technical problems on operators - they also result in delays, inconvenience and additional costs for businesses, consumers and, ultimately, for national economies.

1.2.3 Why Regulate Interconnection?

Telecommunications networks are intrinsically different from other infrastructure like roads and power because of the network externalities involved. The value of the network to the users increases as more customers join the network. Interconnection with other networks increases this value further by increasing the number of people the subscribers of this network can call and the range of services they can access.

Interconnection means different things to different service providers. To some it may represent a cost while to others a means to transfer their network cost to interconnecting operators. Some may see it as a threat to their market share while others a necessity to be in business. *It is, therefore, quite unlikely that telecommunications service providers would interconnect voluntarily under all circumstances.* If two service providers are not in direct competition with each other, then generally they will have an incentive to interconnect. Where the interconnection seeker is a potential competitor, an incumbent may seek to limit competition, and preserve its market power, by refusing to interconnect or making it difficult by offering interconnection at a high price or by incorporating unreasonable terms that make it difficult for an efficient entrant to compete. Negotiations may get inordinately prolonged and cause inconvenience to subscribers of both the networks. In these cases regulatory intervention can lead to a more efficient outcome. In situations where the denial of access or adduction of unreasonable terms and conditions having a similar effect would hinder the emergence of a sustainable competitive market at the retail level, or would not be in the end-users' interest regulators may need to intervene. The regulators also need to ensure that the regulation are able to adapt to changing circumstances as outdated regulation risks stifling market growth and innovation.

1.2.4 General regulatory framework for interconnection

The first widely accepted multilateral trade agreement to include binding interconnection rules was the 1997 WTO (World Trade Organisation) Agreement on Basic Telecommunications (formally known as the Fourth Protocol of the GATS(General Agreement on Trade and Services)) These rules were included in

the so-called Reference Paper, an informal text containing regulatory principles negotiated among WTO Members.

The central principles of the paper are non-discrimination, transparency, and the availability of reasonable interconnection terms, including cost-oriented rates and unbundled access, from "major suppliers". The Reference Paper was designed as a set of general rules or principles to be observed, rather than as detailed prescriptive guidelines, on how the principles are to be implemented. This approach makes the paper adaptable as telecommunications markets evolve, and provides flexibility for application to different legal systems and regulatory interconnection frameworks. As a practical matter, therefore, more detailed guidance is essential to turn the general Reference Paper principles into workable interconnection arrangements, agreements, national regulations or regulatory directives.

A summary of widely accepted interconnection principles as enshrined in WTO document are:

- Terms of interconnection should not discriminate unduly between operators or between a dominant firm’s own operations and those of interconnecting competitors
- Interconnection should be permitted at any technically feasible point, but the requesting operator should pay any additional costs of non-standard interconnection
- Interconnection charges should generally be cost-based (i.e. the evolving best practice specifies that the cost standard should be forward-looking long-run incremental costs; there is normally a mark-up to cover forward-looking joint and common costs)
- Cost inefficiencies of incumbent operators should not be passed on through charges to interconnecting operators
- Where reciprocal interconnection and costs can be expected to be reasonably balanced, bill and keep arrangements are an efficient alternative to cost-based interconnection

- Regulatory guidelines and procedures should be prescribed in advance, to facilitate interconnection negotiations between operators
- Standard terms and procedures should be published for interconnection to dominant operators
- Interconnection procedures and arrangements should be transparent
- Interconnection arrangements should encourage efficient and sustainable competition
- Network elements should be unbundled, and charged separately
- Charges related to universal service obligations should be identified separately, and not bundled with interconnection charges
- An independent regulator (or other third party) should resolve interconnection disputes quickly and fairly

1.2.5 Interconnection Charges

IUC are charges payable by one telecom operator to the other for use of the latter's network either for originating, terminating or transiting/carrying a call. Inter operator calls constitute a major portion of the total calls that are handled by the network. In this respect IUC payable is an important element that should be entered in the retail tariff charged to the customer. A cost based IUC promotes competition among operators and reduces wastage of economic resources. The IUC concept has proved to be the most suitable approach to interconnect pricing in a competitive, multi-operator environment. It gives the operators sufficient flexibility in fixing its tariff for its customers. It also helps in removing discriminatory practices among different operators.

Interconnection charges often account for a very significant part of the costs of new telecommunications operators. This is particularly the case with new entrants that do not own end-to-end networks. The level and structure of interconnection charges are, therefore, major determinants of the viability of operators in a competitive telecommunications market. Over the years, a variety of approaches have been used to calculate interconnection charges and generally to determine the financial terms of interconnection.

While there is no single correct approach, internationally accepted interconnection principles generally require interconnection charges to be cost based or "cost-oriented". This is the case with the interconnection principles of the WTO's Agreement described above. Cost-based pricing of interconnection services is consistent with best practices adopted by regulators in most countries. To implement this some regulators and experts feel that the ideal approach for calculating the level of interconnection charges would be one based on forward-looking costs of supplying the relevant facilities and services such as Long Range Incremental Cost(LRIC) or one of its variants.. While these experts consider variations on the LRIC approach the best practices, there are practical limitations on their applicability. Those not in favour of LRIC would argue that in certain situations setting interconnection prices at LRIC may not permit a new, local services entrant to run a viable business. This could also be a case when established incumbents subsidize tariff by revenues from call termination. They argue that the new entrant's interconnection costs may exceed the retail prices it must offer to compete effectively and establish itself.

The applicability of the non-LRIC-type approaches depends on the circumstances of different countries which the regulators would need to assess carefully. Modifications are often made to the various approaches to attempt to compensate each operator more closely for costs resulting from its interconnection. These approaches can be subject to abuse. For example, excessively high revenue sharing arrangements have been imposed in some jurisdictions in a shortsighted attempt to earn operator or government additional revenues. The effect is to prevent efficient competition. If revenue-sharing schemes must be used, then regulators should consider identifying each component of the revenue share separately. This includes, for example, share to be paid for cost-based interconnection charges, for concession or licence fees, etc.

In the Indian context, the regulatory framework for interconnection was established through the Regulation issued by TRAI in May 1999, titled "The Telecommunication Interconnection (Charges on Revenue Sharing) Regulation 1999". The Regulation specified certain principles for determining interconnection charges, viz. Interconnection charges are to be based on cost,

unless otherwise specified; For determining cost based interconnection charges, the main basis shall be "incremental or additional" costs directly attributable to the provision of interconnection by the interconnection provider; No service provider shall discriminate between service providers in the matter of levying of charges for interconnection; No service provider shall be charged for any interconnection facility it does not seek or require; Para 8 of the explanatory memorandum of the Regulation, is reproduced below for explanation of scope of terms used in the regulation :

"8 *The payment by any service provider for connection and use of the network of another service provider is conceptually divided as under:*

- *Set-up costs, i.e. all costs required for initially linking up two networks and making that link operational (including inputs such as fibre links, ports, building space and any up-gradation of equipment, as well as software required to make the interconnection operational).*
- *interconnection charges are the (recurring) amounts payable for the set-up costs;*
- *usage charges are payments for use of the network for transmission of telecommunications messages by the subscriber of the interconnection seeker. The mode of payment of such charges includes, inter alia, revenue sharing arrangements"*

This Regulation dealt with interconnection charges i.e. the Port Charges and Leased Line Charges, which are the recurring amounts payable for the set-up costs. For Usage Charges, revenue sharing arrangements for basic services and cellular mobile services were specified. Accordingly the Regulation has three schedules covering Revenue sharing for basic services and cellular mobile services; Leased Circuit Charges; and Port charges.

Subsequently after ushering in multi operator environment the revenue sharing arrangements for usage charges were replaced by cost based interconnection usage charges. The IUC regime consists of Origination, termination charge, carriage charge and transit charge. Let us briefly examine each of these:

(i) Termination Charges

There is no a uniform treatment of mobile termination charges among countries. Some countries only regulate mobile termination charges for fixed-to-mobile calls. In other countries, mobile networks are required to

apply a single regulated termination charge regardless of where the call originates. There are two different methods for payment of call by mobile subscriber -Mobile Party Pays (MPP) and Calling Party Pays(CPP). In MPP method cost of the call is to be paid by mobile party therefore for incoming call also the mobile subscriber has to pay and cost of interconnection can be recovered from service provider's own subscribers. Under Calling Party Pays (CPP) the calling party, or the calling party's network, pays for the call. Therefore, termination charge is the requirement in CPP method. CPP is used in many countries to structure interconnection payments for fixed-to-mobile calls and even mobile-to-mobile calls. In recent years, some regulators have decided to regulate fixed-to-mobile prices, rather than leaving this to the mobile operator to determine. This generally reflects concerns that fixed-to-mobile tariffs are too high compared to a cost-based estimate. The premise is that mobile operators are able to sustain high fixed-to-mobile prices because they have market power in setting prices for fixed-to-mobile calls. This market power derives from that fact that the fixed subscriber who places a call to a mobile subscriber has no influence over which mobile network is used. Mobile subscribers make this decision when they decide to join a network. Under Calling Party Pays mobile subscribers do not pay for fixed-to-mobile calls, so they may not take the price of these calls into account in selecting a network. Many regulators now control mobile termination charges. Market forces are also pushing down CPP tariff and mobile termination charges. For example users may substitute mobile-to-mobile calls for fixed-to-mobile calls, creating additional pressure on mobile operators to reduce fixed-to-mobile rates and mobile termination charges.

With the introduction of CPP regime in India, TRAI felt that it was possible to have identical termination charges for the access providing services. In addition to simplifying the implementation of the regime, a common termination charge would facilitate moving towards similar tariff levels for calls from/to different access providers and would reduce imposition of cost items on certain types of calls merely on account of regulatory policy. As regard to termination for services like SMS, IN, paging, Internet no separate traffic and cost data was available to ascertain usage charges for resources

utilized in transmission of these services. The Authority therefore decided to keep these termination charges under forbearance to be worked out by the service providers by mutual arrangements.

(ii) Transit charges

Generally direct connectivity among various service providers is preferred. However, for exceptional situations where direct connectivity may not be possible or due to emergency breakdown etc., and for overflow traffic, traffic can be routed through an alternate route through another transit switch. In such a case the service providers may mutually negotiate the transit charges but this should be lower than Rs. 0.20 per minute. NLDO to NLDO interconnection is not mandatory as per the licencing requirement, however there may be a case that one NLDO may transit the traffic through another NLDO for a specific area where it is not present. The Authority has also forborne NLDO to NLDO transit charges.

A special case of transit is carriage of intra-circle mobile to fixed line traffic handed over by mobile service provider at Level-II Tax and carried to SDCA by BSNL. This has been prescribed at the rate of Rs 0.20 per minute.

(iii) Carriage Charges

Access provider can carry the long distance intra-circle calls only. However, for carriage of calls across circles the call should be routed through NLDO. These were reviewed in February 2006 and changed from distance-slab fixed charge based to ceiling based with a ceiling of Rs 0.65 per minute.

(iv) Origination Charges

The Authority has decided that the originating network must pay from the tariffs the carriage and termination charge for the calls and retain the residual towards the expenses of originating the call. The originating charge was therefore not specified. As the other components of the calls, carriage and termination were fixed, keeping the origination under forbearance has provided flexibility in tariffing and also ensured that access networks do not

pass on the burden of their own tariff decisions to other networks involved in completing the call.

(v) Port Charges

Port charges have been taken care of by a separate regulation on port charges. While in calculation of port charges only the incremental capex for provision of the port was taken into account, cost for augmentation of other downstream network elements to handle additional traffic were left to be recovered through the IUC.

1.3 Significance of IUC

We have seen in the earlier sections that competition is the key to growth and innovation in today's telecommunications market. Interconnection in turn is a key ingredient for the viability of competition. With the liberalization of telecommunications markets across the world, the issue of interconnection has become perhaps the most important practical issue facing policy-makers and regulators as well as incumbent operators and new entrants. On one hand inadequate network interconnection arrangements impose unnecessary costs and technical problems on service providers and on the other causes inconvenience and additional costs for business, consumers and ultimately for national economies. Effective interconnection arrangements have become key to the operations of an increasingly wide range of services. These services include local, long distance and international fixed, mobile and satellite services, providing everything from basic voice telephony to high speed Internet connectivity to Internet multimedia services. Availability of effective and expeditious interconnection is, therefore, one of the most important factors in contributing to the growth of the telecom sector.

While the public interest motive for interconnection is strong, individual operators may view it in different light. Where two networks are vying for customers of the same service, the commercial benefits of interconnection may seem to accrue principally to the smaller network: its customers benefit more from the larger range of communication possibilities made available. As a result, some networks find it to their advantage to refuse, delay or otherwise impede

interconnection, when it is mandated by regulation. A large network may also seek to foreclose entry by charging high interconnection prices which eliminate or weaken smaller competitors for the same pool of retail customers. In addition any network will, other things being equal, benefit from high interconnection charges which enhance its revenues.

Interconnection usage pricing is an important element. There is a consensus among economists and regulators that interconnection prices based on cost are most likely to lead to desirable outcomes. Measuring "cost" is challenging and there is no single correct interconnection price. Depending on the methodology used the result might be different. However, if the interconnection price is set "too low" then inefficient competitors may enter the market. Entrants may look for opportunities to profit by purchasing services at low regulated prices and simply re-selling them, instead of developing innovative new product offerings. Incumbent operators may not invest in the network or maintain its quality. For many new entrants, interconnection is one of their largest costs. If the interconnection price is set "too high" it will deter entry by efficient competitors. Carriers may concentrate on maximizing payments from other carriers, instead of focusing on providing services to retail customers. Customers will be paying more than they need to.

An accepted Regulatory principle in many countries is to ensure that the Service Provider with Significant Market Power publishes a Reference Interconnect Offer (RIO) stipulating the various technical and commercial conditions including a basis for Interconnect Usage Charges for Origination, Transit and Termination. Following these, the new entrants can seek Interconnection and agree upon specific usage based charges. Taking into account the above practice and experience regarding interconnect issue, a model Reference Interconnect Offer (RIO) providing the basic framework was prepared by the Authority in consultation with the service providers. This can be achieved by laying down the terms and conditions of the RIO on which interconnection arrangements would be based and IUC regime that would enable existing and new operators to work out the charges they have to pay to each other for flow of each others traffic on their network. Smooth functioning of such a regime would ensure that the

government policy of telecom development and customers' service objectives are met.

Competing networks' rates were typically based on a 'reciprocity principle'. In some countries they were effectively set equal to the rate determined by the regulator for a functionally similar service provided by the incumbent. In others, a consensus emerged within the fixed sector in favour of prices based on reciprocity. As a result of this process, fixed interconnection rates have been, directly or by proxy, set equal to cost, defined to include a reasonable return on capital employed and a contribution to network common costs. Exceptions occur where the interconnection service in question is found to be competitive and not requiring regulation. In some jurisdictions fixed termination charges may not be treated in this way if they are not competitive.

New entrants in telecommunications markets have little to offer in negotiations to remove these barriers to competition. There is a consensus among telecommunications experts and policy makers that decisive and informed guidance by regulators is required to pave the way for effective interconnection arrangements.

Governments and regulators need to be pragmatic about interconnection regulation for a number of reasons. The direct regulatory costs of a detailed forward-looking cost regime may be significant: operators may hire engineers, economists and lawyers to put forward their views; the regulator must have enough resources to assess competing claims about cost; and there may be costly dispute resolution processes. As regimes increase in complexity, operators and potential entrants are more likely to focus on arbitrage opportunities than ways to offer consumers genuinely new services. ***There is no guarantee that detailed cost estimation approaches will be accurate***. It is therefore necessary to regulators may decide the costing methodology and approach used based on the development of telecommunications in the country. ***If an approach has been established then motivation must be really strong to change it in the next review***.

Interconnection charges have generally been designed following either the paradigm of (1) revenue sharing or (2) interconnection usage charges. Revenue sharing means that the telecommunications operators involved in a call have agreed to share the revenues, on a percentage basis or some other agreed basis. They thus share the risk of billing disputes and bad debts. On the other hand, interconnection usage charges imply setting charges to compensate explicitly one operator for the costs imposed on him by the other operator's use of his network to originate or terminate a call. The operator paying the interconnection usage charge "owns" the call and takes the risk of disputed and unpaid charges.

In India TRAI has considered it important to specify an IUC regime that would give greater certainty to the Inter-operator settlements and facilitate interconnection agreements. In the relevant notifications TRAI had emphasized a policy framework, which would promote lower domestic prices and give rise to strong subscriber growth. The expectations of the Authority with respect to both of these objectives have been validated in the subsequent period. India at present has among the cheapest mobile call charges in the world. Likewise, the monthly growth in mobile subscriber base in India, has been among the highest, and the price decline has contributed significantly to such growth

1.4 Introduction to the present review

The Authority notified an Interconnection Usage Charges (IUC) Regulation dated 24th January 2003 which contained inter alia charges for origination, transit and termination of calls in a Multi-Operator environment. Though this regulation was amended vide regulation dated 29.10.2003 and then 23.2.2006 for IUC, the framework remained the same. The cost basis used had been historical average costs from audited accounts of BSNL.

The present review is in many ways important for the telecommunications industry. This review not only seeks to discuss the various components of the IUC and how they should be fixed, but also expects feed back on how the new development like 3G, WiMax, VoIP and NGN should be dealt with. It would take ahead the work started with preliminary discussions held through communication no 409-12/2008-FN dated 12.9.2008

Many developments of far reaching consequence have taken place since the current principal regulation was put in place in 2003 and amended in February 2006. Subscriber growth has been explosive, specially in the mobile segment. The mobile subscriber base has overtaken fixed line subscriber base and is now almost 7 times that of fixed. The minutes of usage have also gone up drastically. Favourable policy and regulatory regimes have encouraged a number of new operators to come into the arena. Technology has evolved rapidly with increasing stress on Internet Protocol based networks. New streams of revenue are emerging for all sets of operators.

The preliminary consultation carried out through the communication 409-12/2008-FN dated 12.9.2008 stressed that an IUC regime serves multiple purposes. It promotes resource utilization, gives certainty to inter-operator settlements and facilitates interconnection agreements, helps to implement desired policies growth, quality and competition.

The service providers were asked to comment on the basic principles for review, components to be review, method of calculation and level of each charge, approach/model/methodology adopted. They were also asked to provide network architecture, routing, network element cost and its apportionment among services. They were asked to provide data on costs, traffic and revenue used to arrive at the results above including the assumptions underlying the cost calculations in detail. Total number of incoming and outgoing minutes (off-net and on-net separately) handled for various services; Identification of traffic sensitive network elements and relevant minutes of usage for each of the corresponding network element. Responses received from the service providers are summarized in **Annexure-I**.

Chapter 2

The Regulatory approaches so far

2.1 Interconnection environment in India

Progressive regulatory policies and measures for increasing competition have ensured multiplicity of service providers for all types of telecommunication services within each service area. In the earlier days of liberalization, separate licences basic and cellular mobile services were issued. Subsequent to issue of Unified Access Service License guidelines in November 2003, all new entrants obtained UASL for providing telecom access services in the country. Telephony access service licences are being issued on circle/service area basis. For carriage of national and international long distance traffic separate license viz National Long Distance License and International Long Distance License are being issued on pan-India basis.

2.1.1 Multiplicity of networks and service providers

In the current scenario of liberalization service providers are operating different types of networks and offering differentiated products and services to subscribers and to other service providers. There are access – fixed and mobile and long distance – national and international and Internet services. Access service providers and NLD cooperate to give national long distance service to the end user. A fixed access service provider will compete with other fixed access service providers, and to the extent fixed service is substitutable by mobile service, with mobile access providers in the same service area. Interconnection is required between both cooperating and competing networks. There would be a large number of permutations and combinations making the interconnection scenario fairly complex. Various types of interconnections are listed below:

- Basic with Basic
- Basic with Cellular
- Basic with National Long Distance
- Basic with International Long Distance
- Mobile with Mobile

- Mobile with National Long Distance
- Mobile with International Long Distance
- National Long Distance with International Long Distance

Situation is further complicated by the number of licencees for each service within a service area. According to information on DOT web-site as of 30th October 2008 there are 2 basic, 53 CMTS, 226 UASL access licences in the country. There has been no capping on the number of service providers and an open well defined spectrum policy has ensured 5-8 access providers in each licensed service area. In the long distance segment, 23 National Long distance (NLD) and 18 International Long Distance (ILD) operators are licensed. In the Internet domain there are 357 licenced service providers.

2.1.2 Geographical subdivision

Besides different networks, services and products, another element complicating the interplay of interconnecting operators is large size of the country. For proper administration and technical compulsions the country has been divided into telecommunication circles, which are mostly co-terminus with state boundaries with exceptions having more or less than one state in a circle. Access licences are issued circle-wise/service area wise thus these licencees have to negotiate interconnection with service providers within and outside each service area. The circles are further divided into Long Distance Charging Areas (LDCAs) also known as Secondary Switching Areas (SSAs) each roughly corresponding to a district. Each LDCA has a Long Distance Charging Centre (LDCC), which is a Trunk Automatic Exchange in the important town or in the head quarter of the district. The LDCAs are sub-divided into Short Distance Charging Area (SDCAs), which approximately correspond to tehsils. An important town in the SDCA is defined as the Short Distance Charging Centre (SDCC). There are 322 SSAs or LDCAs and 2645 SDCAs in the country. The geographical area co-terminus with Short Distance Charging Area (SDCA) and served by an exchange or an exchange system is defined as “Local Area”. There may also be the case when the licensor has declared any area served by an exchange system to be the local area for the purpose of telephone connections.

2.1.3 Traffic flows

Calls are designated according to where they originate and terminate in relation to the divisions of area described above. Fixed and WLL(M) calls originating and terminating with in the same local area are treated as local calls. For fixed and mobile access provider, a call terminating in a local area other than in which it is originated is defined as a long distance call. The intra circle traffic including the Long distance calls originating and terminating within boundaries of the licensed service area can be carried by Access Providers themselves. The intra circle traffic may also be carried by NLDO with mutual agreement with originating service provider. For carriage of inter circle traffic i.e. Long Distance traffic originating in one telecom service area and terminating in another telecom service area, call has to be routed through licensed National Long Distance Operators (NLDOs). Calls from one circle to another would again be carried by national long distance service providers. International Long Distance (ILD) traffic from fixed and mobile network is routed through network of NLD service providers to the ILD service providers' gateways for onward transmission to international networks. However, in situations where Point of Presence (POP) of ILD service licensee and switch of Access Provider's (GMSC/ Transit Switch) are located at the same station of Level -I TAX the access provider switch can interconnect with the ILDO directly.

2.1.4 Levels of interconnection

The point of interconnection differs on the basis of network and flow of traffic described above. At present, interconnection between basic service providers for local calls is at the SDCC Tandem. The intra circle long distance traffic originated in one basic service providers network be either handed over to another licenced service provider for termination at the far – end i.e. SDCA in which the traffic is to be terminated or at the Near-end, i.e. LDCC TAX (Level II TAX) in the LDCA in which the traffic has originated. The originating inter circle traffic in Basic Service Operator (BSOs) network is being handed over to NLDO for further carriage at the SDCC tandem in which it has originated or by mutual agreement as per license terms and conditions at the LDCC Level-II Tax of the originating LDCA. International Long Distance traffic originated in Basic

Service Operator (BSOs) network is routed through network of NLD service providers, to the ILD service provider's gateways for onward transmission to international networks.

Intra-circle mobile to fixed call is being handed over by mobile operator to basic operator at Level-II TAX in Circles and at SDCC Tandem in Metro service area. Inter-circle mobile to fixed line call is being handed over at SDCC Tandem by the NLDO carrying the call to the terminating fixed line operator. For Inter-circle and intra-circle mobile to mobile calls operators are interconnected at the MSC level. Complete details of the handover points based on the traffic may be seen in the Table II of the Telecommunications Interconnection Usage Charges Regulation dated 29th October 2003. Tables 1.1, 1.2, 2.1 and 2.2 of The Telecommunication Interconnection (Reference Interconnection Offer) Regulation, 12th July 2002 (2 of 2002) may also be referred for details.

2.2 Arrangement before IUC Regime

2.2.1 Initial Arrangements after liberalisation:

Private sector participation for providing services in Indian Telecom sector started effectively from 1994, when on the basis of bidding process, 8 Licenses for providing Cellular Mobile Services were awarded for 4 Metropolitan cites (Delhi, Mumbai, Kolkata & Chennai). When new competitive operators begin service they are not able to establish all the elements of the network and would be dependent on parts of incumbent's network for providing service to their customers. There was no competition yet at that time in the long distance segment, the new service providers therefore had to use DOT network for offering their long distance services to their customers. All local calls from private service providers to DOT and private service providers to private service providers were transited through DOT network and also for national long distance DOT was the only carrier. At that time, the tariff for mobile services was such that the mobile subscriber had to pay fixed monthly rental. For mobile to fixed calls the airtime charge and call charge was levied for calls originated by the mobile subscriber. For calls from Mobile to the Fixed network, the mobile operator retained the airtime charges and paid to DOT in bulk the entire call charges collected from the mobile subscriber for local, STD and ISD calls for the total number of metered calls at the point of interconnect to the fixed network.

For calls originating from the fixed network to mobile, the called mobile subscriber was charged by mobile service provider for airtime, DOT collected the appropriate charges from the fixed subscriber however it was not required to pay any access fee to the cellular operator. For mobile to mobile calls both caller and called party were charged and only airtime charge was levied on them. Ceiling tariffs were also indicated in the License. Before Jan 2001 the POI between fixed and mobile was at Level-I Tax, with 8th Jan 2001 determination it was allowed at Level-II Tax and left to mutual arrangement below Level-II Tax.

2.2.2 Revenue sharing arrangement established by TRAI for Basic network

On 9th March 1999 the TRAI issued Telecommunications Tariff Order, 1999. The NLD and ILD sector was not yet opened up and Long distance and international connectivity were the responsibility of DoT and VSNL respectively. The revenue share regime was put in place by the TRAI vide "The Telecommunication Interconnection (Charges on Revenue Sharing) Regulation 1999". Revenue sharing for Basic services and cellular mobile services was separately specified in the Regulation. For calls originated in a basic service provider's network and transited through or terminated in another basic service provider's network, the specified revenue sharing arrangements were as follows:

- For Local Calls- Bill and keep.
- For Domestic Long Distance Calls- The originating/transit service provider to pay Rs. 0.48 per unit of measured call for traffic delivered from its network to the network of the transit/terminating service provider for the call units measured at the point of interconnection for its further carriage from the point of interconnection to destination, based on the STD pulse rate. No such charge was required to be paid if the point of interconnection was at the destination SDCA.
- For International calls- The originating service provider to pay Rs. 0.66 per unit measured call to the transit service provider (at that time the Department of Telecommunications), for the call units to be measured at the point of interconnection. No arrangement was specified in the regulation for addressing the revenue sharing arrangement between Videsh Sanchar Nigam Limited, the only ILDO at that time and the DoT.

- No revenue was shared between basic service provider and cellular service provider for calls originating from the former's network.

2.2.3 Revenue sharing for mobile networks

The tariff structure as specified by TTO'99 was such that for calls from PSTN to mobile the called subscriber had to pay airtime charges. For calls from Mobile to PSTN, the tariff comprises the Airtime plus PSTN charges for local or long distance as applicable from time to time to the fixed network. For Calls from Mobile to Mobile within Metro Licensee Service Areas both called and calling party were required to pay airtime. For Mobile to Mobile Calls other than metro area, the tariff to comprise airtime plus a supplementary long distance charge based on distance.

The revenue sharing arrangements as specified in "The Telecommunication Interconnection (Charges on Revenue Sharing) Regulation 1999" for calls originated in a cellular mobile service providers network and transited through or terminated in another service providers network, was as follows:

- For local calls from cellular mobile to basic service provider- mobile service provider pays to basic service provider @ Rs. 1.20 per metered call.
- Domestic long distance calls from cellular mobile to basic service provider- Cellular service provider collects from its subscriber the airtime and call charges and pays to DoT the call charges at a rate applicable to domestic long distance calls. The specified charge to be paid to DoT was Rs. 1.20 per metered call, with the number of metered calls measured at the pulse rate applicable to basic service long distance calls. The chargeable distance was taken equal to the distance of the call carried by the basic service provider for an equivalent STD from point of interconnection to destination.
- International Calls from Cellular Mobile- As per the applicable tariffs the Cellular service provider collects from its subscriber the airtime and call charges and pays the call charges to DoT at a rate applicable to international calls. The specified charge was Rs. 1.20 per metered call, with the number of metered calls measured at the point of interconnection at a pulse rate

applicable to an equivalent international call made by a basic service subscriber.

- For Cellular to Cellular Calls: For local/domestic long distance calls carried (partly) by basic service provider, an amount to be paid to DoT at a rate applicable to local/domestic long distance call.
- The regulation did not specifically address any revenue sharing arrangements among cellular mobile service provider for mobile to mobile calls.

2.2.4 Inception of revenue share for cellular operator from Long Distance calls

As mentioned above that for domestic long distance calls from cellular mobile to basic service provider, cellular service providers collected the airtime and call charges from their subscriber and paid to DoT the entire call charges collected from the subscriber at a rate applicable to domestic long distance calls. The cellular operators were not getting revenue share of call charges pertaining to the long distance calls originated from their network. The Authority, vide its determination dated 8th January 2001, allowed mobile operators to retain 5% of such pass through revenue, paid to the basic service providers on account of the fact that cellular mobile service providers incur billing & collection costs and bad debt costs on the amount of revenues they collect from their subscribers and pass on to the basic service providers for carriage of calls on the fixed network of Basic Service Provider,. On 14th December 2001, the Authority issued "The Telecommunication Interconnection (Charges and Revenue Sharing) Regulation, 2001 (5 of 2001)". The basic principles of revenue sharing remained the same however revenue sharing arrangement for WLL(M) services has been included and slight reduction in some of the charges were specified.

2.3 Inception of cost based IUC regime and subsequent amendments

2.3.1 The revenue sharing arrangements specified in the revenue sharing Regulations were interim in nature. Moreover, the revenue sharing regulation was applicable, when the carriage of a long distance call involved only two Networks i.e., one of the access provider (BSOs/ CMSOs) and the other of the incumbent. The Guidelines for Introduction of Competition in National Long Distance Communication was issued in August 2000 on the basis of TRAI's

recommendation dated 13th Dec 1999 and subsequent comments of TRAI dated 15th May 2000 on DOT views on the TRAI's Recommendations. With the induction of the new NLDOs, the need arose to share the total carriage charges from the point of origination to the point of termination between at least three operators based on detailed cost analysis of origination, transit and termination. To develop a general framework for interconnection in the context of private NLD operators' entry into the telecom service market and to evolve a methodology for charging carriage of long distance calls in a Multi-operator environment, TRAI issued consultation paper dated 14th December 2001 titled "Issues Relating to Interconnections between Access Providers and National Long Distance Operators". This consultation paper marked the beginning of the preliminary cost based IUC determination exercise. The paper proposed a number of methodologies for calculating origination, transit and termination charges in a multi-operator environment based on international best practices. The paper also identified the telecommunications network elements involved in the carriage of a long distance call from its origin to destination in a multi-operator environment.

2.3.2 The outcomes of the consultation process inter-alia necessitated a model interconnect agreement that would facilitate a new entrant's connectivity with the PSTN. The consultative process continued with the consultation paper on Reference Interconnect Offer (RIO) in April 2002 based on which RIO regulation was issued in July 2002. The Reference Interconnection Regulation mandated publication of a reference interconnect offer (RIO) for any service provider with significant market power. The interconnection usage charges were discussed in Article 13 of the model RIO, Schedule 5 and 6 of the model RIO are also relevant in this regard. Article 13.3 of the RIO required furnishing the details of network element cost as detailed in Schedule 5 to the Authority. It was also mentioned that these costs shall then form the basis of the IUC for various types of calls and these shall be entered in schedule 6 of the model RIO.

2.3.3 Detailed exercise was conducted on the basis of data submitted by BSNL in the specified schedules of RIO along with the data of Annual reports of DoT and BSNL. The estimate of the IUC were prepared by the TRAI for origination, termination and carriage charges for NLD traffic under the bottom up and top

down approach. A consultation paper on Basic Service Tariff and IUC regime was issued on 23.9.2002. In this paper IUC estimates using three approaches viz. Bottom Up, Top Down and Best International practice (Ovum Benchmark study) were compared. This consultation process culminated into the first IUC Regulation. On 24th January 2003, the Authority notified amendment to Telecom Tariff Order (TTO) and an Interconnect Usage Charge (IUC) Regulation.

2.3.4 The IUC Regulation dated 24.1.2003 was to be implemented w.e.f. 1.4.2003. Various schedules specifying origination, carriage and termination for intra circle and inter circle as well as inter network calls were part of this regulation. In this Regulation the charges differed on the basis of type of network in which call originated or terminated and distance travelled in a particular network. In case of cellular network, the charges also differed on the basis of the destination i.e. metro and non metro networks. The Termination charge varies from 15 paise to 50 paise and Carriage charges were from 20 paise to Rs 1.10 depending on the distance. Interconnection charges (the recurring amounts payable for the set-up costs e.g. Port Charges and Leased Line Charges) continued to be governed by "The Telecommunication Interconnection (Charges and Revenue Sharing) Regulation, 2001(5 of 2001)".

2.3.5 Service providers were to file IUC compliant tariff plans to the Authority in advance. However, given the late receipt of such plans and the fact that the plans required to be widely publicized and the issues related to settlement of inter operator interconnect charging was also to be resolved, the Authority issued a consultation note on IUC on 30.4.2003 and also deferred the date of implementation of IUC Regulation to 1.5.2003. These issues were settled with the concurrence of the operators through a number of meetings amongst the operators and also their meetings with the Authority and IUC regime was implemented from 1.5.2003. This IUC Regulation has introduced the regime of Calling Party Pays (CPP) which is perhaps the biggest factor in growth of telecom services in India.

2.3.6 After the implementation, TRAI received several communications with respect to both the tariff regime and the IUC regime. The various concerns, especially with respect to the IUC regime, pertain to aspects such as sustainability of the IUC regime over time, consistency among the different Schedules of the IUC Regulation specifying the regime, steps to discourage growth of grey area traffic and the possibility of considering improvements like specifying identical termination charges, higher origination charges on account of higher Operational Expense (Selling, acquisition, billing and bad debts) at the originating end etc. For improving and streamlining the IUC regime the Authority decided to go through another consultation process and a consultation Paper on "IUC issues" was issued on 15th May, 2003. After completing the consultation process a revised IUC Regulation was issued on 29.10.2003. This Regulation superseded the IUC Regulation dated 24.01.2003 and came into effect from 1.2.2004. This was well accepted by the industry and has been instrumental in growth of the industry and reduction in tariff. At present the IUC Regulation dated 29.10.2003 is the principal regulation.

2.3.7 The Authority conducted another review of IUC/ADC regime based on its consultation paper of 17th March 2005. This consultation paper recalled, in particular, a wide range of issues which inter-alia included interconnection usage charges (carriage and termination), possible differential termination charges for national and international calls etc. The Authority, after following the public consultation process and discussions with the industry notified a revised IUC regime on 23rd February 2006, which has been implemented from 1st March, 2006. In this regulation, the Authority decided to put a ceiling on carriage charges while other IUC components were kept same for the reasons given in the explanatory memorandum accompanying the regulation. The change provided a strong basis to the operators to reduce the long distance tariffs as well as to pave the way towards more and more usage of the long distance networks. The Regime notified under the 23rd February 2006 Regulation, was followed by announcement of One India scheme by BSNL. Subsequently for STD calls between Delhi and Mumbai, local call rate for fixed line subscribers were offered by MTNL. Some of the private service providers also offered similar tariff plans.

2.4 Description of the prevailing IUC regime

Interconnection Usage Charge (IUC) means the charge payable by one service provider to one or more service providers for usage of the network elements for origination, transit or termination of the calls. A call has three portions Origination, Carriage/ Transit and Termination.

2.4.1 Origination Charges

The originating Service provider, is allowed to retain origination charges as the residual after payment of charges for carriage/transit and termination. As per the prevailing regulations origination charges are under forbearance. Forbearance has been defined in the IUC Regulation dated 29th October 2003 as "*Forbearance means that the Authority has not, for the time being, notified any charge for a particular telecommunication service and the service provider is free to fix any charge for such service. The Authority, however, has a right to intervene at any stage after the introduction of the charge.*"

2.4.2 Termination Charges

2.4.2.1 The terminating service provider, whose network is used for terminating a telecommunication message is supposed to get paid for usage of its network. In simple words, the service provider from whose network the call originates pays termination charges, to the service provider on whose network the call terminates.

2.4.2.2 As per the prevailing regulations, the uniform Termination Charge @ Rs. 0.30 per minute for all types of calls viz. Local, National Long Distance and International Long Distance, has been specified.

2.4.2.3 In its 23rd February 2006 review, Authority noted that due to increased volume of traffic the termination charges especially for mobile services may be lower than specified charges. The Authority had also estimated and found that mobile termination charges as well as fixed termination charges could be lower than the present specified level of Rs.0.30 per minute. In spite of this, the Authority decided to keep the fixed and mobile termination charges unchanged mainly on

account of the reasons given in Para 58 & 59 of the February 2006 IUC Regulation. The reasons in brief are as follows:

- With the growth in subscriber base, addition of capacity is also required to have better QoS.
- MTC is already lowest in the world and 10 to 12 times lower than MTC in other countries.
- The mobile coverage in terms of population in India is only about 35% of the population which is lowest in the world and mobile operators have to increase their penetration into rural areas and therefore, large investments are to be made to cover even the 77% (world average) of the country's population.
- To achieve a higher growth and tele-density in the country, and therefore concern for maintain viability and sustainability of various innovative and competitive tariff schemes which may have a higher component of incoming calls.

2.4.3 Carriage Charges for Long Distance Calls within India

Carriage Charges prevalent from 1st February 2004 to 28th February 2006

2.4.3.1 In 29th October 2003 IUC exercise the cost based charges for long distance carriage were calculated as Rs. 0.21, Rs. 0.65, Rs. 0.85 and Rs. 0.94 per minute corresponding to distance slabs of 0 to 50Kms, 50+ to 200 Kms, 200+ to 500 Kms and above 500 Kms respectively. These costs were calculated based on data of BSNL, who is an integrated operator. Considering that the costs relevant for stand alone operators would be higher, the carriage charges in the IUC Regulation were specified at slightly higher levels for the last two distance categories: they are about 10% higher for the second highest distance category and about 20% higher for the highest distance category. The Carriage Charges for long distance calls within India, as specified in the 29th October IUC Regulation are Rs 0.21, Rs. 0.65, Rs. 0.90, Rs. 1.10 per minute for the slabs mentioned above.

2.4.3.2 On the above specified carriage charges, the service providers were allowed to negotiate a spot value within +/ - 10% of the long distance calls carriage charge beyond 50 Kms.

Carriage Charges from 1st March 2006 to present

2.4.3.3 The Authority reviewed the carriage charges in its 23rd February 2006 Regulation. The overwhelming opinion of the stake holders was that the Authority should continue to fix carriage charges and regulate the same at least as a ceiling charge. Keeping in view the various comments offered by the stakeholders and its own analysis, the Authority moved away from a regime of slab based specified carriage charges introduced in 2003 to a ceiling based regime in which the ceilings was specified as Rs. 0.65 per minute.

2.4.3.4 It may be noted that calculation of carriage charges in the IUC Regulation dated 29th October 2003 was done on the basis of cost data of BSNL alone and keeping in view that the costs relevant for stand alone operators would be higher, the carriage charges in the IUC Regulation were therefore specified as slightly higher amounts for the last two distance categories. While prescribing ceiling in 23rd February 2006 Regulation Authority had provided mark up of 25% on the weighted average cost of carriage of NLDOs operational at that time.

2.4. 4 Carriage Charges for International Long Distance calls :

For international long distance calls, international carriage charges and termination at foreign end are settled between ILDOs and foreign carriers. As per the clause (c) of Schedule II of the IUC Regulation dated 29th October 2003, these charges are under forbearance.

2.4.5 Intra SDCA Transit Charge:

2.4.5.1 The Authority has adopted the policy of forbearance for the Transit Charges for intra-SDCA calls subject to the following condition:

"*Direct interconnection between Access Providers is mandatory. For exceptional cases of Intra-SDCA transit, operators may decide the charges through mutual negotiation. However this should be lower than Rs. 0.20 per minute."*

2.4.5.2 Para 65 and 66 of the explanatory memorandum of IUC Regulation dated 29th October 2003 are also relevant w.r.t. transit charges. The same are reproduced below:

"65. The Authority took account of the fact that it has already mandated direct connectivity among various service providers. However, for exceptional situations where direct connectivity may not be possible or due to emergency breakdown etc., and for overflow traffic, carriage charges may be mutually negotiated but this should be lower than Rs. 0.20 per minute. The Authority will intervene if there is a regulatory concern in this regard"

"66. The Authority also forbears with respect to NLDO to NLDO transit charges"

2.4.5.3 This charge is relevant in the present circumstances as in the absence of adequate direct interconnection; overflow traffic destined for BSNL's CellOne Network is being handed over by private operators at L-1 TAX PoIs. BSNL is charging 19 paise as Transit Charges. Various concerns were raised by operators w.r.t. the transit charge.

2.4.6 Transit Carriage Charge from Level II TAX POIs to SDCA

2.4.6.1 As per the present regulatory framework intra circle mobile to fixed line traffic is being handed over at Level II TAX. From Level-II to SDCA level traffic is being carried by BSNL. For this carriage, mobile operators need to pay to BSNL transit charge of 20 Paise per minute.

2.4.6.2 In para 84 of the Regulation it was mentioned that "*Traffic hand-over for or from Cellular Mobile Networks shall normally take place at Level II TAX POIs and a carriage charge of Rs. 0.20 per minute would be applicable. If handover is at any other TAX level, the relevant carriage charge must be paid."*

Chapter 3

Need for Review of the IUC

3.1 Impact of IUC on telecom sector

The establishment of IUC is an activity of far reaching consequences for the telecommunications sector. It is an important tool for implementing policy and to give desired direction and impetus to growth of services. It enables competition, welfare of the consumer, sustained growth of telecommunications and economic development of the country. It can be used to promote faster infrastructure development in desired segments, technologies and geographical areas. It would not be incorrect to say that the IUC regime determines not only the revenue accruals but also how this revenue is distributed among service providers various networks and services and promotes their development in correct measures. Though IUC defines the wholesale inter-operator tariffs and not directly the retail tariff of customers, it would be naïve to assume that it has no bearing on the retail tariff as well. A well-designed IUC regime would cover cost and allow reasonable margin to service providers to enable them to offer innovative tariff plans. In case of interconnection charges being higher than the current costs the service providers would be able to offer subsidies to customers on retail tariff. It is important to consider some of these effects of IUC in a little more detail.

3.1.1 Facilitating effective interconnection

IUC defines the rules of the game among different types of service providers. In case of networks that need to cooperate for providing specific products and services to the customers, for example access and NLD operators cooperating to provide national long distance calls, then each such network would try to maximize its net revenue by imposing as much network cost as possible on the other operator. In a competitive situation where service providers are offering similar services in the same service area then each would try to transfer maximum cost to the other and maximize its profit. New service providers would initially have small network and low subscriber base and need to interconnect with incumbents' networks to be able to give proper service to its customers and provide competition. The incumbent would not want the new competitors to take

advantage of their network, take away their business and earn high profits. This may lead to protracted costly negotiations and a game of one-upmanship between competing service providers at the cost of efficient services to the customers which, in the first place, was the aim of telecom reforms and increasing competition. It is in the interest of the public that effective interconnections take place. The incumbent operators may feel that commercial benefits of interconnection accrue principally to the smaller network: its customers benefit more from the larger range of communication possibilities made available. They may therefore impede interconnection by charging a high price when regulation so allows or delay when rates are mandated by regulation. In addition any network will, other things being equal, benefit from high interconnection charges that enhance its revenues.

3.1.2 IUC and tariff

The primary purpose of IUC is to facilitate inter operator settlement. However, the impact of IUC on the retail tariffs cannot be ruled out. The 'waterbed' effect is usually cited by the service providers in which reduction in certain interconnect charges may result in increase of tariff. This of course would carry the assumption that full advantage of higher IUC has been passed on to the customer in the first place. Nevertheless, a properly designed IUC regime would allow more flexibility of development of sustainable tariffs that would be affordable to the majority of consumers and would give fair and reasonable returns to the service providers. Apart from accommodating the IUC, there should be margins for further reduction to meet competition and there should not be any incentive for call bypass. The IUC can transfer network costs between operators and thus affect their relative scale and prosperity therefore the IUC regime should also ensure that the access network does not pass on the burden of its own tariff decisions to other networks involved in completing the call or to new competing access networks as high termination charges. The IUC should not provide any regulatory hurdle and ease and flexibility should always be there for introducing innovative tariff plan by the service providers.

Another area where IUC is important is the differential charging of on-net and off-net calls. New service providers not having much subscriber base often say that revenues accrued from high termination rates are being used by large incumbents to subsidize tariff for calls between its own customers. An operator may differentially price these calls by charging itself lower termination and/or other charges than it would to the other operators seeking interconnection. To be competitive a new operator would have to match its off-net retail tariff with the on-net tariff of the large operators. If the termination charge is high then this tariff may force the new operator to incur losses. With lower termination charge the new operator would be able to give effective competition. The interests of service providers are therefore competing in such a situation.

3.1.3 IUC and growth of telecom sector

The IUC is major contributory factor in spurring growth, teledensity and commercial activity in the country. While continuing the current level of termination charge on mobile networks TRAI had said that termination charge both on fixed and mobile could be lower than existing 30 paise per minute but in spite of this TRAI did not reduce the mobile termination charge on account of capacity building, rural penetration and quality of service objectives.

Established incumbents may sometimes use the skewed development argument to ask for high termination charge. They may argue that the profits from termination rates are a special source for the mobile operators to finance further network developments and innovations, in particular 3G-network deployment. It is argued that regulating termination rates may have negative impacts on the competitiveness of the market structure in the mobile market. These arguments may not be relevant in justifying significant amount of transfers from economic perspective. It also goes against the argument of vigorous and effective competition. The capability of withstanding change of termination charge may not be same among all mobile operators. The retail price of new and smaller mobile operators may already be under pressure because of IUC structure and on-net tariff of larger players, then their already relatively weak competitive position in the market may be weakened further. Potential competitive impacts on the mobile market should not give reason for keeping transfers forever but give

reason for regulators to take care of potential market impacts when defining their remedies with regard to termination rates. In case the termination charge is perceived to be high then regulators may have to see whether a glide path is justified to bring down termination rates closer towards costs or slam-dunk approach would be better.

3.1.4 IUC and inter-operator revenue distribution

It has been often argued that high termination charge unduly enriches the incumbent operators and transfers cost of their network to the new operators. Termination charges are integral part of business model of operators. It is estimated that more that 80% of the traffic terminating on mobile networks originates from mobile subscribers of other networks. Though the termination charges may not affect the total net revenues that accrue to all operators combined as every rupee of mobile termination revenue for one mobile operator is equal to a rupee of termination cost for the other mobile operators but it could alter the distribution of this revenue. Mobile operators who have a large subscriber base would seem to benefit from high termination charges at the cost of smaller and newer operators as the latter are net payers of large termination charges as a higher proportion of their calls terminate of larger mobile operators. The termination charge for most operators, particularly new and smaller operators, becomes an item of cost as they are net payer of termination charge. Higher termination charge reduces their margins and their competitive ability. This however would have to be seen if larger perspective to draw any definite conclusions. If the charges are cost based and competitive pricing prevails, all operators would be able to get fair returns on their investment.

The competition is effective when service providers recover their costs mostly from their own end users, who can choose among competing service providers, rather than from subscribers of interconnecting networks for whom the terminating access provider is a de facto monopolist. The higher termination charge gives distinct cost advantage to large operators over competing new and smaller networks which in turn helps them to consolidate the termination market by acquiring more subscribers. Termination costs above the actual cost may lead

to market distortions. On the other hand, lower termination charge may increase service uptake.

The incumbent operators feel that IUC is important for long term sustainability of the telecom sector specially when ARPU is falling, margins are declining and tariffs are reducing. Huge investments have been made by the service providers, Return on Investment and availability of funds to invest is affected. An immediate need is to encourage the operators in rural areas. The cost of providing the telecom service in rural/semi-urban area is relatively high. Move to 3G would require additional funds. In such a scenario, the Government must partner the industry through enabling economic viability of providing rural connectivity through a fair and progressive cost-oriented IUC regime.

There are a large number of customers who are low usage customers and do not originate many calls. However, these customers may receive many calls from other affluent callers. The incentive to the service providers to keep low calling customers on the network is provided by the termination revenue. Termination revenues from inbound calls are particularly important to the overall economics of serving these low usage customers. If the termination charge were to reduce these customers would adversely affect the service provider's revenue thereby forcing the service provider to cream-skim by not taking on low calling rate customer.

The regulators have gradually sought to redress the balance by setting mobile termination charges on a cost-oriented basis, or by agreeing transition paths with mobile operators. If the reciprocal flow of calls is balanced payments in either direction would cancel out. In these circumstances the parties might find it efficient to agree to set charges equal to incremental cost. This result would not apply if flows were not balanced, as the operator with more incoming calls would seek a higher agreed rate than its interconnecting partner.

3.1.5 IUC and policy implementation

The establishment of IUC needs to take into account often conflicting views of the stakeholders and also reconcile a number of complementary and conflicting

objectives The methodology used would decide the level of charges and ensure that direction of development of the sector is consistent with the plans and policies. Efficient interconnection is crucial to the effective implementation of virtually all public policies opening competitive opportunities in telecommunications.

One has to consider the transfers from fixed to mobile and mobile to mobile networks associated with call termination. It has to be examined whether they are justified from an economic or social welfare perspective. The impact on competition, prices, quality, incentives and investment in fixed networks and mobile network have to be seen. The regulator can then examine what remedies are required at national level to put right any identified distortions and restore a level competitive playing field.

An effective interconnection framework is therefore the foundation to developing a competitive marketplace which is seen as a means to provide market incentives for rapid and efficient telecommunication infrastructure development. Effective interconnection framework also provides benefits to a host of other stakeholders. Network operators benefit from increased demand. Workers benefit from increased employment. Economies expand, and governments benefit from increased tax revenues. Societies on the whole benefit from new applications for health, education, and participative governance.

3.1.6 IUC and the regulatory cost

As evident from all previous consultation processes, establishment of IUC regime and its review is a complex exercise. It needs to take into account detailed costing analysis of network elements, appropriation of costs to services, fair return to the network owner, incentive to the small and new operators, welfare of consumers etc. It would also be important to decide, based on the availability of data and state of development of the network/competition, whether top-down or bottom-up approach would be used, costs would be historical, current or future, fully allocated or incremental, depreciation, cost of capital, efficiencies because of adoption of new technologies and processes, licence fee, network expansion objectives, investment incentives, symmetrical vs asymmetrical charges and so

on. There is substantial cost involved at the regulators end specially to evaluate LRIC models, if applied, for various networks and to verify claims and counter-claims. There would be cost involved at the service providers' end in preparing and giving detailed information required for such an exercise and implementing the changes in their networks.

3.2 Factors necessitating review

3.2.1 Monopoly in termination remains

Termination of voice calls on each mobile network constitutes a separate market in which the terminating operator has a 100% market share. Furthermore, the callers who pay for the call under the Calling Party Pays arrangement have little or no countervailing power. They normally have no commercial relationship with the terminating operator and no choice over who will terminate their call.

Consequently, terminating operators may have no incentives to keep charges low. Barriers to entry may be high as no alternative provider may currently terminate calls on a SIM card without the agreement of the mobile operator that provides service to the called party. Because the need for intervention is independent of the number of firms terminating calls (and the level of competition in call origination), regulation is currently not a transient but a permanent feature. Thus, a growth in the number of providers of mobile services, because of availability of more spectrum or liberalization of its use, is unlikely to have any impact on competition to terminate voice calls, as each provider is likely to have a 100% share of call termination to its customers.

Excessive charges would be detrimental to consumers, and that the 'waterbed' effect, by which excess profits from termination services may be returned to mobile users via lower retail prices, does not provide a justification for the structure of charges that would arise in the absence of regulation. The first reason is that the waterbed effect may not be complete, as competition in the retail market may not be sufficient to drive out all of the excess termination profits that would arise in the absence of regulation. However, secondly, even if the waterbed

effect was fully effective in returning excessive profits to consumers, there may be detrimental effects of excessive termination charges:

- Reduction in economic efficiency; the presence of high termination charges subsidising low prices for retail mobile services provides consumers with distorted price signals.
- Undesirable distributional effects; in case of asymmetric termination charges, the segment having higher termination charge might subsidize originating calls whereas the other segments would not receive such benefits.
- Distortion of consumer choice; above-cost charges may distort consumer choice between making on-net calls and off-net calls and also between fixed and mobile calls if one of them has higher termination charge.

3.2.2 Change in design parameters

In cost based or cost oriented models many factors like cost of the network, operational cost, minutes of usage, number of subscribers go into evaluation. In the last few years, since the inception of the current principal IUC regulation, a number of these might have undergone enough change to warrant revaluation of the charges. With increasing competition, massive growth of subscribers, and reduction in tariff the total traffic its distribution and calling pattern might have undergone change.

3.2.3 Policy and regulatory changes

A number of policy and regulatory changes have happened since the IUC regulation was first issued in 2003. With the government favouring infrastructure sharing a number of infrastructure companies have come into existence. USO has also floated tenders for installing towers that can be shared by a number of service providers. Sharing of passive infrastructure brings in significant savings in terms of CAPEX and OPEX. For the service provider hiring such infrastructure, there is initial savings in CAPEX. The real savings would come from OPEX. Fixed OPEX (O and M, insurance and valuable OPEX power and fuel , landlord rent etc.) is typically 20 to 25% of the total OPEX and is shared by the service providers sharing the infrastructure. Backhaul fiber sharing would

also allow savings in cost of providing service. Certain categories of network equipment particularly electronic equipment have shown a declining trend in prices. The last few years there have also seen high levels of CAPEX investment by operators in the urban areas and smaller cities in towns. There has also been an increase in some elements of OPEX costs such as wage, costs, steel diesel etc. Some amendments have been made to the licencing conditions e.g. use of dual technology by full mobile service providers, NLD allowed to carry intra circle mobile to fixed traffic. Also there are recommendations on Mobile Virtual Network Operators (MVNO), Mobile Number Portability (MNP) under consideration of the licensor.

3.2.4 Technological developments

Compulsions of handling traffic efficiently, reducing the CAPEX and OPEX and with a view to eventually migrate to NGN more and more operators are moving towards Internet Protocol (IP) network. It would be necessary to consider how these changes would affect IUC

As auction and subsequent deployment of 3G services is round the corner it would be necessary to understand the views of the service providers on whether both 2G and 3G voice termination should be included in the same market or different charges should be prescribed. Current regulatory treatment of 3G varies considerably from country to country. Some service providers have argued that regulation of 3G mobile termination charges will reduce their incentives to invest in 3G mobile technologies. Other parties have insisted that 3G mobile voice services would be no different from 2G service then 3G termination charges should be symmetric with 2G termination charges. Although most of the countries have carried out their market analysis on mobile termination, little effort was dedicated to analyzing the position of the 3G player. They found 3G operator as being an SMP operator, basing their decision on it having 100% market share in the market for wholesale voice call termination. Even though regulators imposed the SMP status over 3G operator, they chose different remedies to correct the market. Remedies adopted range from a ‘light touch’ in the UK that chose not to impose any regulation upon 3G operators and at the other extreme were Sweden and Austria. In Sweden, the regulatory Authority

chose to impose all remedies upon 3G operators, including a price ceiling over its termination. Austria decided to go for the LRAIC method.

It is increasingly being realized that in converged networks interconnection is an important tool for the facilitation of competition in both services and facilities. In these networks use of Internet Protocol based packet switched services are bound to affect the kind of interconnection products that would be required. These products would include new network products in both the access and the core network. They also raise challenging issues like the kind of service products relevant for the provision of voice telephony (including mobile, fixed and VoIP), Internet access, broadcasting services etc. and interconnection products that will become relevant in Next Generation Networks(NGN).

Interconnection would basically depend on availability of standards and the incentives for operators to interconnect. The standardization issue has partly become more transparent with the layered architecture of the communication networks and partly more complicated because of the profusion of standards for the different layers. The issue of interconnection regulation becomes more diversified with the possibility of many different forms of interconnection agreements relating to the different layers in the network architecture. As phone calls will only be one out of a number of different types of communication services in a packet switched network, the core issue will be interconnection between unbundled network elements and exchange of data in an IP network. Moreover, the current regulatory framework for interconnection focuses on interconnection of telecommunications networks, while for broadcasting networks are either unregulated or subject to different types of regulation. Convergence implies that harmonization would be necessary in order to achieve technology neutral regulation.

As mentioned earlier, the change in technology from circuit-switched to IP-based networks affects the cost of providing and running networks. Consequently, the regulators would need to consider capacity-based interconnection rules to revise the figures they determine to take into account the change in the nature of the networks. IP telephony, for example, has dramatic impacts by reducing the costs

of providing voice telephony services. Technology is steadily decreasing the cost of networks, while the costs of billing and customer service may be falling more slowly. This creates strong downward pressure on retail prices.

3.3 Preliminary consultation with the stakeholders

The right interconnection usage charge would have to strike a balance among a number of factors, some of which may conflict with each other. Sustainability of service providers' operations, consumer interest, growth of telecom sector, ease and flexibility of introducing innovative tariff plans by the service providers are some of the factors that need to be considered. The IUC review being a complex exercise and one that affects the entire telecommunications industry directly and which could only be completed with close co-operation of the service providers, the Authority considered it appropriate to engage the service providers in a pre-consultation process where the service providers would give their opinion about the cost models and provide detailed information about network, traffic and cost data. Towards this end the service providers were requested vide TRAI's letter no dated 12th September 2008 to furnish the following information by 30th September, 2008:

(i) What should be the principles of the review for creating the future IUC regime that meets the requirements outlined above?

(ii) What should be the components of IUC that should be reviewed? What should be the level of each component that requires review? Please give detailed justifications to support your viewpoints

(iii) Explain the approach/model/costing methodology adopted to arrive at results in (ii) above. Give justification for adopting the proposed approach, model or methodology

(iv) Provide data on costs, traffic and revenue used to arrive at the results at (ii) above including the assumptions underlying the cost calculations in detail.

They were also asked to furnish the following information as part of reply to the above or otherwise

(i) The network architecture considered in the proposed model and details of routing factors;

(ii) The network elements taken into consideration for providing the specific services and network element wise apportionment of relevant

CAPEX (both historical as well as current cost) and relevant OPEX and also the basis of distribution of costs;

(iii) In case the same network element is used for providing more than one services, the utilization factor/capacity utilization for providing the specific services for determination of which it is being used;

(iv) Life of cables/equipment/buildings or other network elements considered in the proposed model;

(v) Details of the assumptions used in the model, if any;

(vi) Total number of incoming and outgoing minutes (off-net and on-net separately) handled for various services;

(vii) Identification of traffic sensitive network elements and relevant minutes of usage for each of the corresponding network element.

(viii) Justifications as to why the model proposed by you should be used for determination for interconnection usage charges;

Most of the operators asked for extension of time on the grounds that the requisite information is very complex and elaborate and collection/compilation of data would require more time. The Authority extended the last date of submission up to 15.10.2008 and finally up to 31.10.2008. The industry has presented divergent viewpoints on most aspects of IUC. The main responses received are summarized in **Annexure –I**.

Chapter-4

Telecommunications Pricing and Costing

4.1 Telecommunications Pricing

4.1.1 Telecom Pricing Objectives

The telecom sector's objectives cover a wide canvas including enhancing efficiency and flexibility of operation, financial viability of the sector, promoting investment and innovation, stimulating demand and competition, addressing unfair competition, providing high quality service to consumers and meeting social objectives such as universal provision of telecom network services at fair and reasonable rates. The National Telecom Policy 99 envisages a number of objectives for the telecommunications sector in the country. Efficient cost based pricing is important for achieving these objectives. At the same time flexibility to offer innovative plans and respond to competitive pressures would be in the interest of service providers and consumers.

Regulators seek to achieve three primary objectives namely: Financing Objective: ability of operator to achieve sufficient revenue to finance on going operations and future investments; Efficiency Objective: Efficiency is achieved when prices equal marginal cost of producing the service and/or when increased levels of output are realized through unchanged levels of input; Equity Objective: Equity objectives generally relate to the fair distribution of welfare benefits among members of society. Operator-operator equity and Consumer- consumer equity is desirable.

4.1.2 Telecom Pricing Principles

For the telecom sector, the key principles in setting price/tariffs can include the following.

- Cost basis: Charges must reflect the underlying cost of providing service. In case of ceilings and forbearance, operators should provide justification of how they arrived at the charges by reflecting the underlying cost. On their

part regulators are focusing more and more on cost-based and cost-oriented pricing.

- Unbundling: The prices must be arrived at by considering sufficiently unbundled infrastructure so that service providers do not pay for facilities, which are not part of their interconnection service or product.

- Transparency: Operators must publish details of tariffs and fees and make them available to the public or any interested parties.

- Transparency and non-discrimination: An operator should offer the same wholesale tariff for identical services and should offer discounts where it makes commercial sense, and the discounts should be clearly reflected as discount on the published tariff.

4.1.3 Pricing Methodologies

There are two main approaches to preventing propensity to charge excessively high prices: price cap regulation and rate of return regulation.

- Rate-of-return approach

  This is the traditional method of telecommunications regulation. The regulator allows the service providers to charge the prices expected to produce profits equal to a fair rate of return on the capital invested. The regulatory agencies fix the rate of return that the service providers can earn on its assets. They set the price the service providers can charge so as to allow it to earn a specified rate of return and no more. The regulated price can be reviewed as the situation changes to ensures that the service provider can continue to provide the service, ensuring sustainability of interconnection. Disadvantages of rate of return approach is that it lacks incentive to minimize costs. In rate-of-return regulation, the operator's prices are set at a level sufficient to cover its costs. From a dynamic perspective, therefore, the operator has little incentive to reduce its' rate base or its operating costs.

- Price cap approach

  A flexible price range is usually provided under a price cap methodology, which imposes an upper limit on the average price increase of telecom interconnection services. The price cap regulation is founded on a principle that efficiency and productivity gains by the operator should be passed to interconnecting operators. The Price cap provides greater pricing flexibility and incentive for operator to improve efficiency. As the telecommunication market moves towards competition, form of regulation with incentive to increase productivity might be more desirable.

  The price cap approach has been used in many countries because it is thought to give firms stronger incentives to be efficient. The regulator naturally takes into account the service providers' rate of return. If it is high, the price cap is likely to be reduced; if it is low, the price cap may be relaxed.

- Prices based on costs:

  Prices may be based on short run marginal (or variable) costs, long-run incremental costs (which include investment costs) and fully allocated costs. All cost-based pricing requires considerable information and monitoring, and a number of conceptual and practical problems need to be resolved in measuring and assigning costs to the various telecom services. Price must ensure that it covers its costs. The challenge in defining cost-based prices is that services are usually produced jointly. A large part of the total cost is a common cost, which can be difficult to apportion rationally amongst the different services. A mark-up is required to cover the deficit that would arise if an efficient cost-based price were determined. Different methods for ascertaining the mark-up include: mark-up varying inversely with elasticity of demand of different users or services (Ramsey rule); applying a rule-of-thumb, such as a risk-adjusted reasonable commercial return; and applying different price slabs to different units of usage, or obtaining the requisite revenue through rentals. They are easier to develop since they are based on linear relations with the actual cost information and are easier to understand by accountants. They are based on accounting data that are available to the regulators. A limitation is that the demand is ignored; the price is set by adding a mark-up to the cost. They do not provide incentives for improving the efficiency of the provider and deploying newer

technologies since they cover his full historic cost. They are not always based on causal relations but depend on arbitrarily chosen coefficients for sharing the non-directly attributable cost; hence these do not reflect the actual cost of services.

- Price floors and ceilings

  They can be used for providing flexibility, and to limit an operator from abusing its dominant market position.

4.2 Telecommunications Costs

Determining or verifying the costs for telecommunications services are among the major challenges before the regulators. Nevertheless, cost analysis can be of crucial importance. In particular, regulators use cost analysis in setting or approving prices, including "retail" prices for consumers and "wholesale" prices for competitors e.g. interconnection and in enforcing competition policy. Different cost approaches, concepts, definitions, interpretations and data sources lead to complexity. Generally, the nature of the problem being addressed and the purpose of the costing exercise will determine which the most appropriate approach to follow. There are three fundamentally different approaches to cost analysis viz accounting cost, engineering cost and economic cost:

4.2.1 Accounting cost

It is principally concerned with the recording, classification and interpretation of actual incurred costs by the service provider. Data sources include corporate financial accounts statutory financial statements like cash-flow statements, profit and loss accounts and balance sheet and more detailed management accounting measures. Though the values in an account may represent historical costs or current costs, the focus of accounting is the historical record that bears on the actual cost and revenue performance in the current period for ongoing organizations. If firms are just starting in business special accounting rules may have to be applied. The accounting data as recorded by services providers according to the standards followed in the country have been used by regulators as the major source of information in regulating not only telecommunications but other public utilities as well. Management accounting systems have provided the

main data source for cost of service measurements This typically involves two basic steps. The first step is to identify direct costs or directly attributable costs which are appropriate for regulatory purposes and assign them to service or services that use the cost items represented in the account. An accounting cost study that stops at this first step is called a direct cost study or an embedded direct cost analysis if historical costs are used. The second step in the accounting approach is to allocate the remaining accounting costs across services. This typically occurs in two parts. In the first part, the analyst identifies accounting costs that appear to be reasonably attributable to particular services or to activities whose costs have already been directly assigned. Such costs are sometimes called indirectly attributable costs. In the second part of this step, the analyst allocates costs that appear to be common to all services across. In accounting these are called common or overhead costs. Also in accounting, a cost is considered an overhead cost if it relates to all services that the company provides such as cost incurred for executive salary. This second step creates what is called a fully distributed cost study.

4.2.2 Engineering cost

It is directed to examining the cost of alternative ways of performing specified tasks. This approach is primarily concerned with forward-looking management decisions. Engineering cost analysis assess is different ways of meeting a specified objective, such as provisioning a certain amount of capacity. The goal of engineering cost analysis is generally to determine the optimal method of building telecommunications facilities. Both engineering and economic costing are primarily concerned with management decisions that have not yet been taken. At the completion of the engineering cost analysis, a decision whether to invest in a specific expansion plan will be made. If a decision to invest is taken, the engineering estimates of the cost of that expansion plan are recorded and later compared with the actual experienced accounting costs of the plan, as a basis for improving future engineering estimates.

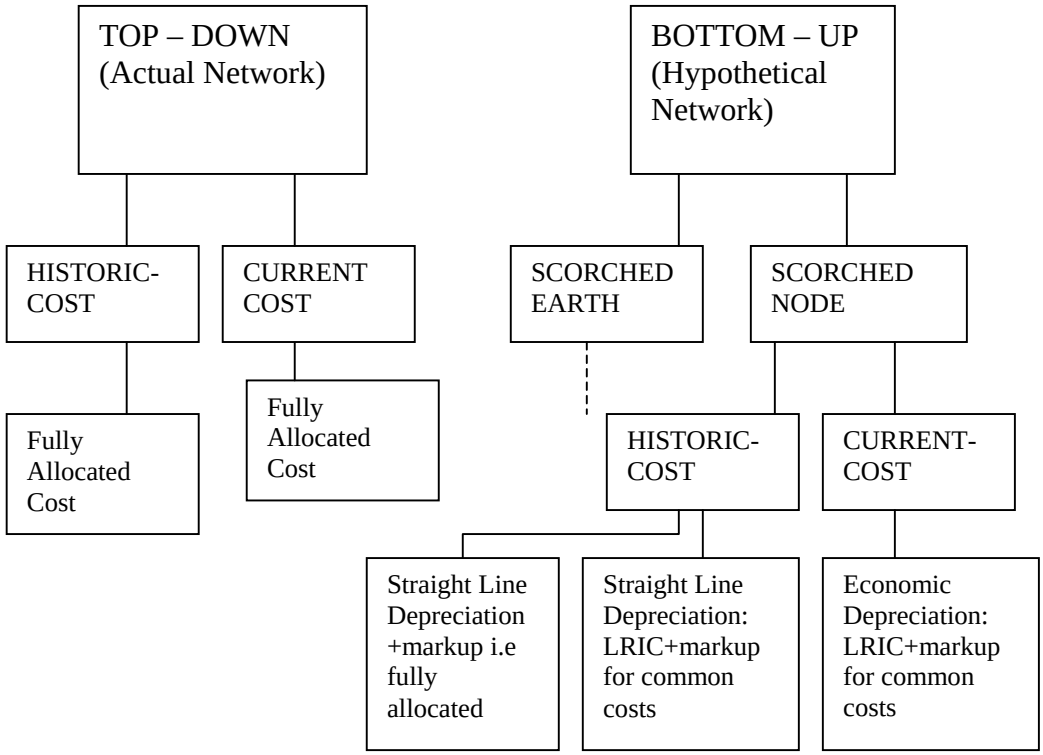
4.2.3 Economic cost

It is concerned with the most efficient way of allocating society's limited economic resources among different possible uses. The economic cost of an activity is the actual forward-looking cost of that activity that emphasizes concepts of cost variability, incremental costs and opportunity costs. This is the cost of accomplishing that activity in the most efficient way possible, given technological, geographical and other real world constraints. Forward-looking costs are the costs of present and future uses of a firm's (or society's) resources. In contrast with the accounting approach, the *economic approach* focuses on how changing the output of the utility will affect the total cost of the company. This cost is the present value of the opportunity costs of the firm, for a specific future production period, and for a specific level of production. Because the economic approach is forward looking, it does not rely upon a particular database of cost data. Economic cost studies in telecommunications regulation traditionally relied upon projections of incremental cash flows associated with changes in output or econometric estimates. The econometric approach relies upon historical data to make statistical estimates of how variations in output affect total cost. More recently proxy cost methods have been developed to estimate economic costs. These methods use computer models of how a company might engineer its network to estimate how changes in output affect the costs of the network. The economic approach always includes the cost of capital as a cost. Lastly, the economic approach generally includes opportunity costs, which are the alternatives that must be foregone by the utility if it provides the output whose costs are being measured.

4.2.4 In summary, both the economic theory of cost and engineering cost analysis can help management make its best judgments about the firm's production and output levels by facilitating comparisons among alternative possibilities before decisions are taken. Accounting cost analysis can assess the experienced actual cost of decisions after they are taken and provide a foundation for forecasting future costs. Each approach to costing can contribute to an improved understanding of costs and facilitate improved decision making by service providers and telecom regulators. In that sense these approaches are complementary.

4.3 Commonly used costing approaches

These approaches and underlying concepts are summarized in the diagram given below:



These elements are discussed in the following sections

4.4 Costing methodologies

Cost studies should be as thorough as possible, given the available data.. Three general approaches to cost studies can be pursued, either separately or in combination: Each approach could, in principle, yield meaningful cost results by itself. If there are too many data gaps then the results obtained may not be meaningful unless interpreted in combination with results from another approach. These three methods of constructing cost models are top-down, bottom-up or Outside-in approach.

4.4.1 Top-down methodology

Under a top-down modeling approach actual (historical) accounting data (e.g. capital employed, traffic volumes, etc.) of a specific carrier entity are taken as a starting point for parameterisation of the model. Top-down modeling approaches rely on actual network architectures and configurations and assume their

efficiency. After certain efficiency adjustments and a proper asset valuation the historical cost-volume relationships of costs are projected forward to develop forward looking incremental costs. The top-down approach begins with aggregate, company-wide cost data such as total annual expenditures, capital investments and operating costs. The top-down approach reflects by definition and by construction the current cost level of a specific carrier. Ideally, such costs will be tracked according to some general categories, such as whether they are capital or operating costs. The goal of a top-down study is to take these aggregate costs and allocate them among all services provided by the carrier. The advantage is that this method assures that all of the carrier's costs are accounted for. On the other hand, determining a suitable allocation formula poses problem. It can be used as a check and comparison against a comprehensive bottom-up, incremental cost analysis. However, such a complete bottom-up analysis is rarely possible because of a lack of adequate data. Aggregate company costs, by contrast, are usually available. As a result, the top-down analysis often becomes an integral part of the cost study and is used to estimate capital and operating costs where exact facility input data are unavailable.

4.4.2 Bottom-up methodology

A bottom-up approach models the network and cost structures of a hypothetical operator. This efficient operator employs modern technology and is not constrained by technology, systems and architectural decisions of the past. A bottom-up model identifies all components of the network necessary to produce the services in question. Based on engineering and economic experience and evidence, cost causation relationships are then defined to link the relevant quantities of network components with outputs and other relevant cost drivers. This method is expected to give good estimates of unit costs, assuming sufficient data are available which is rarely accessible to the regulator. It is based on the idea that service costs can be identified from the facilities and other inputs needed to provide the services. The costs of the inputs are combined in proportion to their utilization in providing each service, then divided by the number of total units of service, resulting in per-unit facility costs. This approach depends on the availability of complete, disaggregated data on input costs and the relative use of facilities in the provision of different services. This can be analyzed on a

historical cost basis or a forward-looking incremental cost basis, but any results expressed as pure, incremental facility-based unit costs must be reconciled with joint and common costs and administrative overheads.

4.4.3 Outside-In Methodology

The third approach is to use "proxy" estimates from outside sources, establishing cost "benchmarks," or ranges of costs, for services or facilities. There are two steps. First, the regulators must define the appropriate cost elements and the scope of cost comparisons—whether they will be comparisons of specific facility costs, operating unit costs or service-wide costs. Second, the results have to be adjusted to account for differing conditions between the subject country and the benchmark country. In principle, it would be desirable to develop a broad database of proxy costs from as many countries as possible. That could form a kind of econometric regression model or statistical correlation analysis of costs in almost any environment—if enough variable data were known. The challenge, of course, is to achieve an accurate measurement of costs in the proxy countries, using direct bottom-up and top-down approaches. Then it would be possible to compare reliable results from different countries and come to conclusions about the effect on interconnection costs of national variations in labor costs, topography, demography and other factors

4.5 Network Design Considerations

In a top-down modeling environment this is a decision between whether or not to allow the incumbent to base its costs on the existing network topology (scorched node) or on a ideal network topology that would meet the demands of a fully efficient operator (scorched earth). In a bottom up modeling environment this is a decision between whether or not the bottom up model should take into account the existing network topology (scorched node), or that the costs in the model should be based on a ideal topology (scorched earth)

4.5.1 Scorched earth approach

A scorched earth approach, also called the Greenfield scenario, assumes that optimally dimensioned switches would be employed at locations that are optimal

to the overall transmission design. The scorched earth scenario reflects the structure of a completely new network that would have been designed from scratch. The main difficulty in this approach is the agreement between all market players on the optimal network structure.

4.5.2 Scorched node approach

A scorched node approach, on the other hand, assumes that the existing nodes will still be used in the model. However, the scorched node approach replaces existing technologies with optimal technologies that are able to deliver equivalent functionality (e.g. this could mean the replacement of an analogue tandem switch by a digital tandem switch and possibly also the replacement of a host switch by a remote concentrator). Moreover, it assumes the utilization of optimal transmission technologies that connect these different nodes. This approach has the advantage that it takes into account the current geographical situation of the existing incumbent. However, this may perhaps not be the most efficient solution, compared to the scorched earth approach. The scorched node approach is often altered into a modified scorched node approach. This approach takes the actual node-configuration as a starting point but changes the actual structure in order to replicate a more efficient network than is currently in use.

4.6 Basis of Costing

The solution to most interconnection problems is that interconnect charges should be based on costs. Indeed “cost-based pricing” is recited with such frequency and conviction, particularly by economists, as the correct answer to most telecom and other public utility regulatory problems, one is tempted to conclude the regulation of telecom prices should be a straightforward and non-controversial issue. The most appropriate approach to cost analysis depends upon the problem being addressed and the purpose of the costing exercise. All approaches to costing require judgment in implementation, have limits to their ranges of usefulness in application, and require a careful interpretation of the meaning, significance and limitations of cost study results. Cost analysis can be an extremely useful tool for telecom managers and regulators. It is a tool to guide and facilitate judgment in decision-making, not a substitute for judgment.

4.6.1 Historical cost accounting

This refers to the costs actually recorded and accounted for in the operator's books, without any additions, such that they reflect the costs actually incurred. This makes less difference for mobile than for fixed networks but, in a world of some inflation and changing relative prices, current cost accounting better expresses how costs move over time.

4.6.2 Current cost accounting

Costs are calculated on the basis of current prices for current estimates of the various cost-components. This can be further sub-divided into presently incurred costs and costs that are likely to arise in the near future, i.e. prospective or forward-looking costs.

4.7 Methods of Cost Allocation

The Cost Allocation Principles indicate how various costs should be treated and allocated/apportioned to different services/network elements. The following two methods are generally used for allocation/apportionment of cost:

- Fully Allocated Costing (FAC)
- Long Run Incremental Costing (LRIC)

There are important costing principles which a costing model should observe and these include: Cost causation principle (like an Activity based costing,), Objectivity principle, Consistency principle, Transparency principle (Auditability and Accounting Separation), practicality, efficiency, and contribution to common costs, present value. However, objective costs can not be calculated without sufficiently detailed cost data

4.7.1 Fully Allocated Costs

FAC is done in two steps. In the first step, all the costs are identified into three categories:

- Direct costs: These are the costs, which can be directly identified to services/ network elements. For example, in a Basic Telephone Service network, cost of local exchange can be directly allocated to the account head of "Local Exchange".

- Indirect costs: These costs cannot be directly allocated to any one-service/ network element as they may be shared by more than one (identifiable) services/ network elements. For example, in a Basic Telephone Service network, access cables and exchange cables may share the cable trench. Hence, the cost of trench for laying cables will be shared by the network elements "Access – cable" as well as "Network- Exchange to Exchange Transmission".

- Unattributable Costs: Such costs cannot be identified to a particular service/network element such as corporate expenses.

In the second step, the direct, indirect and un-attributable costs are allocated to various services / network elements on the basis of suitable cost drivers.

Here, the cost of a service derives from the usage of a set of algorithms that allocate both direct and indirect costs to it. The idea of the FDC approach is to simply divide the total cost that the firm incurs amongst the services that it sells. Both fixed and variable costs are used in the production of the output and therefore both contribute to the revenue generated by these products or services. Its simplicity in directly relating prices to information that is available in the accounting and billing system makes the model auditable. FDC is based on historic costs because accounting data concerns the firm's actual costs but it is possible to use current costs carrying out modifications to the accounting.

4.7.2 Long Range Incremental Costs

LRIC is the incremental costs that arise in the long run with a specific increment in volume of production. An increment is the unit of output over which costs are

being measured. Incremental costs are the costs that are caused by providing a defined increment of output given that some level of output is already being produced. Long Run Average Incremental Cost (LRAIC) is a variant of LRIC, which associates long-term horizon to incremental cost. Incremental costs measure the cost variance when increasing or decreasing the production output by a substantial and discrete increment. LRAIC equates tariff to cost of production of the additional unit of the service. Added to unit cost is an allocated share of common costs, excluding administrative costs.

The cost of the services is computed by apportioning the cost of the network elements (similarly as in the activity-based approach), and by adding the cost of labor and the rest of the overheads as a simple markup on the cost of the infrastructure. Such a markup follows the trends observed in actual networks. LRAIC of a service equals to the total cost of the company minus the cost of the total company if it continues to provide all the other currently provided services but the specific one. The sum of LRAIC of all services is less than the total cost of the company due to the existence of common costs. It is natural to use current cost with LRAIC because the aim is to construct prices that would prevail in a competitive market.

4.7.3 Activity Based Costing (ABC)

ABC is the methodology by which costs are assigned based on the activities required to deliver a service and the resources these activities absorb.

The key to this methodology lies in two aspects: (1) What is causing the activity (2) What is causing the costs. Simply put, ABC works on the premise that the budget is absorbed by resources and the resources are absorbed by services. ABC is one way of trying to make a more accurate determination of the true time, cost and value of specific activities, and thereby evaluate their real contribution to meeting the overall objective.

Through early involvement, the cost estimator can not only influence the final design by feeding in the relevant cost information, but can also actively

contribute to cost reduction by identifying cost drivers and to highlight how, for instance, a relatively small increase in system performance can have a disproportionately heavy impact on final cost. Costs are assigned based on the activities required to deliver a service and the resources these activities absorb.

The major cost drivers are the number of subscribers, the volume of traffic (call attempts and call minutes) and the geographical area covered by the network. For many of the elements, there is more than one cost driver. It is based upon a hierarchy of four levels and is a refinement of the traditional FDC approach.

The bottom level consists of the input factors that are consumed by the network operator, e.g, salaries of personnel, depreciation of network elements, cost of capital, depreciation of buildings and vehicles, marketing cost, overhead, power consumption, and the cost of renting raw bandwidth. The goal is to apportion these cost elements to the services that the network provides. Instead of a one-stage assignment where costs are assigned directly to Products and Services, ABC assigns costs from the General Ledger ("Resources") to "Activities". Costs in "Activities" are then assigned to Products and Services ("Cost Object").

In theory, ABC has no conflict with FDC and LRAIC either. ABC can be used to replace the arbitrary cost absorption method that is used to calculate to say, LRAIC. The use of ABC might bring much more transparency in the calculation of transferred cost, making the current costing practice look redundant.

4.7.4 Marginal Costing

Marginal cost is one of the most important concepts in standard microeconomic theory. It focuses attention not on the total level of cost, nor the average level of cost but rather on the change in costs that occurs as the volume of output is increased or decreased. Marginal cost is defined as the change in the total cost of production resulting from an extremely small change (upward or downward) in the level of output. To be strictly technical about it, marginal cost is the first derivative of the total cost function with respect to output.

The minimal measurable change can be extremely small e.g, one Erlang of traffic, one more second of calling duration, or one more local loop. In attempting to estimate marginal costs, the analyst often encounters practical difficulties when the measurements are directly calculated at the smallest possible level. Accordingly, most practical estimates of marginal cost are based at least in part on a slightly larger increment of output than what is envisioned in economic theory.

The incremental cost can be viewed as an "average" level of marginal cost, if it is computed over a narrow increment in the immediate vicinity of the current volume of production.

4.8 Principles of cost allocation

Costs shall be allocated or attributed to different services, geographical areas, network elements and products/network services through following Accounting Standards/Principles

- Causation - costs should be allocated to those services or products/network services that cause the cost or revenue to arise.
- Survey and sampling - Operators may need to use survey and sampling techniques such as pattern of usage of network element for each type of product/network service, staff activity data, engineering information etc. in order to allocate costs to the relevant segments. The fundamental objective of this activity is to arrive at an appropriate basis of attribution to comply with the principle of causation. Where sampling is used it should be based either on generally accepted statistical techniques or other methods, which should result in accurate attribution of cost, revenue, etc.
- Consistency - To assist comparability, the same bases and assumptions should be used from year to year. However, it is recognised that with rapidly changing technologies, it may be necessary to review attribution principle annually.
- Materiality – The principle of materiality may be followed to avoid any detailed/ cumbersome procedures if the impact is not considered very

material. For example the iterative attribution methods may not be used for certain items, if the effect of that particular item is not expected to be material to the ultimate outcome.

- Practicality - The principle of practicality would reflect the need in any system to undertake sampling analysis, and at times use prudent and unbiased estimates of cost and volumes.
- Objectivity – This principle requires that the allocation method proposed should be reasonable, substantiated and arbitrary allocation method should be minimal.
- Transparency - The methodologies followed for attribution and preparation of statements by each operator should be comprehensively documented so as to be transparent to the regulator / other users of the statement.

4.9 Principles of Cost Recovery

In drafting rules for interconnection charges, policy-makers and regulators may have several objectives and priorities.

4.9.1 Efficiency

The goal of economic efficiency is generally achieved by establishing charges that are as close to cost as possible, and that are specifically based upon cost causation. That is, when certain costs stem from the activities of a given carrier or customer, they should be recovered through charges levied on that carrier or customer. Moreover, the relationship between costs and charges should be direct. Variable (traffic-sensitive) costs should be recovered through traffic sensitive charges, and fixed (non-traffic-sensitive) costs should be recovered through fixed or "flat" charges. Under a pure efficiency policy, these differences should be reflected in interconnection charges.

4.9.2 Equity and Competitive Balance

In many markets, sustaining and nurturing competition is often a more immediate policy priority than achieving short-term economic efficiency. The competitive balance principle calls for interconnection charges to be generally set at the same

levels for all similarly situated carriers. They may even be set at deliberately favourable levels for new market entrants. The equity principle, meanwhile, may lead regulators to impose interconnection costs equally, or at least proportionally, on both interconnected carriers, even though, from a cost-causation point of view, one carrier may be generating more costs than the other. Equity can also be the motivating philosophy behind interconnection policies that base charges on discounts from relevant retail prices.

4.9.3 Laissez-Faire

Adherents to the laissez-faire doctrine believe that regulation can often be more of a hindrance than help in introducing competition—or at least that regulation is unnecessary to achieve that end. A total "hands-off" approach represents a kind of wishful thinking for most countries, where a single dominant operator has nearly total control of bottleneck facilities and considerable economic power to influence interconnection terms. However, policies encouraging negotiated interconnection agreements, with regulatory intervention only as a last resort, are quite common in established and newly liberalized markets alike.

4.10 Fixing Interconnection charges

In the end, all discussion and debate on interconnection policy and economic costs must lead to the setting of interconnection charges. Those interconnection fees should mirror both the network operators' costs and the regulatory policies that governments wish to pursue. There are several methods available and also there are several variations of these methods. The descriptions that follow are general in nature.

4.10.1 Cost-Based Charges

With cost studies and the principle of economic efficiency as a guide, interconnection charges can be set to recover costs in roughly the manner in which carriers incur them. Fixed costs can be recovered through proportionate fixed or flat charges. For example, a one-time cost for establishing a connection circuit can be recovered through a non-recurring charge for the appropriate amount. Variable costs, meanwhile, should be recovered through variable charges. That is, traffic-sensitive costs should translate into per-minute

interconnection charges. These appear, perhaps, to be straightforward concepts, but they have been practiced only intermittently in many markets. Dominant operators may have a preference for usage based charges, because such fees ensure increasing interconnection revenues whenever a competitor expands and brings in more traffic. But relying entirely on usage-based charges may not be the most economically appropriate arrangement. It is difficult to establish underlying costs in any circumstance. The job becomes even more difficult when cost-based rates must be established for unbundled network access.

4.10.2 Retail-Based Charges

One common, simple – yet ultimately questionable – practice involves basing interconnection charges directly on a carrier's retail collection rates. For example, a usage-based access or termination charge might be set based on a percentage of the dominant carrier's retail local call charges. Similarly, a fixed charge for an interconnecting circuit might be set relative to the carrier's fixed local access line or leased line prices. The assumption is that interconnecting carriers and the large customers of such retail offerings make an essentially equivalent use of the services and facilities. This retail-based approach has a broad appeal. The regulator has the ability to ensure that there is a clear "margin" between retail prices and interconnection charges. This approach also appears to be pro-competitive by guaranteeing that competitors will have a sufficient margin to compete with their dominant rivals. Often, the interconnection rate is determined by subtracting from the retail rate all of the dominant carrier's estimated average costs for such retail activities as marketing, customer-service and billing. This "avoided cost" formula is thought to generate an interconnection rate that approximates wholesale costs. The process may be reversed to derive retail rates. Starting with interconnection charges, regulators "impute" the cost of interconnection to the dominant carrier, then add retail costs, arriving at a retail price deemed to be competitively neutral.

The real drawback of retail-based pricing is that in most cases, it results interconnection charges that are not based on the true underlying costs. It is difficult enough to identify accurate, cost-based interconnection rates. It is even more difficult to pinpoint the costs that go into calculating retail basic telephone

rates, because those costs may include marketing, billing, and customer service. Thus, very few countries could realistically lay claim to having achieved cost-based end user pricing. Basing interconnection rates on distorted retail rates simply creates distorted interconnection charges. A more viable goal might be to determine cost-oriented interconnection charges independently, then use those as the basis for moving retail prices closer to costs.

4.10.3 Price Caps

Price cap mechanisms have become widely used for regulating all sorts of telecommunication rates. The core principle involves placing a ceiling or cap on charges for a group of services that are placed together in a conceptual "basket." This gives the operator flexibility to raise or lower rates for individual services, so long as the overall average rates remain below the basket's cap. Adjustments in the cap may be based on inflation, estimates of an operator's productivity growth, or specific, targeted rate-reduction goals. The caps usually are not based on detailed, service-specific cost analysis.

The popularity of price cap systems reflects the complexity and difficulty of determining the real costs underlying telecommunication services such as interconnection. Price caps are intended to keep prices reasonably in line with costs, without involving regulators in micro-managing carriers' operations and business decisions. It is probably more challenging to implement price caps for interconnection than any other service, because of the contentious market environment in which interconnection typically takes place. The most difficult and important task in establishing a price cap regime is to set the initial caps as close to costs as possible. Any inaccuracy in the initial price caps will be maintained and even magnified over time. In the case of interconnection, setting initial price caps too high risks damaging potential competition or forcing competitors to subsidize incumbents for an extended period of time.

4.10.4 "Bill and Keep" or "Sender Keeps All"

This approach entails levying no charges on interconnecting carriers at all. Each carrier "bills" its own customers for outgoing traffic that it "sends" to the other network, and "keeps" all the revenue that results. The Bill-and-keep model

assumes that if there were interconnection payments, they would roughly cancel each other out, resulting in no real net gain or loss for either carrier. Further, by forgoing payments, carriers avoid the administrative burden of billing one another for exchanged traffic. This model plainly works best if the traffic flows from one network to another are roughly in balance. Otherwise, one carrier will be under-compensated for the costs of traffic that it receives from the other. To ensure that there is such a balance requires measuring and recording traffic and costs on an ongoing basis. Bill-and-keep systems are typically used when competitive local carriers interconnect with one another or with an incumbent local carrier. Moreover, the peering arrangements that traditionally have been used to interconnect Internet backbone networks of comparable size may be viewed as a form of bill-and-keep arrangement.

4.10.5 Revenue Sharing

In certain relationships between carriers serving complementary markets, revenue sharing is sometimes used in place of paying explicit interconnection charges. This is sometimes true, for example, where long distance operators interconnect with local access networks. The carriers' interconnection agreement may call for the long distance carrier to pay the local carrier a specified percentage of the revenue generated by each long distance call. The same may happen when fixed and mobile carriers interconnect, particularly when mobile service customers are charged for incoming and outgoing calls (called-party pays systems).

4.11 Costing Terms and Concepts

In telecommunication cost analysis, there are some important costing terms and concepts which are the basic building blocks of cost analysis. Some examples are given below:

(i) Total Cost – The aggregate amount of all costs incurred in producing a specified volume of output. The sum of fixed and variable costs equals total cost.

(ii) Fixed Cost – A cost that does not vary by volume of production. A specific type of fixed cost is sunk costs, costs that cannot be changed or

avoided even by ceasing production entirely. For instance, head office space is a fixed cost, but the labour component of the installation of the copper wire in the local loop is a sunk cost. Neither fixed nor sunk costs enter into marginal-cost pricing decisions because neither varies with output.

(iii) Variable Cost - A cost that varies with increased volume of production.

(iv) Stand-alone Cost – The total cost to provide a particular product or service in a separate production process (i.e. without benefit of scope economies).

(v) Average Cost - A specified cost divided by the quantity of output. [By default, usually refers to the average of total cost, which is total cost divided by the specified volume of output.]

(vi) Direct Cost – A cost that can be attributed solely to the production of a specific item. A direct cost does not require a cost allocation (or distribution) to separate it from the costs incurred in the production of other items. An indirect cost, however, does require such an allocation. An operator that produces a single product sold in a single market incurs only direct costs. When an operator is engaged in producing multiple products or serving multiple markets, however, it will normally also incur indirect costs such as joint and/or common costs.

(vii) Common Cost - A cost incurred when a production process yields two or more services. This is also referred to as shared cost if it applies to all of the operations of the operator. For example, the cost of the building to house a telecommunications exchange may be described as a common cost of serving both business and residential customers. The salary of the operator's president may be considered a shared cost of all services (this type of cost is often also referred to as an "overhead" cost).

(viii) Joint Cost – A specific kind of common cost incurred when a production process yields two or more outputs in fixed proportion. Joint costs vary in proportion to the total output of the joint production process, not to the output of the individual joint products.

(ix) Allocated Cost - A joint or common cost that has been divided among services in accordance with a set formula or by judgment. This is also known as a distributed cost.

(x) Avoidable Cost - A cost that would not be incurred if output volume was reduced.

(xi) Fully allocated costs (FAC) – Approach for allocating telecommunications costs to different telecommunications services (also referred to as "Fully Distributed Costs"). This approach is usually based on an allocation of historical accounting of costs to various broad service categories. After assigning direct costs to each category, the Joint and Common Costs are allocated to applicable service categories based on formulas that reflect relative usage or other factors.

(xii) Increment - A specific non-minimal increase or decrease in volume of production.

(xiii) Incremental Cost – The change in total cost resulting from an increment. Incremental cost equals total cost assuming the increment is produced, minus total cost assuming the increment is not produced. Because a wide variety of different increments can be specified, incremental cost can conceptually range all the way from total cost per unit (entire output as the increment) to marginal cost (one unit as the increment). The size of the increment used in any specific cost analysis will be a matter of judgment. The most common practice is to use the entire service or element as the increment, in which case the service or element specific fixed costs of the service or element would be included in the increment.

(xiv) Long Run – A period over which all factors of production, including capital, are variable. In practice, a period of 10 to 15 years is sometimes selected by regulators for the purpose of LRIC analysis, for example.

(xv) Long Run Incremental Cost (LRIC) – The incremental costs that arise in the long run with a specific increment in volume of production. LRIC is generally calculated by estimating costs using current technology and best available performance standards. When a cost study is based on the "costs of an efficient firm", it usually refers to LRIC-type methodology. In the presence of joint or common costs, the sum of the LRIC for all of the operator's services will be less than the total costs of the operator. Hence, the operator will not be able to recoup all of its costs. Regulators will generally allow a mark-up to be added to LRIC or LRIC-type costs for the firm to help recover all of its costs.

(xvi) Marginal Cost - The change in total cost resulting from a very small change in the volume of output produced. Due to a number of practical issues, including the lumpiness of capital increments (i.e. the inability of telecommunications plant to be divided into very small parts, or scaled to provide an exact fit with the actual requirements of the network), marginal cost is difficult to estimate. Accordingly, most estimates of marginal cost are based on incremental cost.

(xvii) Mark-Up – A percentage or a fixed monetary amount that is used to take into account joint and common costs, for example, to supplement certain costing methodologies. Cost concepts that do not fully allocate (or distribute) all indirect costs generally require mark-ups. These cost concepts include incremental costing methodologies, including LRIC (and its various variant i.e. TSLRIC/LRAIC and TELRIC). The mark-up may be uniform or non-uniform. While regulators have generally set uniform mark-ups to promote competition, the application of Ramsey principles suggests that a non-uniform mark-up may be economically efficient.

Chapter 5

Estimation of and proposals for various components of IUC

5.1 Introduction

5.1.1 In an environment where all the segments of the telecommunications business i.e. access, national long distance and international long distance have been opened to competition, multi-operator scenario is unavoidable. In such a situation the types and number of interconnections become large. To facilitate interconnection arrangements among various co-operating and competing service providers and provide greater certainty to the settlements among them, it becomes necessary to have an interconnection usage charges (IUC) regime. Not only it is important to have an effective interconnection usage charges regime but also it is necessary to review the regime from time to time to continue to meet the industry expectations, reflect market conditions and support the overall objective of telecom growth in the country.

5.1.2 The purpose of an IUC regime is to ensure that all service providers are able to gain access, on reasonable terms and conditions, to the interconnection facilities and services necessary to provide efficient service to their own customers. This allows dependent activities to flourish, thus creating a more robust market environment, one that is able to offer consumers more choice and value-for-money. In India cost-based interconnection usage charges regime for origination, transit and termination was first specified by TRAI in 2003 through the IUC Regulation dated 24th January, 2003. This Regulation was later superceded by the Regulation dated 29th October, 2003. The method of determining IUC in these regulations involved an assessment of the various cost items attributable to different network services. Interconnection usage charges are part of the cost of carrying a call from a calling to the called party and in this way they are linked to determination of tariff. Right level of tariff is very important for sustainability of a telecom service provider. Every effort therefore has to be made to accurately assess the cost of the network elements corresponding to respective services based on the inputs provided by various service providers, including the new entrants in the sector, in the form of statements submitted to the TRAI and also

using information available from other secondary sources. The other important factor for determination of IUC is minutes of usage (MOU) of resources for which cost has been assessed. This is basically according to work done principle i.e. one operator charging the other for the resources consumed in terms of minutes of usage by the call.

5.1.3 The Authority further takes note of the growth experience of the sector in the past particularly in the wireless segment and the need to sustain the growth in future so as to take the benefits of technology to segments that are hitherto untouched particularly in the context of the gap between our present tele density and the potential demand. Further the Authority, based on the experience in the last few years, notes that the growth has come about largely because of forward looking policies that has promoted competition. As a result the market witnessed competition and the services were made available to people at affordable levels, which further fuelled the growth prospects. It is at this critical juncture, the Authority is undertaking the present review. Considering the yawning gap that still exists between present level of achievement and the potential in the telecom sector, continued growth of the sector becomes all the more important. Experience suggests that further growth can be achieved only by continuously promoting competition

5.2 IUC components to be reviewed

5.2.1 To assess the possible impact of telecommunications growth, evolving market conditions, changes in technologies etc. on interconnect usage charges wide consultations were decided to be carried out. In view of importance of IUC to the telecommunications sector and its direct impact on service providers as well as consumers it was decided to carry out the consultation process in two stages. A pre-consultation with the service providers and telecommunication associations as the first stage and a wider public consultation as the second stage. The pre-consultation process was initiated with a document number 409-12/2008-FN dated 12.9.2008. Through this pre-consultation the service providers were asked to give their opinion on the components of IUC that need review, the level of the charges along with justification, methodology to be used and data on network

cost and traffic. A total of 14 service providers and 2 associations sent in their responses.(A summary of comments is provided in **Annexure – I**)

5.2.2 The general response is in favour of reviewing all the components of the IUC regime. However the opinion on methodology and correct level of charges is divided. TRAI has tried to work out possible methods of handling disparate opinions in an effort to maintain a conducive growth environment and provide certainty to the market. It is therefore now the right time to hold the second-stage consultation to get a more informed opinion to assist TRAI in taking a final view on IUC. The preliminary estimates of ranges of various IUC components given in the following paragraphs are only indicative as the Authority would make appropriate analysis after the methodology and various inputs going into the methodology are firmed up.

5.3 Termination Charge

The total interconnection usage charges relevant to a call in a multi operator environment are to be shared among origination, transit, carriage and termination on the basis of work done in each segment for the carriage of the call. In the prevailing and earlier Regulations the cost of local call was determined on the basis of relevant operational expenditure (OPEX) of the network within the local area. For this purpose the total operational cost of the elements, the capital expenditure (CAPEX) of which has been taken for cost based rental, was divided by the total minutes of the use that were relevant.

5.3.1 Mobile termination charge

5.3.1.1 A number of responses were received in favour of reduction in the mobile termination charge(MTC) on the basis of changes in cost attributable to network elements involved in completion of a call and increase in minutes of usage. A wide range of comments for and against using Fully Allocated Cost (FAC) and hybrid forward looking incremental cost (FLRIC) have been received from the stakeholders. Many stakeholders submitted that the current rate of mobile termination charge is above the cost and is consequently not in the consumers' interest. AUSPI and some of the service providers argued that current regime with higher termination charge allows some service providers, specially

incumbents, to shift their cost to other service providers, as there would be net outflow of termination charge, thus obtaining undue competitive advantage. High termination charge favours mobile service incumbents who offer low cost on-net service. It has been explained by some respondents to the Pre Consultation Note that for new service providers most calls would terminate on mobile incumbents' network and to keep service competitive they would have to price their calls at levels comparable to on-net rates of incumbents. Service providers have raised the need to review and rework the termination charge based on the revised network size, tremendous growth in traffic, phenomenal increase in tele-density and impact on input costs. Cellular Operators Association of India(COAI) has also provided a study report on the basis of hybrid FLRIC model wherein they have shown a path with the MTC figures as: Year 2009- Rs 0.36, Year 2010 – Rs 0.38, Year 2011 – Rs 0.36, Year 2012 – Rs 0.35. It can be seen that the estimates for Mobile Termination Charge is much above the existing termination charge of Rs. 0.30 per minute. It is noted that cost model which is said to capture efficiencies of the network and the benefits of future technological progress is yielding an estimate of cost which is much above the estimates of cost arrived at using Fully Allocated Cost methodology. This aspect was also raised during the discussions with the consultants to the industry associations but no satisfactory explanation was forthcoming from them for such a contradictory results in the estimation of cost using Hybrid FLRIC.

5.3.1.2 Hybrid FLRIC submitted by COAI was carefully examined in the TRAI. This model is based on hypothetical efficient operator and depends on a number of assumptions i.e. likely cost of network going forward, traffic pattern, presence of service providers in a given service area, coverage areas, towers, capacity requirement, market share of critical operators, assumption of converting SMS and data to minute of usage, estimation of CAPEX, depreciation, cost of debt, beta estimation, effective corporate tax and various design parameters. Discussions were held with COAI and their consultants Spectrum Value Partners engaged on behalf of their service provider members. During the discussions it was also mentioned that the hybrid FLRIC model involves reconciliation of the results obtained by Bottom up approach with the results of the Top-down approach using accounting data. COAI/SVP also mentioned that in case there are

differences then the Top-down results are taken to be correct and bottom-up results are adjusted accordingly. It was mentioned that the Hybrid FLRIC model overcomes the limitations of the Bottom up method that does not work well when there are gaps in data. It was also stated that the determination based on a theoretical efficient operator eliminates biases due to individual differences between operators and possible new entrant with regard to network design and the cost associated with the same. Discussions prima facie revealed that the model being proposed has a number of assumptions and subjective decisions compared to the advantages it presumably bestows vis-à-vis the model that has already been used by TRAI in various IUC Regulations. It seems to be difficult for all the service providers to agree on the efficient operator model and assumptions that are vital for implementation of FLRIC, as is evident from the responses received. There are apprehensions that any methodology that is based more on assumptions and projections may give uncertainty to the market and may not assure sustainability and fast pace of growth that the sector is currently witnessing in India. Arriving at an efficient model, collecting the network cost data and rationalizing it to reflect average element cost and then fitting it to all kinds of operators big and small, pan India and in a few circles, having CDMA 800 MHz and GSM 900 MHz or 1800 MHz spectrum, incumbents and new operators would be a Herculean task with low prospects of agreement among service providers. It has also been noted that this model allocates all types of incremental costs – CAPEX and OPEX, for termination charge. The method does not take into account the additional revenue generated by the service provider in the form of value added services, rentals etc. Transferring all costs to MTC makes MTC high and could be detrimental to the interests of the interconnecting new entrants and consumers.

5.3.1.3 Fully allocated cost method and consideration of relevant OPEX for termination charge earlier used by TRAI does not pass on the burden of the tariff decisions of one service provider to other interconnecting service providers. It is pointed out by some of the stakeholders that the existing methodology is time tested and has given sustainable telecom growth and affordable tariff to the country. Apart from the telecom growth it also provides flexibility to the service providers in offering innovative tariff plans as origination charge and rental for voice services and

tariff for value added service have been kept under forbearance. Any major change in the methodology should be supported and justified with irrefutable evidences in favour of such a change. It is further noted that the same set of service providers who have been beneficiaries of the FAC based IUC regime till now are propounding a new cost model without any justifiable grounds for such a paradigm shift. **The stakeholders may therefore give their opinion on continuation of the approach evolved and fine-tuned by TRAI over the years.**

5.3.1.4 TRAI has carried out an analysis of termination charge using the methodology that it has used earlier with the cost data submitted by the various service providers. Because of different business models (outsourcing, owning, franchising), cost structures and inter-service cost allocation adopted by the service providers there is a wide variation in the termination charge as well as the cost based rental. TRAI has analyzed each of these situations using the available information.

5.3.1.5 When different business models adopted by different service providers are compared it is seen that some of these models result in higher OPEX but lower CAPEX therefore, requires less CAPEX recovery. This kind of the business model reflects lower cost based rental but comparatively higher termination charge. On the other hand, the data indicates that the service providers who have adopted a business model having higher CAPEX and lower OPEX reflects lower termination charge but higher cost based rental. To further examine this matter quantitatively the data from Accounting Separation Report for 2007-08 were used to calculate turnover ratios ie Gross Revenue/Capital Employed of various leading pan-India wireless service providers and are given in Table 5.1. From the table it can be inferred that GSM industry (represented by the service providers who together have more than 90% market share) has realized about Rs 140 against an investment of Rs 100 during the year 2007-08.

Wireless Service Providers	**Turnover Ratio** (Gross Revenue/Capital Employed)
A	77%
B	144%
C	68%
D	215%
E	84%
F	131%
G	35%
Wireless Industry Average	92%
GSM Industry Average	140%
Source: Service providers Data and TRAI analysis	

* While the calculations are actual the service providers' name have been withheld

Table 5.1: Turnover Ratio

5.3.1.6 The generally high turnover ratio indicates that compared to the capital investments made, the revenues earned are high. This does not relate appropriately with the capital-intensive nature of telecom business. One of the reasons for very high turnover ratio could be that some major GSM operators have changed their business model from buying to hiring more passive infrastructure from infrastructure provider companies. It is also noted that many major GSM operators have hived off their tower investment to subsidiary telecom companies, some at zero value. Such transactions have direct impact on assessment on termination charge. It is also noted that there are substantial differences in turnover ratios of various companies because of their business models whereby those companies that have invested heavily in infrastructure would have lesser turnover ratio than those who are working on outsourcing model. This is resulting in different mobile termination charge for different service providers. TRAI cannot base its decisions on individual companies' business decisions and has to take a rational holistic view which can protect the interests of consumers and industry as a whole.

5.3.1.7 While examining from the point of view of cost structure, it has been seen that some of the existing service providers who have been awarded licences for new service area and are planning to start new services have both higher CAPEX and OPEX and thereby resulting in higher rental and termination charge. The high

expenses could be on account of minimum economic quantum of deployment for coverage and low initial utilization of the network deployed. As a regulator while assessing the correct level of MTC, transferring the burden of long term investment, underutilization and inefficiency of the operators on the consumer through higher termination charge would not be fair.

5.3.1.8 The data of BSNL gives mobile EBIDTA of 65% and fixed EBIDTA of 2%. This does not compare well with the wireless industry average of EBIDTA margin of 35%. Considering the effect of inter-service allocation of costs it has been observed that if a service provider is offering both mobile and fixed services does not allocate the costs pertaining these services correctly i.e expenses of one service is booked under the other then both mobile and fixed termination charges arrived at would not be an exemplar. Cost allocation amongst services as done by BSNL in their Accounting Separation Report of 2007-08 reveals that BSNL has allocated inexplicably higher OPEX to their fixed services and low OPEX to their mobile operation leading to higher fixed termination charge (FTC) and lower mobile termination charge(MTC). If no corrections are applied to the Accounting Separation Report data of BSNL then the mobile termination charge comes to an ludicrously low value which is less than 50% of the lowest MTC among private service providers. Mobile operations of BSNL should be comparable to the operations of other mobile service providers therefore this exceptionally high EBIDTA was perplexing to TRAI. To find an answer Accounting Separation Report of BSNL was examined and it has been found that BSNL has booked more OPEX towards their fixed line operations resulting in 2% EBIDTA for fixed line which, as can be inferred from Annual Reports, was 65% in 2001-02 when BSNL was only fixed line operator. This drop of 65% to 2% EBIDTA(increase of OPEX from 35% of Revenue to 98% of revenue) for fixed line operation cannot be explained otherwise. Similarly EBIDTA of BSNL for mobile is 65% while EBIDTA for the other mobile operators varies from 33.8% to 40.1 %. This clearly demonstrates that allocation of cost done by BSNL neither in line with the industry trend nor convincing and the MTC calculated on the basis of data submitted by BSNL cannot be conclusive for termination charge determination. Therefore to properly assess MTC of BSNL there is a need to make corrections in allocation of the operational cost so that it reflects correct

OPEX for fixed line and also EBIDTA of mobile in conformance with the wireless industry trends.

5.3.1.9 In reply to pre-consultation BSNL has also submitted the calculation of mobile termination charge taking into account both CAPEX and OPEX and have indicated a value of Rs 0.20 per minute. This method of calculation is not in conformance with the established methodology of TRAI in which only relevant OPEX is to be taken into consideration for calculation of termination charge.

5.3.1.10 Employing the same costing methodology as used in its prevailing costing exercise of IUC (i.e. 29th October, 2003) for determination of Mobile Termination charge revised estimates of MTC have been arrived at with the data of the financial year 2007-08 for mobile service providers. In this costing exercise with same operating cost items, as taken in previous exercise, without deducting the VAS revenues from relevant OPEX, the range of MTC comes Rs 0.13 to Rs 0.30 per minute

5.3.1.11 Another exercise was carried out where the revenue generated from value added services was deducted from the relevant OPEX, as done in October 2003. Based on the data available the estimated revenue of VAS is about 10 % of total revenue. These estimates suggest a cost based mobile termination charge from Rs 0.09 to Rs 0.22 per minute

5.3.1.12 Apart from the above two methods, it also possible to consider the fact the actual calculations would involve taking into account the cost as well as revenue from value added services for calculating MTC. In the absence of actual data a good approximation can be deduction of 10% of relevant OPEX for calculating MTC.

5.3.1.13 The above estimates of MTC have been made on the basis of cost data and MOU for 2007-08. When the data was projected for coming years the ranges of MTC as mentioned do not vary much.

5.3.2 Wireline (fixed) Termination Charge

5.3.2.1 BSNL have submitted that there is a need to have higher termination charge for wireline networks. In their submission during the pre-consultation BSNL has submitted that as per their calculations carried out on the basis of sample data/CDRs (details of sample data not provided to TRAI) in respect of fixed wireline cost based termination for fixed wireline networks following fully allocated costing principles comes to about Rs. 0.77 per minute and for mobile network its comes to Rs. 0.20 per minute. In previous exercise TRAI had adopted the principle that the cost based monthly rental should be based on allocation of CAPEX of the network and termination charge should be based on OPEX. It would perhaps be reasonable and customer friendly to continue with prevailing methodology of cost allocation for determination of termination charges. In their calculations BSNL has used a methodology that is not consistent with the principles followed by TRAI in the earlier IUC regulation. For calculation of termination charge they have taken into account both CAPEX and OPEX leading to higher termination charge. Taking CAPEX into account for termination charge would transfer the burden of BSNL's capital expenditure decisions to the interconnecting service providers. This would reduce the flexibility of interconnecting service providers for offering innovative service plans.

5.3.2.2 The data submitted by BSNL has been further examined with respect to the data submitted in their Account Separation Report for 2007-08. It has been found that EBIDTA calculated based on data provided for BSNL fixed line comes to 2% and for mobile 65%. It is observed from the annual report of BSNL for the year 2001-02 when they were not offering mobile service their EBIDTA was 65%. As has been said before, drop of EBIDTA from 65% in 2001-02 to 2% in 2007-08 is inexplicable. This would mean that OPEX has increased from 35% of revenue to 98% of revenue. Also EBIDTA for the other mobile operators varies from 33.8% to 40.1 % vis-à-vis 65% indicated by BSNL for their mobile services. This clearly demonstrates that allocation of cost done by BSNL is not in sync with the exercise undertaken by TRAI and it seems they have booked higher cost to the fixed services in the data

provided to TRAI. The motive behind such an adjustment could be the dominant position of BSNL in fixed line segment.

5.3.2.3 BSNL has also stated in their preconsultation submission that origination charge should be at least 20% higher than termination charge. In the context of IN services BSNL has signed agreements with a number of operators, based on mutual negotiations, at Rs. 0.52 per minute origination charge which is inconsistent with their demand of Rs. 0.77 per minute termination charge. It may also be mentioned here that after phasing out of ADC, considering the importance of fixed line network, TRAI has recommended support to rural wireline network in form of support from USO fund for 3 years. Government has also waived licence fee on the revenue generated from rural wireline.

5.3.2.4 As BSNL has the largest share in the fixed line business(78.32%) in the fixed line business, TRAI had viewed as appropriate it would be appropriate to take BSNL's fixed line network as the basis for arriving at the termination charge for fixed line. Data pertaining to any other fixed line network may not be representative due to the sheer size of the incumbent's network. Accordingly, data was requested from BSNL for this purpose. BSNL could not provide incoming and outgoing MOU for their fixed line network for this exercise despite repeated communications asking for the same**.** In the absence of that data, the Authority used the best estimates from available information with TRAI**.** As explained above because of questionable allocation of costs BSNL's calculations lead to about 2% of EBIDTA for fixed line and about 65% EBIDTA for their mobile network as against EBIDTA for the other mobile operators varying from 33.8% to 40.1 %. therefore, after reasonable adjustments are made the fixed termination charge varies from Rs 0.19 to Rs 0.28 per minute

5.3.2.5 In the prevailing Regulation the cost based fixed termination charge was estimated to be Rs 0.23 per minute in the year 2003. In view of the decision for common termination charge for fixed line and mobile termination charge was specified Rs 0.30 per minute for fixed line as well (the extra termination charge was adjusted against ADC). As described in the earlier section, there

is no rationale for abruptly changing the methodology of arriving at the Interconnect Usage Charges at this stage.

5.3.3 Asymmetric Termination Charge

5.3.3.1 Many of the service providers, especially the new entrants, and AUSPI have also argued in favour of asymmetric termination charge citing similar arrangements in various European countries. These service providers have argued that the differential interconnection rates are required because of significant cost difference between existing and new network. The late entrants suffer from inherent disadvantage in a high fixed cost industry with fast growing demand (volume benefit). The later a firm enters such a market, the higher its initial investment need to be competitive as late entrant cannot spread its investment over several years and must immediately offer the same QoS as an early entrant. These service providers further argued that most of their originating calls would terminate in other networks with consequential outflow of termination charges. In their opinion this asymmetry between larger and smaller network is the basis on which several regulators around the world have introduced asymmetric termination charges to promote fair competition. These service providers further argued that late entrant into the telecommunication got spectrum in 1800 Mhz band and in this band they face higher coverage cost than the operators in 900 Mhz which makes the network more expensive to install and operate. From among the service providers who are opposed to asymmetric termination charges, one of the existing service providers has mentioned the following grounds for their stand:

- Inefficient cross-subsidies from “universal service” mobile operators to “cream-skimming” operators, resulting in negative outcomes for India’s telecommunications sector as a whole;
- A form of regulatory entry assistance that is inconsistent with market forces and not provided to any other sector in the economy;
- Likely to result in higher retail rates to customers who call the subscribers of new entrants;

- Likely to result in arbitrary and discriminatory rules that are create endless disputes

5.3.3.2 Apart from the asymmetry of mobile termination charge between existing mobile operators and new entrants, BSNL has also demanded higher termination charge for wireline. It is often said that one disadvantage of asymmetric termination charge is that it might skew the traffic against the type of service whose termination charge is higher. Non-uniform termination charge for partly substitutable services would again incentivise call to one type of the network. This cumulative effect of decreasing traffic on one type of the network will further increase the termination charge for that network and put a question mark on sustainability of that network. The stakeholders are therefore entreated to carefully consider the issue of asymmetric termination charges between service providers in the same segment and also between service providers in different service segments while giving their response to the relevant question in Chapter 6.

5.3.4 Impact of change in termination charges on tariff

At present the originating operator could retain the residual amount after paying for carriage, transit and termination making it possible for it to reduce its tariff to the extent its margin plus origination charge can be squeezed. In the competitive scenario the competitor service provider would reduce their tariff at their optimum level and would also ensure that it remains in business. The policy of forbearance of origination charge provides service providers flexibility in tariff. However, the higher termination charges would lead to shifting the burden of its own tariff decisions to other networks involved in completing the call. Stakeholders may give their views in detail keeping in view importance of affordability of services to the customers.

5.4 Termination charge on international incoming call

5.4.1 During the preliminary consultation one of the major service providers has argued that there is a need to have parity with their counterparts in termination charge on international incoming calls. It was further argued that Indian

operators are paying weighted average cost of Rs 3 per minute for termination of their calls in foreign countries vis-à-vis termination charge of Rs. 0.30 per minute on incoming international calls in India.

5.4.2 The termination charge on international long distance incoming calls was also examined in the IUC Regulation dated 23.02.2006 wherein during the consultation process many of the access providers have proposed that they should be permitted to negotiate termination charges with the ILDOs. The Authority took account of all points made in favour and against in allowing the access providers to negotiate the termination charges with ILDOs. The relevant Para of Explanatory Memorandum to the Regulation dated 23.02.2006 is reproduced below:

"61. The Authority recalled the situation few years ago, where such negotiation was allowed and the uncertainty and dispute that was created in the market at that time. In this context, the Authority noted that the moment the negotiation process becomes a dispute, which is likely; the prevailing legal framework is such that the Authority will not be in a position to take steps to address the matter. This will imply lack of certainty and increased possibility of discord in the market, which possibility may get further enhanced as BSNL has already entered the market as an ILDO itself. Termination is a monopoly , therefore, an access provider may ask for a high termination charge which could lead to non-settlement of termination charges between access provider and ILDO. This would result in the call not being completed because the network would be broken.

62. For incoming calls, since the end user is specified by the number on which the call comes, the access provider effectively has a monopoly position. In such a situation, the Authority is of the view that there is a major likelihood of the dominant operator exercising undue advantage through the negotiation process. The Authority further noted that allowing negotiations would permit a reduction of the ADC charge on international calls, but the total arbitrage margin would still remain high due to an increase in the termination amount retained by the access provider. As explained earlier, the

lower ADC on international charge would result in a correspondingly higher ADC charge for the domestic calls, making them more expensive.

The Authority also noted that BSNL was already being provided adequate funding for ADC and there was a USO regime in place for funding investment in rural and other net cost areas. Hence additional funding through negotiations would have certain adverse effects and would be over and above the amounts already being provided. In none of the countries termination rates are different between local, long distance and international long distance calls.

"64. In this background, allowing BSNL or any other access provider to negotiate termination charges with ILDOs would not be appropriate. The Authority foresees the reduction in the arbitrage margin along with better monitoring and vigilant action, to result in growth of international long distance calls through the legal channels."

" 65. The Authority also observed that with the policy initiative to reduce per minute ADC from time to time on incoming international calls (From Rs.5.50 to Rs. 4.25 to Rs.3.25), the increase in minutes of international incoming calls (46% as compared to last year) have shown that there was a great elasticity in incoming minutes whereas the same elasticity was not available in outgoing calls. This, the Authority considered may be due to the addition in subscriber base being of the marginal subscribers and would keep a watch on this trend"

5.4.3 It is now to be considered by the stakeholders how the incoming international termination should be regulated. Even after abolishment of ADC arbitrage would be there if international termination is higher than domestic. The stakeholders may give their opinion on whether the policy of same international termination charge and domestic termination charges should continue. Also, whether international charge should be higher or lower than domestic or it should be left under forbearance or should be prescribed on reciprocal basis with different countries. In giving their opinion possibility of arbitrage, rerouting of calls, security concerns and gray market needs to be kept in consideration.

5.5 Carriage charge

5.5.1 In response to the pre consultation paper on IUC some of the service providers have argued that the prevailing market rates are below the ceiling which clearly establish that NLD carriage market is largely competitive and there is a no need to review the present ceiling of Rs. 0.65 per minute. BSNL, however, argued that this ceiling is above cost on high traffic density routes and the NLD operators are carrying traffic at rate lower than this. However, this ceiling does not fully compensate the cost of carriage to high cost areas like hilly, remote and difficult terrain, therefore, higher carriage charge for those locations will not only compensate the existing NLD operators for their cost but also encourage other NLD operators to roll out their networks in these areas. Some of the service providers have also mentioned that there is a huge variation in terms of the charges for off-net and on-net thus in order to have a level playing environment there is a need to have the rates of each operator published and should be based on some scientific rationale. One of the new entrants has suggested that the carriage charge should be reduced from Rs.0.65 per minute to around Rs.0.13 per minute without substantiating with data.

5.5.2 TRAI had taken the stock of various carriage charge rates offered by the NLDOs to the access providers after the amendment in February 2006. These data show that carriage charge offered by NLDOs to access providers generally varies from about Rs. 0.34 per minute to Rs. 0.60 per minute depending on traffic commitment period, volume of traffic committed, indicative share of traffic being routed etc. with the exception of BSNL who is offering flat Rs. 0.65 per minute i.e. at the rate of ceiling for the distance of more than 50 kms and Rs. 0.20 per minute for distance less than 50 kms. Evidence on retail tariffs for long distance calls charged by the service providers was also examined which suggest that there has been a substantial reduction in tariff for long distance calls.

5.5.3 TRAI has now used the data on cost of various NLDOs submitted to TRAI for the financial year 2007-08. The average cost per minute after considering the cost in respect of all NLDOs ranges from Rs. 0.16 per minute to Rs 0.72 per

minute taking leading private operators excluding BSNL whose MOU were not available. The NLDOs lying at the upper end of the carriage charge range have shown high CAPEX employed for NLDO network along with low total minutes carried in 2007-08. This could be because either they may not be providing correct number of minutes or infrastructure is presently inefficiently utilized.

An analysis of profitability of major NLDOs for the year 2007-08 was carried out and the same is summarized in Table 5.3

Analysis of Profitability of NLD Segment for FY 2007-08				
Particulars	W	X	Y	Z
EBITDA Margin	44.2%	29.0%	23.6%	52.7%
RoCE	29.01%	7.30%	9.68%	14.89%
Turnover ratio	76%	54%	73%	35%
Source: Data filed with the Authority and TRAI analysis				

*While the data used are actual the names of the service providers have been withheld

Table 5.3: Profitability of NLD Segment for 2007-08*

The stakeholders may give their opinion on whether the existing ceiling of Rs 0.65 should continue or should be increased or reduced and also whether there is justification for higher carriage charge for hilly and other remote locations.

5.6 TAX transit charges

5.6.1 In response to the pre consultation, many of the service providers have proposed downward review of the TAX transit charges. However, BSNL has submitted that these charges need not be reviewed and regulated. BSNL also submitted that transiting of calls is not mandatory and based on the mutual commercial arrangement between the operators and, therefore, these charges should be left for mutual negotiation.

5.6.2 Although direct connectivity is preferred by the service providers for intra SDCA traffic, however, in the absence of adequate direct links, the traffic is routed through BSNL's TAX POI. The transit charge lower than Rs 0.20 per minute has been prescribed by the TRAI in IUC Regulation 2003. The transiting of traffic is also required when there is an overflow of the traffic from any route of the traffic.

This may be further important as the new entrant may not be in a position to establish direct interconnection in one go with all service providers. The transit charge should be cost based so that burden of the transit charge does not get transferred in the tariff to the consumers in large proportion. The situation may also give an opportunity for complaint when sufficient E1s are for some reason not provided on direct routes from mobile network and the mobile operators are forced to handover the traffic to BSNL's fixed line transit switch for which they are being charged Rs. 0.19 per minute by BSNL as a transit charge. BSNL on the other may argue that sometimes sufficient ports are not available to provide direct connectivity to all operators to the full extent. During preconsultation sufficient data was not provide by the service providers. Service providers are requested to provide sufficient information in response to the relevant question in Chapter 6.

5.7 Transit/ carriage charge between LDCA to SDCA

5.7.1 This charge is applicable for intra circle traffic originated from mobile network and terminating in the BSNL fixed line network. As per present licence conditions mobile service providers are required to handover their intra circle mobile traffic to BSNL fixed line at Level-II TAX. The carriage/ transit charge for carrying the mobile originated call from LDCA to SDCA has been prescribed Rs 0.20 per minute by the TRAI in the IUC Regulation dated 29.10.2003 based on costs prevailing at that time

5.7.2 Some of the service providers argued that handing over of the call at Level-II TAX is at instance of BSNL and private cellular operators are not allowed to handover this traffic at the SDCA level to avoid this transit/carriage charge. In this way this segment becomes non-competitive, therefore, this mandatory carriage charge from LDCA to SDCA should be strictly cost based or mobile service providers should be allowed to handover their traffic either directly or through NLDOs at the SDCA level. BSNL on the other hand argues that it is not possible to give adequate POIs at SDCA level where such exchanges are initiated. They also cite licence conditions in their favour.

5.7.3 During pre-consultation stage BSNL, the major beneficiary of transit/carriage charge for intra-circle mobile to fixed calls, has not provided any data for calculation or any estimated value for these. However, because of possible at the reduction in CAPEX and OPEX actual cost of these services might have decreased. One of the service providers has suggested that the carriage may be estimated on the basis of average distance and tariff fixed by TRAI for leased lines. Another method could be to apply proportionate change to reflect current cost. Stakeholders may give their opinion on how these could be assessed. Service providers are also requested to provide sufficient information in response to the relevant question in **Chapter 6**.

Chapter 6

Issues for Consultation

Q.1 What components of Interconnect Usage Charge (IUC) should be reviewed?

Q2. In view of the details provided in the paper, please give your opinion whether TRAI should continue with the existing methodology of fully allocated cost with appropriate assignments for termination charge or changeover to LRIC or its variant. Please provide full justification.

Q3. Should termination charge be strictly 'cost-based' or should the principle of 'cost-oriented' be applied taking into account other affecting factors? Give reasons in support of your answer.

Q4. In the absence of cost data for value added services, how should the revenue of such services be taken into account for determination of termination charge?

Q5. Are asymmetric termination charges justified? If yes, which of the following should be the basis

(i) Existing service providers vs. new entrant
(ii) Urban lines vs. rural lines
(iii) Mobile termination charge vs. fixed termination charge

Give justifications for your answer.

Q6. Should the existing practice of applying the same principles and methodology for calculation of fixed and mobile termination be continued? If not then what should be the methodology for fixed and mobile termination charges? Give full justification.

Q7. Explain in detail the impact of the proposals being submitted by you for mobile and fixed termination charge on tariff and why?

Q8. Are asymmetric domestic and international termination charges justified? If yes, then whether international termination charge should be fixed higher/lower than domestic, should be on reciprocal basis with other countries or left under forbearance? Give justifications.

Q9. What should be the ceiling of carriage charge for long distance calls?

(i) Maintain at the same level
(ii) Increased/ decreased on the basis of current data
(iii) Higher ceiling for remote/ rural areas and one ceiling for rest

Please give sufficient reasons with data in support of your answer.

Q10. Which of the following options should be the TAX transit charges for intra SDCA transiting?

(i) Maintained at the same level
(ii) Left to forbearance
(iii) Increase/ decrease on the basis of current data

Please give sufficient reasons with data in support of your answer.

Q11. What should be the transit/ carriage charge from LDCA to SDCA?

(a) No need to specify separately
(b) Under forbearance
(c) Increase/ decrease on the basis of current data

Please give sufficient reasons with data in support of your answer.

Q12 India is preparing for launch of 3G mobile services. Which of the following option would you consider best? Give reasons, practicality and method of implementation of your choice.

(i) 3G termination charge same as 2G termination charge

(ii) Forbearance of 3G termination charge

(iii) Higher or lower 3G termination charge?

(iv) Should be considered at a later stage?

Q13. New developments like WiMax, HSPA, FMC, NGN and further advancements in access technologies are expected to complicate the termination scenario further. What should be done in the current review to take care of these future developments?

Annexure-I

Summary of comments on Pre-consultation no 409-12/2008 dated 12th September, 2008

1. COAI

Principles, cost-models, methodology

Interconnection to be ensured under non-discriminatory terms, conditions and rates and of a quality no less favourable than for their own services in timely fashioned and cost oriented rates and sufficiently unbundled so that the supplier need not pay for network components or facilities that it does not require. Upon requests at points in addition to the network termination points offered to the majority of users. Public availability of the procedures for interconnection negotiations. In view of the developments – growth, usage infra sharing The Authority should take a holistic and balance review of the IUC Regime.

The Authority is urged to adopt the Hybrid LRIC model for determination of MTC in line with International best practices and taking into account all relevant costs. The use of a hybrid LRIC model, use of economic depreciation, the use of a forward looking model incorporating historic data as a sense check, allocation of costs between services based on routing factors in competitive markets should be based on the technologies in use, 2G migrating to 3G. Most important remedy applied by Regulations is the imposition of cost-oriented pricing. The Hybrid FLRIC Model based on Hypothetical Efficient Operator is widely accepted to be the best international practice in cost modeling for MTC. It may be noted that hybrid FLRIC model generally gives the lowest value for MTC.

Components to be reviewed, justification, data

- Cost of bandwidth to be allowed as a pass through deduction.
- Transit charges
- Connectivity at LDCA level.
- Programming of junctions separately for incoming and outgoing traffic

COAI has also annexed a white paper prepared by Spectrum Value Partners(SVP), engaged by them on behalf of their members and GSMA-PWC report.

2. AUSPI

Principles, cost-models, methodology

The interconnection charging regime till now was closely linked to ADC regime and not fully designed for competitive and deregulated telecommunications markets. It gave overwhelming majority of benefits and cash flows to the incumbent public sector wireline operators and largely ignored the public interest and other benefits and efficiencies presented by new private service providers.

Since 2003 only cosmetic changes have been carried out, mostly relating to the carriage component. The Authority reviewed the termination charge in February, 2006 has substantially come down but based on certain flawed assumption that lowering termination rates would decided to maintain the termination charges at the prevailing rates. It is violation of TRAI's own regulation that the charges will be cost based.

The termination charge for most operators particularly new and smaller operators is an item of cost and not of revenue as they are net payer of termination charge. Higher termination charge reduce their margins and their competitive ability. To enhance competition it is imperative that termination charges are reduced. The competition is effective when service providers recover their costs mostly from their own end users, who can choose among competing service providers, rather than from interconnecting networks for whom the terminating access provider is a de facto monopolist. The higher termination charge gives distinct cost advantage to large operators over competing new and smaller networks and which in turn helps consolidate the termination market by acquiring more subscribers.

The current termination charges are high. The large difference in on-net and off-net call rate arising due to higher termination charge is inconsistent with the goal of providing interconnection between networks that is seamless and transparent to customers. The ability of a service provider to provide much cheaper on-net calls lessens the competition and huge benefit to already established networks.

The cost of terminating a call for a large operator in its own network is much lower than the regulated termination cost. This allows it to differentially price its off-net and on-net call rates. A small operator can set its off-net prices below the on-net prices of large operator to attract customers which forces small operator to incur losses. Thus market is distorted to favour large operator when termination costs are not set at their actual cost. Larger operators benefit in two ways- one because its large base and lower on-net rates attracts subscriber with its expected lower average call rates and secondly larger off-net call rates leads to what is known as network effects. The potential competition issue comes not from differential retail pricing but when the operator sets its on-net rates below the terminating rates. Small operators can over come the network effect of incumbent operator by charging a lower off-net call rates compared to the on-net rates by incur losses.

Lower termination charge leads to a regime that is competitively neutral and provide the maximum consumer welfare. A review of termination charges is long overdue.

Lower termination charges bridge Digital Divide: Even though the average call rates in India are one of the lowest in the world, for some sections of society they remain high preventing them from being connected. The Government has recently encouraged the operators to cover 95% of the development blocks to recap the benefit of 2% reduction in USO. The high termination charges will prevent rural population from being connected. Lowering of termination charges would directly lead to the reduction in per minute call rates.

Higher termination charges are not consistent with the cost causation principles. Call recipient can control the receipt and continuation of the communication. It is incorrect to assume that 100% cost causation falls to the calling party. Although the caller decides the called party will decide whether to receive it and how long to continue. Thus, there is the mutual need or desire to exchange information, rather than the calling party -, the communication.

To enhance competition and protect consumers interests the termination charge above the cost should not be permitted. AUSPI recommends immediate review of termination charge, transit carriage charge and port charge. Origination charge with specific reference to ILD and NLD should be regulated.

Asymmetric termination charge to larger and smaller may also be a fair competition.

TRAI had adopted the cost based pricing methodology after deliberation with the stakeholders. Any attempt to change the methodology, may lead to an endless debate and unnecessary legal complications. This would not only to make the review process more difficult as also delay the full process. The existing methodology met the policy objectives to promote competitions and provide services at affordable rates. It is not only allowed full cost recovery but also reasonable margins for the operators. Same methodology should be applied using current cost and existing efficiency factors to re-estimate MTC.

The Authority may like to decide interconnection rates that reflect the differential customer base between current and new networks. No costing methodology can claim intrinsic superiority, cost analysis can be fashioned to support almost any pre conceived conclusion and, therefore, provide apparent justification for any price or proposed price change. The Regulators must develop and apply specific cost concepts, methods, data sources and interpretations that will address the specific problems they face and inform the specific decisions they must make.

The LRIC is not consistent with the national objective for affordable telecom services, increase tele-density and promote competition. As it is designed to

transfer compete costs capex and opex to the competitors. This would obviously increase costs for the competing network and certainly make it difficult to compete with established large networks. It has inherent drawbacks like costs are transferred on the basis of routing factors although tariffs are not decided on the same based. Hybrid FLLRIC is difficult implement assumptions are subjective and not easily verifiable (i.e. coverage by each self has major impact but the major outlook). The Authority would require to cross-verify LRIC assumes with the actual cost. This would require elaborate conclusion of data from various field units. It would also require separate modeling for 900 MHz networks and 1800 MHz which have significant capex differences. It would also have to take into account that the networks were deal at significantly different point of times.

TRAI's Existing Methodology promotes competition and it consistent with NTP 99 objectives. It does not allow to transfer of capital costs of one operator to the other either through MTC or FTC. These are costs which are to be recovered from one's own customers because networks are set up basically to acquire customers and provide them telecom services for incoming and outgoing calls. Therefore, as per the case— principle the capex costs are allocable to the terminating network? The existing methodology is fully justifiable of all -- operators show that they have not only recovered costs but also margins required for expansion of networks.

Components to be reviewed, justification, data

Carriage charge between LDCA and SDCA must be reviewed. 20 paisa irrespective of distance but in the stated background it is unfair to charge any amount from the interconnecting service providers for carriage of calls. The current termination charge emerging out of TRAI determination is 50 paisa (termination plus mandated transit carriage) which is around 50% of the retail price. Carriage charge for 500 plus kms was Rs. 1.10 per min. However, while the carriage charges were revised down from Rs. 1.10 per min to Rs. 0.65 per min during IUC review in 2006. the carriage4 charges for LDCA to SDCA remained intact.

Transit carriage charge should also be reviewed and brought down 0.2 paisa per min. NLD carriage market is largely competitive and there is no need to review of the present ceiling of Rs. 0.65 paisa per minute.

AUSPI recommends immediate review of:

- The termination charge. Termination charge should be reviewed and rates brought in line with costs and subscriber base
- Asymmetric termination charge should be introduced.
- Transit carriage charge
- The port charge
- Carriage charges between LDCA and SDCA
- Transit charge. Transit carriage charge costing methodology should include only opex. No transit charge should be payable if BSNL fails t provide direct connectivity or enhance capacity
- Carriage charge not required to be reviewed

3. BSNL

Principles, cost-models, methodology

In the changed scenario, there is an urgent need of reviewing/ calculating the different components of Interconnection Usages Charges (IUC) especially after phasing out of Access Deficit Charges (ADC) w.e.f. 01.04.2008. In the existing IUC regime, the cost of wireline access networks was shown to be compensated through ADC and was, therefore, not taken into account while calculating the cost based termination charges for wireline networks. This cost is now required to be considered while calculating the IUC.

The IUC should be determined on the basis of the actual costs (CAPEX and OPEX) of the network elements involved, which varies from network to network. Such as the cost of the wireline networks is almost four times that of the wireless networks. Therefore, the termination charges for wireline networks should also be four times that of the wireless networks.

The present regulatory regime in India has resulted in drastic reduction in revenue from incoming international calls whereas there is significant increase in the outflow of revenue to other countries, as foreign telecom operators have not reduced their termination charges because of the favorable and protective regulatory regime in their countries. This has not only adversely affected the

financial viability of telecom service providers in India but has also deprived the country of the valuable foreign exchange to the tune of Rs 4000-5000 crores per annum. While calculating the IUC, this important aspect needs to be taken into consideration and it has to be ensured that interests of the country at large and that of the Indian telecom sector in particular, are protected. This can also be used to moderate the termination charges for domestic calls for the benefit of Indian consumers.

Cost of carriage in hilly, remote and difficult terrains/areas is much more than the national average. This needs to be taken into consideration while prescribing the cost based IUC. Therefore, the cap for carriage charges to such areas should be higher than the national average.

Approach/Model/Costing Methodology adopted and costs, traffic and revenue used:

1. Top Down Costing approach with historical cost has been used to arrive at the cost of the various segments. The details of the cost and revenue have been taken from the accounting separation statement already submitted to TRAI for the year 2007-08.

2. Cost of access networks only have been taken into account. This includes the cost of tandem switches, local switches, copper network and intra-SDCA transmission media and switches.

3. Weighted Average Cost of Capital (WACC) has been taken @13.98% (same as taken by TRAI in the year 2003 while calculating the IUC).

4. OPEX and depreciation taken for calculation is same as already submitted to TRAI in the accounting separation statement for the year 2007-08.

5. The total annual cost based revenue to be recovered from telecom operations has been arrived at by adding the cost of the capital employed @ 13.98 % WACC, depreciations and operating expenses.

6. For arriving at the annual cost to be recovered from the usage charges (origination and termination), the fixed income in the form of rentals/fixed charge, value added services etc. has been excluded from the total annual cost based revenues to be recovered, as prescribed in para 4.4 above.

7. Further, as BSNL does not have the CDR based billing system for generating the subscriber's bills for basic services, sample datas of traffic/CDRs were collected from some of its field units. Based on the data so collected, per wireline subscriber minute of usages were calculated. These minutes of usages have been used by BSNL in the calculations of origination/termination charges for wireline services.

8. In case of mobile services, BSNL is having the CDR based billing system in place and the traffic figures of Quarter Ending June'2008 have been utilized. This traffic data for June'2008 is already available with TRAI, as submitted by BSNL.

9. Details of calculations of the basis of such data on costs, revenue and traffic for wireline and mobile services are as given in the following table. Termination and Originations charges have been assumed to be equal while calculating the termination charges for wireline and wireless networks.

S.No.	Details	Wireline Networks	Mobile Networks
1	Total Cost (including capital recovery, depreciation and OPEX) (A) (Crores of Rupees)	23261	7014
2	Fixed recovery from services(Rental + Value Added Services) (B) (Crores of Rupees)	4561	1307
3	Balance {C=(A-B)} (Crores of Rs.)	18700	5707
4	Minutes of Usages (D) (In crores)	24141	28616
5	Termination Charges (E = C/D) (Paise per minute)	77	20

With regard to the information sought in the paragraph 6 of your office letter dated 12.09.2008, it is submitted that the same information, which was submitted by BSNL during the calculations of IUC carried out by TRAI in 2003 may be used for the present exercise as the network architecture, proposed model, routing factors etc. of the BSNL's network remains the same. (These are BSNL's comments)

Interconnection Usages Charges (IUC) mainly has three components namely origination, termination and carriage charges. Presently termination charges are 30 paise per minute and a ceiling of 65 paise per minute has been prescribed by TRAI on carriage charges during the year 2006. After payment of termination charges and carriage charges, rest of the amounts recovered as tariff is to be retained by originating service providers. Present IUC regime does not specify the origination charges, which is working well in the present licensing regime. However, if recommendations of the TRAI with respect to calling cards are accepted by Government and, accordingly, licenses of NLDOs/ILDOs are amended, the origination charges will also have to be specified through regulation in order to protect the interest of access providers and ensure level-playing field. The originating access provider will have to be fully compensated based upon the actual cost being incurred by it in provisioning and maintaining of its access network including cost of customer acquisition, marketing etc. The origination charge should be at least 20% higher than that of termination charge.

Termination charges are same for all types of calls at present. These are above costs for wireless networks and, therefore, causing their undue enrichment. On the contrary, these are much below the costs being incurred by wireline networks. Further, for the incoming international calls also, the termination charges are only 30 paise per minute, whereas Indian operators are paying weighted average charges of about Rs 3 per minute for termination of their calls in foreign countries. In view of above, it is necessary that termination charges are reviewed immediately to compensate all operators for the actual costs being incurred by them and also to have parity with their foreign counterparts.

As per the calculations of BSNL, carried out on the basis of sample data/CDRs, which could be collected from the field units in respect of fixed wirelines in the available short duration of time, cost based termination charges for fixed wireline networks following fully allocated costing principles comes to about 77 paise per minute. Using the same costing principles, the cost based termination charges for mobile/wireless networks comes to about 20 paise per minute as per the cost and present traffic figures of BSNL, which clearly establishes that wireless termination charges are almost 1/4th that of the wireline termination charges.

Carriage charges were prescribed by TRAI in February' 2006 and a ceiling of 65 paise per minute was fixed irrespective of distance and terrains. This charge was above cost on high traffic density routes and the NLD operators are carrying traffic at rates lower than this. However, this ceiling does not compensate the cost of carriage to the hilly, remote and difficult terrains. Therefore, in spite of manifold increase in the number of NLD operators and concessions granted by Government to them in terms of very low entry fee, huge reduction in license fee from 15% to 6%, none of the NLD operators has rolled-out their networks in these areas. It is felt that higher carriage charges for these locations/ areas will not only compensate the existing NLD operators for their costs but will also encourage other NLD operators to roll-out their networks in these areas. It is therefore proposed that the separate cost based carriage charges may be prescribed for these high cost areas.

As far as transit charges are concerned, it is submitted that these need not be reviewed and regulated. Transiting of calls is not mandatory and is based upon the mutual commercial arrangement between the operators and, therefore, charges for the same should be left for mutual negotiations.

4. M/s Bharti Airtel Ltd

Principles, cost-models, methodology

While reviewing the IUC the principle should be favourably considered are International best practices should be followed, full transparency of models, subject to data confidentiality concerns and associated documentation, sufficient

time allocated for the process, consideration of the different methodologies, effective consideration, any cost model approach including component should be decided with industry's concurrence.

While reviewing IUC, the long term sustainability of the telecom sector should be considered especially in the light of trend of falling ARPU, declining EBITDA margins, consistently reducing tariffs of industry, the huge investments made by the operators to connect the unconnected and ROI and availability of funds to invest. The existing government levies of 3G spectrum will represent another significant cost. In the last IUC review in 2003 the guiding principle for the Regulator was to reduce the tariffs, encourage competition and boost in subscriber base. In the last 5 years the tariffs have ~~not~~ come down drastically and the Indian market has one of the lowest tariffs in the world, the competition in access segment is extremely high with the presence of 10 to 12 operators in each service areas and huge additions in subscriber base. Thus, the subjective objectives to a great extent and now the market forces will continue to play their role. An immediate need is to encourage the operators in rural areas. The cost of providing the telecom service in rural/semi-urban area is relatively high.

In such a scenario, the Government must partner the industry through enabling economic viability of providing rural connectivity through a fair and progressive cost-oriented IUC regime.

The setting of regulated MTC is a complex and involved task which is likely to require detailed costing analysis and careful consideration of welfare ~~a~~nd competition meet the objectives of fostering interconnection, ensuring right remuneration to terminating operator, enhancing competitive play, long term sustainability and viability of the telecom sector.

No particular model has been found to be most suitable, each country must decide based on the industry. Internationally models are based on Cost Modeling and International Benchmarking. At the current state of development in India cost modeling is relevant. The following were considered: top-down, bottom-up hybrid, average or incremental costs, historic cost and straight line depreciation

or adjustments made to reflect economic or current cost asset valuations and alternative depreciation methodologies.

We recommend Hybrid Forward Looking LRIC Model for terminating call. This model not only works on efficiencies that accrue in future period due to constant evolution in the industry but also takes into account past investments and performances of the existing operators. Efficiencies of technological developments can be factored in. This scheme will be beneficial to the existing as well as new entrants in the telecom sector through due recognition to the investments made by the existing operators to set up telephone networks in the country, build in efficiencies that would flow in the future period through implementation of scale and technological advancements. Model for each circle will be different and will have to be evaluated separately.

Network architecture/call flow diagram, network elements to be costed, operating costs

5. M/s Reliance Communications

Principles, cost-models, methodology

Need for review of the IUC Regime: The IUC regime till now was closely linked to the ADC charges regime and not fully designed for competitive and de-regulated telecommunication markets. The regime gave overwhelming majority of benefits and cash flows to the incumbent public sector wireline operators and largely ignored the public interest and other benefits and efficiencies presented by new private service providers. The Authority reviewed the termination charge in February, 2006 and found that the costs have substantially come down but based on certain assumption that lowering termination rates will affect rural rollout, viability of life time schemes, operator's margins etc. which are flawed, decided to maintain the termination charges at the prevailing rates.

Basis for change: The termination rates had tremendous impact on the retail prices and affordability of telecom services. One of the cornerstones in the Indian Telecom success theory was reasonable termination rate. However, the no

review of termination charges for over 5 years. Important principle in deciding interconnection charging regime is that competition operates more effectively when service providers recover their costs mostly from their own end users. Terminating service provider has monopoly over termination on his subscribers. Service providers with larger subscriber base use termination charges to transfer effectively their costs to the competing networks as such operators have higher incoming traffic flow. The higher termination charge gives distinct cost advantage to large operators over competing new and smaller networks and which in turn helps consolidate the termination market by acquiring more subscribers.

Components to be reviewed, justification, data

The current termination charges are high which even TRAI acknowledged in the IUC Regulation dated February, 2006 and also evident from much lower on-net call rates when compared to the off-net call rates. The current termination rate of 30 p is an enormous cost difference in the off-net and on-net call rates. The difference in on-net and off-net calls in certain tariff plans is as high as 70%. The ability of a service provider to provide much cheaper on-net calls lessens the competition and huge benefit to already established networks.

TRAI should watch out for myths being propagated by incumbent network operators looking to protect their revenues from MTC. Lower termination charges will increase tariff is not valid. Lower rate will expand the market enhance economies of scale and ensure proper revenues and margins for the service providers. Termination rates is not a guarantee for revenues and margins. Consumer welfare and competition can best be achieved by recovering internal network costs from end subscribers. Another myth is lower termination charges are not consistent with the cost causation principles. With caller ID and Do not call list the called party is much in control of communication. Call recipient can control the receipt and continuation of the communication. They give number to others for calling. Thus 100% causation does not fall on calling party. Called party can decide whether to receive or not and how long to continue. Both benefit by the call. Third myth terminating revenue push rural rollout. There is no evidence that such revenue has been used for rural rollout.

The following components should also be regulated

- Origination charge with specific reference to ILD and NLD calling cards.
- We recommend immediate review of the termination charge, transit carriage charge and port charge.

Need to review MTC

Important principle is the effective operation of the competition. They should recover costs from their network rather than transferring significant part to originating service providers. Higher termination results in lower on-net call rates. Present 30p which is 30% of the retail tariff is providing enormous cost difference in off-net and on-net call rates. Higher termination rate is thus inconsistent with the goal of providing interconnection between networks that is seamless and transparent to customers. Termination charge is an important competition and consumer issue and should not be liked to rural rollout.

Interconnection rates should reflect the far higher base among existing networks

Subscribers per network have increased 8 fold and therefore the rate should be 3.75 paise assuming not additional capex has been spent for increasing this subscriber base. Increase in number of towers etc results in incremental cost 67% that of incremental cost in 2003. Using factor of increased sites 5 times then IUC is 12 p/min

- The Indian market today is a classic two-camp structure having differential in cost and customer base. Countries have adopted IUC that reflects this differential in cost and customer base
- Interconnection rates should reflect the differential customer base between current and new networks. Cost of terminating for existing network will be 8p in 2014 and 20 p for new networks.
- The Interconnection regime should take into account the cost differential between existing networks and newly launched networks. 900MHz vs 1800MHz
- A symmetric interconnection rates have been adopted as a best practice in a large number of countries.

Need to review carriage charge between LDCA and SDCA: In proportion to carriage charge this should come down

Methodology for determining the cost based transit charge: 19p per minute existing. This should be reviewed. Even NLD ILD pay this if they handover at a different POI. There is little distance element involved. Calculations have been give 1-2p per minute.

Carriage charge: No need to review

Origination charge: Celing on origination for NLD/ILD calling cards. This will ensure early agreements.

The current termination charges are high which even TRAI acknowledged in the IUC Regulation dated February, 2006 and also evident from much lower on-net call rates when compared to the off-net call rates. The current termination rate of 30 p is an enormous cost difference in the off-net and on-net call rates. The difference in on-net and off-net calls in certain tariff plans is as high as 70%. The ability of a service provider to provide much cheaper on-net calls lessens the competition and huge benefit to already established networks.

Benefits of lowering termination rates :

- Lower Termination charge prevents service providers from imposing costs on other service providers and promote competition.
- It benefits consumer through lower tariffs. It can be expected that the inter-operator calls may also be available nearly at rates of on-net calls.
- Lower termination charge check skewed intra-operator calls and promotes competition.
- Lower termination bridge digital divide: increase in termination charge would make calls unaffordable particularly for semi-urban and rural subscribers.

The following principles may be used while deciding the mobile termination charge.

- Interconnection rates should reflect the far higher base among existing network.

- The Indian market today is a classic two-camp structure having differential in cost and customer base.
- Interconnection rates should reflect the differential customer base between current and new networks.
- The Interconnection regime should take into account the cost differential between existing networks and newly launched networks.
- Asymmetric interconnection rates have been adopted as a best practice in a large number of countries.

The basic principles should be as used earlier by the Authority: promote competition and encourage all networks to compete on equal terms. Promote consumer interest and be one of the drivers for higher mobile penetration. Should promote Indian regulatory regime as being among the most forward looking

- Interconnection charges should generate incentives for all service providers to become more efficient, cost effective and competitive. Termination charges are one of the main costs for the new entrant. Excessive termination rate gives competitive advantage to the existing players.
- IUC and universal service obligation should not be mixed as these have different connotation. Termination charge is not for funding rollout. **The Authority's decision in feb 2006 to allow higher termination charge is flawed and results in termination charge being 25% to 50% of the retail tariffs. The arbitrage available is being used to promote on-net traffic which is not conducive to healthy growth of competition.**

Costing methodology

Revenue sharing gives relatively higher interconnection charges than retail minus which in turn gives higher than fully allocated costs. Incremental provides lowest interconnection charges assuming this sufficient traffic volume. LRIC based is more difficult to define and implement.

TRAI methodology for termination charge is closely linked to LRIC. We agree with the costing principles though the current rates are not in line with costs. Data of 2007-08 should be appropriately projected. Subscriber growth to be taken into account.

Transit carriage charge we do not agree and should only include the opex.

International best practice involves bottom-up cost analysis. The current favorite is FLRIC. Incumbent operator looking to protect their market position try to push hybrid FLRIC. This is done by including historical or sunk costs in the LRIC calculations through inclusion of depreciation. This should not be done. Incumbent also use charges between associated companies in calculation eg capital recovery of the tower company.

Details of calculations being submitted separately. For 2009-10 cost based termination charge is 11 p/min

PCOs should be treated differently. It was most hard hit by CPPC regime. They are only call origination centres. The PCO user pays 30-50% of retail tariff for termination. Termination charges for PCO originated calls should be consistent with social and affordability objectives.

6. M/s Vodafone Essar Ltd

Principles, cost-models, methodology

We support the COAI's view that Regulation of termination charges should be cost-related and consistent with internationally accepted cost modeling approaches.

Comments on Q. 5 (i) of TRAI's letter of significance of termination charges to the business strategies of operators and the delivery of Government's telecommunications policy objectives.

There are large number of usage customers that generates relatively little outbound revenue for operators, even in Metro circles. 29% subscriber base in Mumbai; the equivalent numbers are 31% in Delhi and 39% in Punjab) have monthly bills of less than 120 Rs. per month. On the other hand there is significant number of very high spending customers in the Metro circles that generate a significant proportion of the total revenue. In Mumbai, the subscribers with monthly bills in excess of 1000 Rs. Per month generate 41% of total revenue; the equivalent proportion in Delhi is 41% and 15% in Punjab.

Termination revenues from inbound calls are particularly important to the overall economics of serving these low usage customers. There are some customer that receive many more calls than they make. These customers are typically lower income customers who desire to be connected but who lack the disposable income to be able to afford to originate many calls. However, these customers often receive numerous calls from more affluent employers, friends or family. 4% of the customer bases in each of the three service areas that did not originate a single outbound call or SMS in the month and only received inbound calls. For these customers, the principal ~~9~~ (and sometimes only) source of revenue for the operator serving them is termination revenue.

Operators are very dependent on incoming revenue across a large proportion of low usage subscribers. Operators providing service to low usage subscribers are much dependent on inbound the level of termination rates. It is these consumers who will be adversely affected by reducing termination charges.

Termination charges are integral part of business model of operators. Currently 87% of terminating traffic on mobile networks originates from other mobile subscribers. Therefore, mobile termination charges cannot affect the total net revenues that accrue to operators as a whole because every rupee of mobile termination revenue for one mobile operator equates to a rupee of termination cost for the other mobile operators. It is largely a closed system.

If an operator's aggregate customer base makes as many calls as they receive, the inbound/outbound traffic should be zero. Irrespective of the level of the termination charge. However, operators may adopt differentiated commercial strategies and acquire different types of customers which affect traffic balances. Lower termination rates shift the attractiveness of customers to operators away from low usage customers (which generate a high proportion of inbound revenue). In an extreme world of zero termination charges, operators would only wish to serve high usage customers who make many outbound calls and have high ARPUs. Operators would have every incentives to seek to churn them off of their networks. A reduction in termination rates will incentives operators to shift

their focus away from low usage customers and towards higher usage, typically urban customers.

7. TTL/TTML

Principles, cost-models, methodology

Existing methodology and principles hold good fixed today and there is no rational for bringing about a change in this specially so when this methodology is now global expected practices. However, the interconnection usage charges needs to be reviewed and reworked based on revised network size, tremendous growth in the traffic, phenomenal increase in mobile density, impact on the input cost, etc.

Components to be reviewed, justification, data

Components of IUC that should be reviewed – origination charges are currently not mandated.

Carriage charges: Present model which was used during the exercise in 2003 appears to be appropriate.

Termination charges: should continue to be mandated and there could be a scope for downward review considering increased traffic.

Cost of call termination for fixed line – based on 17 million subscribers and 326 minutes of use per DEL per month. Termination charges for Mobile termination were calculated to be Rs. 0.26 per minute and Rs. 0.30 per minute.

Tax transit charges need downward review since these changes are quite high and should be cost based like all other IUC components.

There is a pressing need to review the Interconnection Usage Charges (IUC) :
In multi operator environment, IUC plays a key role in promoting a basis for fair competition between larger and smaller players and to promote service in

underserved areas and among poorer populations. Many regulators do so by both reducing and specifying asymmetric revenue share and inter operator revenue transactions. With mobile subscriber base being about seven times the landline, thee should be specific concentration on reduction in termination charges and reasons for imposing asymmetric termination rates in the context of the Indian Mobile market.

Need for reduction of termination charge is made out for the following reasons:-

- Expansion telecom growth.
- Growth in minutes of usage. Based on the above computations, it can be concluded that the current level of minutes has drastically brought down the cost of termination which should typically lie in between a range of Rs. 0.06 per minute Rs. 0.11 per minute and hence must be brought down from the existing level from Rs. 0.30 per minute. TRAI also can not adopt a principle different from what it adopted in 2003. It must be remembered that it was this reduction brought in by TRAI, which was responsible for the explosive growth in the telecom sector.

- Such tremendous saving to the consumer who would directly benefit by a reduction in tariff by about Rs. 0.24 to Rs. 0.19 per minute and would lead to the next round of explosive growth.

- High termination charges favour larger incumbent operators.

- A cost and revenue transactions analysis across telecom operators today demonstrates clearly that mobile operators who have large subscriber base benefit from high IUC termination charges at the cost of smaller and newer/Second Network operators.

While the charges themselves are equal, a relatively higher burden is borne by smaller operators. This is because smaller and new/Second Network mobile operators pay proportionately larger IUC charges month on month since a higher proportion of their calls terminate on mobile operators.

Termination costs above the actual cost leads to market distortion.

Differentially price its off-net and on-net by large operators because of high termination charge. A small operator can set its off net prices below the on-net prices of large operator to attract customers which forces small operator to incur losses.

Lower termination charges would increases service uptake.

Even though the average call rates in India are one of the lowest in the world, for some sections of society they remain high preventing them from being connected. Government has recently encouraged the operators to cover 95% of the development blocks to reap the benefit of 2% reduction in USO levy. High termination charges will prevent the rural population from being connected.

Termination rates were set 5 years ago and needs revision.

TRAI had used cost based methodology to arrive at the termination costs wherein it considered the operational cost, minute of usage and the subscriber base. In the ensuing 5 years due to advances in the technology, networks have become more efficient reducing the termination charges below what were calculated in 2003. Hence a review of termination charges is long overdue.

Introduction of asymmetric termination charges.

Asymmetric termination charges promote fair competition.

Such as concluded that asymmetric termination charges leads to increase industry profitability makes market more desirable for newer firms, increases consumer welfare and leads to increased service uptake.

Symmetric termination puts newer/second Network entrants at a disadvantage.

The later a firm enters such a market, the higher its initial investments needs to be as late entrant cannot spread its investment over several years and must immediately offer the same QoS as an entrant. The first entrant made profits while it was a monopoly and could spread its investment over years, whereas the

later entrant made profits while it was a monopoly and could spread its investment over years, whereas the later entrant starts within a huge loss.

Asymmetric charges promote services among underserved and poorer populations.

A symmetric termination can act as facilitator for reaching into rural markets and help in increasing access to telecommunications facilities in rural areas.

Current termination regime favors operators in 900MHz: current IUC regime does not support operators in 1800 mhz. Even though they suffer from obvious cost disadvantage. Asymmetric termination charges are justified for transitory period in such cases where due to exogenous factors some operators are at a disadvantage.

Smaller player with less than 15% market share should enjoy a premium on termination rates, say 33% or Rs. 0.20. Much of these benefits would be passed on to customers. TRAI is requested to provide a glide path for bringing the termination charges to a symmetric level over a predefined time counted from entry of a new operator.

8. Swan

Principles, cost-models, methodology

IUC Regulation and need for review.

To promote effective competition through market entry and to avoid excessive returns to the incumbent/operators with significant market power, interconnection charges should be set as close as possible to the costs associated with the provision of the interconnection service. In the long run allows recovery of joint so that inefficiencies of the incumbent operator shall not be unnecessarily allowed of the new operator in future.

Components of IUC to be reviewed

In view of the sharp reduction in the ceiling tariffs for domestic bandwidth, the cost of carriage would also need to be significantly revised downwards. As on date carriage charges are on the higher side. Once the carriage charges are reduced the overall tariff will fall resulting in increase in affordability, which in turn will fuel growth in teledensity. Swan telecom is of the view that the current cap on carriage fee is around 5 tmes that of cost per minute.

Termination charge needs to be reviewed for reasons mentioned below:

- Above-cost termination charges
- Consumer interest
- The objective of reducing per minute call charges and making outgoing calls as local calls can be achieved in the carriage charges termination charges are regulated and linked to LRIC model.
- Carriage charge should be reduced from 0.65 per minute to around Rs. 0.13 per minute. Termination charge should be reduced from Rs. 0.30 per minute to around Rs. 0.10 per minute.

Approach/model costing methodology.

Swan Telecom Recommends the adoption of FL-LRIC model in determination of IUC.

On the basis of proxy model worked out on the basis of data collected from the annual report of some of the operators and various assumptions, Swan recommended cost of carriage

0 to 50 Km Rs. 0.02 per minute
50 to 200 Kms: Rs. 0.09 per minute
More than 200 Kms: Rs. 0.11 per minute

Cost of termination Fixed: Rs 0.10 per minute
Mobile: Rs. 0.09 per minute (Both for metro and non metro)

9. Rainbow

Principles, cost-models, methodology

Termination charges were set 5 years ago and need to be revised. In view of better network utilization, technological advancements and exponential growth in subscriber numbers.

It is needless to mention the importance and timing of bringing about change in the IUC regime. We also understand that even PSU companies have suggested mobile termination in the order of 10paise per minute.

The symmetric termination charge which are set above the actual cost to terminate a call is no longer relevant, and only benefits and incumbent mobile operators as the cost of network elements has fallen steeply, and utilization has increased, due to increase in MOUs, and subscriber growth.

Mobile operators with a proportionately larger subscriber base have larger proportion of incoming calls. While the charges are equal, a relatively higher burden is borne by smaller operators. The cost of terminating a call for a large operator in its own network is much lower. This allows it to differentially price its off-net and on-net call rates. Typically a small operator has to, set off-net prices below the on-net prices of large operator to attract customers. This will force small operator to incur losses. World over Regulators have taken to Asymmetric termination charges to promote fair competition, and maintain level playing field by reducing the charges paid by smaller/newer operators relative to larger operators. World bank, ITU, ECTA etc. have endorsed the concept of Asymmetric termination charges to encourage competition.

10. Loop Telecom Pvt. Ltd.

Principles, cost-models, methodology

Since we are yet to launch access services, we are not in a position to provide the actual cost, traffic and revenue data as required vide your letter. A well designed IUC regime for India must take into consideration the cost incurred by the operators for establishing their networks in different time frames, their present

depreciated valued the present network usage and the expected network utilization over the 2 to 3 years.

The methodology used by TRAI to arrive at the various components of IUC, including termination charges was totally on the cost-based principles. Due to growth in minutes of usage, sharing of active and passive infrastructure, advances in the technology like increasing emphasis on IP based networks, etc. and also a reduction in the prices of some network equipment, clearly makes a strong case for reduction in the termination charges.

COAI has suggested the usage of hybrid LRIC model, in our view while the LRIC model may be all right in case of incumbent operators who have been in operation for the last 5 years or more, it may not be suitable in case of new licensees who have been issued licenses about six months back and are presently in the process of rolling out their networks. In the case of such new licensees, as per our understanding, the fully allocated cost model will be more appropriate. For the survival of the new operators and for promoting a fully competitive regime. We suggest that asymmetrical IUC regime is implemented. It has been introduced in the past by the Regulators in many European countries such as France, Germany, Italy, Greece, New Zealand, UK etc. to support competition between large and small players.

We suggest that termination, intra circle carriage and inter circle carriage charges need to be reviewed. The origination charges and tariff should continue to forborne as at present. However, in case of calls to the free phone services provided by the other operators as well as the charges payable for the calls originated by the out roamers while roaming in other operator's network should also be decided. This will be necessary to protect the new operators from the unreasonable demands by the incumbents.

11. Unitech

Principles, cost-models, methodology

Cost incurred by different operators will be different because of different time frames and therefore, cost based approach may vary. Due allowance need to be

provided on network externality. It is well known that in the current CPP regime, the share of off-net incoming traffic is more than on-net traffic as most of the customers additions are those who mainly receive the calls. In addition the upcoming operators will not have so soon in place, the required service diversification so as to amortize the costs on a wider base.

Free phone service, as also charges payable for the calls originated by the customers should also be fixed.

Even today TRAI's earlier approach with some modifications, will be the best fit in the current environments mentioned above. The Authority may also look at the option of introducing asymmetric mobile termination rates amongst the incumbent and the new operators.

12. Orange Business Services

Principles, cost-models, methodology

Orange Business Services (Equant Network Services India Pvt. Ltd.-NLD and ILD operators) (France Telecom Group)

1. In order to keep the momentum going we need to give equal opportunity for the new operators to enter the market and play an active role in this growth. The principal to be considered of Interconnection should be based on Market forces while keeping upper ceiling on them.

2. Components should be reviewed. Origination may continue to be kept under forbearance. However there is a need to look after the SMS origination charge. The charges for SMS have not come down as comparison to the voice charges. Thus there is a need to review the same.

3. Carriage inter circle : there is a huge variance in terms of the charges for Off-Net and On-Net Charges. Intra Circle, termination to be reviewed.

13. Discussion with COAI and AUSPI

Keeping in view sharply divergent view of the two main associations COAI and AUSPI regarding the cost modeling and methodology both the associations were invited on 16.12.2008 for proper understanding of their models, methodology assumptions and proposals.

List of Acronyms

Acronym	Expansion
ABC	Activity Based Costing
ADC	Access Deficit Charges
ARPU	Average Revenue Per User
AUSPI	Association of Unified Telecom Service Providers of India
BSNL	Bharat Sanchar Nigam Limited
BSO	Basic Service Operator
BWA	Broadband Wireless Access
CAPEX	Capital Expenditure
CCA	Current Cost Accounting
CDMA	Code Division Multiple Access
C-DoT	Center for Development of Telematics
CDR	Call Data Record
CMSO	Cellular Mobile Service Operator
COAI	Cellular Operators Association of India
CPE	Customer Premises Equipment
CPP	Calling Party Pays
EBITDA	Earning Before Interest Tax Depreciation and Amortization
FAC	Fully Allocated Costing
FLLRIC	Forward Looking Long Run Incremental Cost
FMCG	Fast Moving Consumer Goods
FTC	Fixed Termination Charges
FTS	Fixed Telephone Services
GDP	Gross Domestic Product
GMPCS	Global Mobile Personal Communications by Satellite
GMSC	Gateway Mobile Switching Center
GSM	Global System for Mobile Communication
IIM	Indian Institute of Management
ILD	International Long Distance
ILDO	International Long Distance Operator
IN	Intelligent Network
IP	Internet Protocol
IPLC	International Private Leased Circuits
ISD	International Subscriber Dialling
ISD	International Subscriber Dialling
ISP	Internet Service Provider
IT	Information Technology
IUC	Interconnect Usage Charges
LDCA	Long Distance Charging Area

Acronym	Expansion
LRAIC	Long Run Average Incremental Cost
LRIC	Long Run Incremental Cost
MNP	Mobile Number Portability
MOU	Minutes of Usage
MPP	Mobile Party Pays
MSC	Mobile Switching Centre
MTC	Mobile Termination Charges
MTNL	Mahanagar Telephone Nigam Limited
MVNO	Mobile Virtual Network Operator
NGN	Next Generation Networks
NIXI	National Internet Exchange of India
NLD	National Long Distance
NLDO	National Long Distance Operator
NRA	National Regulatory Authority
NTP'94	National Telecom Policy' 1994
NTP'99	New Telecom Policy' 1999
OPEX	Operational Expenditure
PCO	Public Call Office
POI	Point of Interconnection
PSU	Public Sector Undertaking
QoS	Quality of Service
RIO	Reference Interconnect Offer
ROI	Return on Investment
SDCA	Short Distance Charging Area
SDCC	Short Distance Charging Center
SIM	Subscriber Identity Module
SMP	Significant Market Power
SMS	Short Messaging Service
SSA	Secondary Switching Area
STD	Subscriber Trunk Dialling
TRAI	Telecom Regulatory Authority of India
TSLRIC	Total Service Long Run Incremental Cost
TTO	Telecom Tariff Order
UASL	Unified Access Service License
USO	Universal Service Obligation
VCC	Virtual Calling Card
VoIP	Voice Over Internet Protocol
VSAT	Very Small Aperture Terminal

Acronym	Expansion
VSNL	Videsh Sanchar Nigam Limited
WACC	Weighted Average Cost of Capital
WiFi	Wireless Fidelity
WiMAX	Worldwide Interoperability for Microwave Access
WLL	Wireless in Local Loop
WTO	World Trade Organisation