

Preface

1. India has made a commitment in the World Trade Organisation (WTO) during the negotiations on Basic Telecommunications under the General Agreement on Trade in Services (GATS) to review further opening up of national long distance service beyond the service area in the year 1999. It was in pursuance of this commitment that the Telecom Regulatory Authority of India (TRAI) under clauses (a), (b) and (h) of sub-section 1 of Section 11 of the TRAI Act, 1997 decided (in June 1998) to commission a study on the **Introduction of Competition in the Domestic Long Distance Communication** with a view to making recommendations to the Government on the subject. The Terms of Reference of the study were formulated in consultation with the Department of Telecommunications (DOT). The study was assigned to Tata Consultancy Services (TCS) in October 1998. This Consultation Paper is based on the aforementioned TCS report.

2. In the meanwhile, the Government (in March 1999) announced the New Telecom Policy (NTP) 1999. The policy envisages opening up of the National Long Distance (NLD) service beyond service area to private operators for competition with effect from January 1, 2000; the terms and conditions of license including the number of operators, the entry fee, and the license fee as a percentage of revenue would be decided by the licensor in consultation with the TRAI. The Government has now sought (in May 1999) TRAI's recommendations on modalities for opening up the NLD communications (which is also referred to as the Domestic Long Distance (DLD) communications), with specific reference to the following:

- a. The scope of the service;
- b. The service area;
- c. The number of long distance operators;
- d. License fee structure; and
- e. Selection criteria for the service providers.

3. NTP 1999 envisages usage of the existing backbone network of public and private power transmission companies, Railways, GAIL, ONGC etc. for national long distance data communication with immediate effect, and for national long distance voice communication from January 1, 2000. The NTP 1999 also makes policy provision for Resale of services for domestic telephony. The modalities thereof are to be worked out along with the opening up of the NLD communications.

4. This study undertaken by the TRAI identifies issues relevant to liberalisation of the DLD telecommunications market. It makes an assessment of the existing DLD facilities in the country including that of the utility sectors. The study contains estimates of the total DLD traffic in the country and its distribution, projections on growth of traffic and revenues in the time frame of 2000-05.

5. A study of this nature is necessarily based on assumptions and this holds true in this case also. The key assumptions made to quantify the projections and for developing trends to understand implications of the policy options have been explicitly stated in the Paper. The options in the Paper in regard to modes and modalities of liberalisation, their merits/ demerits,

and pros/ cons of each option do not constitute any preferences of the TRAI at this point in time. Any expression of opinion in the document is to be read in the context of analysis of the options/data and is not necessarily a view of this Authority.

6. Following have been identified as key determinants for the competition policy in DLD communications:

- a. type of competition;
- b. areas of operation;
- c. degree of competition raised; and
- d. time-frame for policy implementation.

7. Issues relating to facility and non-facility based competition have also been discussed in this context, along with policy implications on interconnection, access, bundling, universal service obligation etc, which will arise out of introduction of competition. These issues and their impact on policy parameters have been put in the form of a questionnaire in this study with the objective of soliciting views of the Service Providers, Consumers, Consumer Organisations or any body interested in the subject.

8. Since recommendations to the Government are to be made in a time-bound manner, we would like to have comments and views on any or all issues raised in this Paper on or before **13th August 1999**. Public consultations through Open House sessions would be held thereafter, which along with the views/ opinions of all stake-holders would form the basis for formulating recommendations in this regard. **If any clarification in the matter is wanted, Mr. Rakesh Kapur, Joint Secretary (Commercial) or Mr. Sanjay Kumar, Director (Commercial), TRAI may be contacted on Tel Nos. 331 6782 or 335 6523, respectively [Fax Nos. 3738706, 3356083; e-mail: traid@del2.vsnl.net.in].**

Justice S. S. Sodhi)

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Abbreviations

A & N	Andaman and Nicobar Islands
ABTO	Association of Basic Telecom Operators
AP	Andhra Pradesh
APs	Access Providers
ACA	Australian Communications Authority
ACCC	Australian Communication Competition Commission
ARE	Annual Recurring Expenditure
ART	Autorite de Regulation des Telecommunication

AT & T	American Telephone & Telegraph Company
BOOL	Build-Own-Operate-Lease
BT	British Telecom
BTL	Bharti Telenet Ltd.
C & W	Cable & Wireless
CAC	Carrier Access Code
CAGR	Compounded Annual Growth Rate
CAN	Customer Access Network
CMSPs	Cellular Mobile Service Providers
COAI	Cellular Operators Association of India
CoI	Community of Interest
CTMS	Cellular Telephone Mobile Services
CUG	Closed User Group
DELS	Direct Exchange Lines
DoJ	Department of Justice
DoS	Department of Space
DoT	Department of Telecommunications
DLD	Domestic Long Distance
DLDO	Domestic Long Distance Operator
DMW	Digital Microwave
ECU	European Currency Unit
ETSI	European Technical Standards Institute
FCC	Federal Communications Commission
FIPB	Foreign Investment Promotion Board
FT	France Telecom
FTS	Fixed Telephone Services
FSPs	Fixed Service Providers
FY	Financial Year
GAIL	Gas Authority of India Limited
GoI	Government of India
HBJ	Hazira Bijapur Jagdishpur
HP	Himachal Pradesh
ICR	Interconnection Charges Regulation

IRCON	IRCON International Limited
ISP	Internet Service Providers
IT	Information Technology
ITA	Indian Telegraph Act
ITU	International Telecommunication Union
J & K	Jammu & Kashmir
JV	Joint Venture
LD	Long Distance
LDCAs	Long Distance Charging Areas
LDCC	Long Distance Charging Centre
LEC	Local Exchange Carrier
MBPS	Mega Bits Per Second
MOST	Ministry of Surface Transport
MP	Madhya Pradesh
MSC	Mobile Service Centres
MTNL	Mahanagar Telephone Nigam Limited
NE	North East
NPM	Net Profit Margin
NPV	Net Present Value
NTP'94	National Telecom Policy 1994
NTP'99	National Telecom Policy 1999
OCS	Overseas Communication Service
OECD	Organisation for Economic Co-operation and Development
OFC	Optic Fibre Cable
OMC	Operations and Maintenance Controller
ONGC	Oil and Natural Gas Commission
OPGW	Optical Fibre Ground Wires
PCO	Public Call Office
PDH	Plesiochronous Digital Hierarchy
PGCIL	Power Grid Corporation of India Limited.
PICC	Pre-subscribed Inter-exchange Carrier Charge
PLCC	Power Line Carrier Communication system
PLDT	Philippines Long Distance Telephone Company

PMRTSP	Public Mobile Radio Trunking Service Providers
PoI	Point of Interconnection
PoP	Points of Presence
PSDN	Public Switched Data Network
PSTN	Public Switched Telephone Network
PTOs	Public Telecom Operators
PUC	Public Utilities Commission
QoS	Quality of Service
RIO	Reference Interconnection Offer
UTES	Rail India Technical and Economic Services
Rkm	Route Kilometre
RoI	Return on Investment
RoW	Right of Way
ROCE	Return on Capital Employed
RPSPs	Radio Paging Service Providers
SC	Special Carrier
SCADA	Supervisory Control and Data Acquisitions
SDCA	Short Distance Charging Areas
SDCC	Short Distance Charging Centre
SDH	Synchronous Digital Hierarchy
SEBs	State Electricity Boards
SME	Small and Medium sized Enterprises
SSAs	Secondary Switching Areas
STD	Subscriber Trunk Dialling
STM	Synchronous Transfer Mode
TAX	Trunk Automatic Exchange
TEC	Telecommunication Engineering Center
TN	Tamil Nadu
TO	Tariff Order
ULDS	Unified Load Despatch Scheme
UP (E)	Uttar Pradesh (East)
UP (W)	Uttar Pradesh (West)
UK	United Kingdom

USA/US	United States of America
USO	Universal Service Obligation
VSAT	Very Small Aperture Terminal
VSNL	Videsh Sanchar Nigam Limited
WB	West Bengal
WDM	Wavelength Division Multiplexing
WTO	World Trade Organisation

EXECUTIVE SUMMARY

Introduction

1. This paper discusses issues relevant to the liberalisation of Domestic Long Distance (DLD) telecommunications service market. The objective is to seek views of entities associated with the sector and consumer interest groups via public consultations. This would facilitate the formulation of recommendations with respect to terms and modalities for opening up of the DLD segment. These issues are presented in the Annex to this summary.
2. At present the Department of Telecommunications (DoT) is the predominant provider of DLD services in the country. The liberalisation of fixed/cellular services has resulted in private operators providing telecom services in a few states in the country. These operators are allowed to extend DLD services to their subscribers within the state. There is multiplicity of operators within a state but a subscriber cannot select a DLD carrier of choice. The Access Provider¹ (AP) is the default DLD carrier for the customer.
3. With respect to DLD liberalisation, the National Telecom Policy (NTP'99) states that "National Long Distance service beyond service area to the private operators will be opened for competition with effect from January 1, 2000." It requires that all APs provide interconnection to the Domestic Long Distance Operators (DLDO), so that subscriber can exercise the choice with respect to DLDO. It further states that resale would be permitted for domestic telephony.
4. There are two contrasting interpretations of the term "beyond service area" mentioned above. One interpretation is that the intra-circle DLD services will not be opened for competition, since the basic service licensees have exclusivity in their service areas for ten years. The other view is, although as per basic service license agreement, licensees are permitted to carry intra-circle DLD calls, this cannot be construed as their right to be exclusive intra-circle DLD service providers. Further if the latter interpretation is taken, then opening intra-circle DLD service to competition may effect the profitability of existing private licensees.
5. Six circles have already been licensed and 15 are yet to be licensed. NTP'99 proposes multiple operators for the circles to be licensed. It does not mention whether these licensees will have exclusivity for intra-circle operations. This may result in non-uniformity of policy across circles.
6. NTP'99 envisages usage of the existing backbone network of public and private power/transmission companies, Railways, Gas Authority of India (GAIL), Oil and Natural Gas Commission (ONGC) and others, for voice and data services. It is not clear as to whether the utilisation of facilities is limited to entities specifically mentioned in NTP'99 or whether any entity (including service providers) can build a network and offer it for voice and data services.

Facilities Assessment

7. The facilities for long distance communication are switches, transmission media and transmission systems. Optical Fibre Cable (OFC) offers advantages over other transmission media for DLD carriage. Technological developments are making it possible to create higher capacities over a single pair of fibres, resulting in connectivity acquiring greater significance than system capacities.
8. Further, an entity requires Rights of Way (RoW), if it has to deploy OFC along a route. RoW is a critical asset since it entails costs and time spent on obtaining approvals from various authorities. DoT has RoW due to the statutory authority granted to it by the Indian Telegraph Act, 1885 (ITA). There are several other organisations with transmission and distribution networks such as Indian Railways (Railways), State Electricity Boards (SEBs) and Ministry of Surface Transport (MOST), which have RoW by virtue of their existing networks.
9. With such technological advancement and criticality of RoW, it needs to be discussed if the policy should facilitate development of capacities by only a few entities, considering economies of scale and scope.

Existing Infrastructure

10. At present, most of the DLD infrastructure in the country is with DoT, which has 76,000 Rkm of OFC in comparison to 3,000 Rkm with other agencies. The Railways have approximately 1,500 Rkm of OFC. Basic and cellular licensees have also established limited infrastructure in their circles, since they are allowed to carry long distance calls of their subscribers within their service areas. Further, there are certain organisations that use captive telecommunication networks, mainly for their internal operational purposes. Railways, Power Grid Corporation of India Ltd. (PGCIL) and GAIL are principal among these.
11. Analysis reveals that there are two levels of infrastructure, national and state, with different agencies owning and operating them. There is no existing alternate nation-wide infrastructure available with network owners connecting major metros and important locations, which can provide competition to DoT on major routes. The spare capacities of Railways, PGCIL and GAIL are scattered and not easily connectable.
12. In comparison, the state-level infrastructure of private operators is tuned to telecom traffic requirements. Bharti Telenet Ltd (BTL), the basic operator in Madhya Pradesh, has around 1,700 Rkm within the state. Apart from this, long distance digital microwave (DMW) capacities connecting major locations exists in a few states. In some of these states spare capacity exists to cater to long distance traffic. These routes are mainly intra-state and on some of these routes capacities are available with more than one operator, implying possibility of greater competition on these routes. For instance, in Kerala and Gujarat, cellular operators have competing networks.

Planned Facilities

13. If plans of all the private network owners (including utilities and operators) fructify by 2003, alternative OFC network in the country will be around 70,000 Rkm. Meanwhile, as per its perspective plan, DoT plans to add 1,36,000 Rkm of OFC by 2003.
14. The plans show that there are a large number of entities interested in building facilities. The fructification of these plans is contingent upon a favourable business environment. Key issues impacting facilities build-out are:
 - Cellular and basic operators' plans, have been held up due to their inability to raise resources to invest. Hence the viability of the business plans of the existing operator's will impact their plans for setting up facilities.
 - The plans for building facilities were developed before the reduction in lease line tariffs. With the cost-based tariffs introduced by TRAI Tariff Order (TO), many of these entities may reconsider their plans of building their own facilities.
 - NTP '99 permits usage of existing backbone networks of public and private power transmission

companies, Railways, GAIL, ONGC and others immediately for national long distance data communication and from January 1, 2000 for national long distance voice communications. It does not state if the permission to

utilise existing backbone network for national long distance data and voice communication is limited to entities specifically mentioned or whether others can also build facilities.

- International trends show that utilities entering telecom may either remain carriers' carriers or enter public switched services business. The option to enter public switched services is purely a commercial decision. Utilities may have little incentive to invest in infrastructure, if they are not allowed to provide services.
 - Business users account for a significant percentage of telecom revenues. Increasingly, PTOs are specialising in catering to private corporate networks or business users networks. It needs to be discussed whether pure infrastructure owners should be allowed to build and manage networks for closed user groups.
1. The TRAI Act is applicable only to service providers. The commercial agreement between infrastructure owners and service providers may have implications for interconnection, quality of service and tariff. In such a scenario a regulatory mechanism needs to be evolved for these infrastructure providers.

Traffic Analysis

2. The analysis is based on data collected from 40 cities. These cities are commercially important and account for 54 percent of Direct Exchange Lines (DELs) in the country. An analysis was undertaken of distribution of traffic originating from a city vis-à-vis inter-circle and inter-region component. The key findings are as follows:
 - Originating traffic per DEL is highest for cities with low number of DELs since subscribers in these cities are primarily business users with higher calling needs
 - Level 1 cities reflect higher originating traffic per DEL and a much higher proportion of inter-circle and inter-regional traffic than the Level 2 cities.
 - Metro cities reflect a lower ratio of traffic originating per DEL since higher tele-penetration in their case includes higher percentage of residential subscribers
 - All cities have a high level of intra-circle traffic with average intra-circle traffic at almost 67 percent of the total originating DLD traffic
 - Inter-circle originating traffic from the major cities/state capitals is much higher in comparison to secondary cities
 - Higher level of traffic flows to nearby states as compared to far-flung states; 81 percent is intra-regional and only 19 percent flows out of the region
1. Sample data ratios have been used for estimating total DLD traffic in the country. The Level 2 TAX sample city ratio of traffic originating per DEL (0.012) has been applied to the DELs not represented in the sample. Further, certain assumptions have been made to convert traffic in erlangs into minutes and market size. The resultant estimates for 1998-99 are as follows:
 - DLD traffic for the country is 187,152 erlangs while for 40 cities it is 89,084 erlangs.
 - Inter-circle traffic is 6.7 billion minutes and total traffic is 26.9 billion minutes.
 - Inter-circle market size is Rs. 6,746 crore and the total market size is Rs. 12,441 crore.
1. Table 1 presents the total traffic and revenue estimates in FY 2001-02 and FY 2004-05. During this period traffic is expected to grow at 25% p.a., but revenues are expected to grow at only 6.5% p.a., due to lower tariffs introduced by TRAI.

Table 1: Estimated Traffic and Revenues in FY 2002 and FY 2005

	FY 2002	% increase p.a. 1999-02	FY 2005	% Increase p.a. 2002-05
Traffic	372 070	25	504 720	17

Revenue (erlangs)	372,070	23	307,120	11
Revenues (Rs. Crore)	15,105	6.5	23,916	16.5

Viability Analysis

2. Viability analysis of national level operations has been undertaken based on likely number of cities on the network. An entity is expected to start with major cities and add cities to the network, if traffic potential justifies the inclusion.
3. Key assumptions are listed below:
 - Market size is based on 40-sample cities, for which data is available.
 - DLDO will build its own network.
 - Capital cost of TAX is Rs. 8,000 per line.
 - Cost of transmission system and medium is as Rs. 6.0 lakh per Rkm.
 - Annual Recurring Expenditure (ARE) is 25 percent.
 - Interconnection is 40 percent of revenues.
 - Costs related to license fees, contributions to Universal Service Obligations (USO) and regulatory expenses have not been considered.
 - Market share is 15 percent.
 - Per call (per pulse) tariff is rupee one. Tariffs for peak rate are as per the TRAI TO for FY 2002, while for off peak 1 and off peak 2 rates, they are 50 percent and 33 percent respectively of the peak rates.
 - Traffic flows during peak, off peak 1 and off peak 2 are 47 percent, 12 percent and 41 percent respectively.
 - DLDO will commence network roll out in the Year 2000 and the network will be operational in the FY 2001- 02.

1. An overview of the analysis is presented in Table 2

Table 2: Analysis of Nation wide Operations

	4 City Market	8 City Market	23 City Market	40 City Market
(Rs. in Crore)				
Investment	448	613	705	1,105
Market Size	761	1,699	3,645	5,389
Revenue	114	254	547	808
Costs	166	272	436	664
Profits	(52)	(18)	110	145
ROCE	3%	12%	31%	8%

2. The comparative analysis of the four options shows that operating only in metros or eight major cities does

not make the operations profitable in the first year. This could be attributed to the fact that the analysis is based on the premise that revenues accrue from traffic flows between these cities alone.

3. An overview of analysis when the market size is limited to inter-circle alone is given in Table 3.
 1. The sensitivity analysis with respect to tariff discount at 10,15 and 20 percent and market share at 5, 10 and 15 percent was undertaken. The analysis shows that profitability is more sensitive to market share than price discounts. For instance, at five percent market share the ROCE varies from one percent to negative ROCE of two percent with price discounts ranging from 10 to 20 percent. At 10 percent market share the ROCE varies from nine to 14 percent and at 15 percent market share it varies from 19 to 27 percent.

Policy Options

2. The DLD policy will need to address an array of issues relevant to the introduction of competition. The key determinants of DLD policy are as follows:
 - *Type of competition, that is whether these entities compete on facilities or on services or both.*
 - *Areas of operation, which means geographical boundaries within which these entities will be allowed to operate.*
 - *Degree of competition, which is determined by the number of entities to be licensed in the segment.*
 - *Time frame, for policy implementation and transition through different stages of competition.*

Type of Competition

1. *The following types of service providers exist in the telecom sector:*
 - *Public Telecom Operators (PTO), which either lease facilities from utilities and other PTOs or build their own network to provide services to the public*
 - *Switch based resellers, which lease transmission facilities from PTOs for providing services to the public*
 - *Switch-less resellers who purchase bulk minutes from PTOs for providing services to the public*
1. *Competition can be introduced either through facilities-based or non-facilities-based modality. Facilities-based competition involves licensing of entities, which own and operate facilities for provision of services. Non-facilities based competition would entail competition by entities not operating their own facilities.*
2. *Competition in facilities can be introduced either by allowing utilisation of infrastructure of entities such as utilities for provision of telecom services or by licensing facilities-based operators. Entities such as utilities provide competition in facilities, at optimum costs due to their access to RoWs. However, the benefits to the end-user are better served through introduction of facilities-based operators, as the latter are able to ensure continuous and better quality of services at competitive prices, by exercising control over facilities*
3. *The international experience has been that the non-facility-based operators do not entail any additional costs to the economy but provide additional benefits in terms of product innovations and prices customised to end-users' needs. Non-facilities-based competition does not adversely impact facilities build out. Rather, it is a positive impact on the facility-based operator due to expansion of markets facilitated by the resellers. Although resellers corner some of the retail revenues, their presence in the long-term results in growth and maturity of the market, which translates into higher revenues for facilities operators.*
4. *NTP '99 envisages utilisation of utilities' facilities for voice services. Hence, a PTO should have an option to either build its facilities or lease them from owners of any such facilities. Moreover, cost-based leasing charges offer great economies and it can lead to earlier introduction of competition.*
5. *International trends show that resellers are a feature of more mature markets representing unrestricted competition in services. Most developing countries do not allow third party resale in the initial phases of liberalisation. The spare capacities' assessment shows that the currently limited availability of facilities in the country, may be overcome in the next two to three years. Adequate level of facilities accompanied by competition in facilities are pre-requisites for introduction of non-facilities based*

competition.

Areas of Operation

6. The area of operation may be route, circle, region or nation
7. DLD services are offered over routes, which presents a possible unit for licensing. However, route-level licensing may not be desirable in a large country like India due to the possibility of a large number of routes. Traffic analysis shows that 50 percent of the traffic between 40 sample cities is concentrated in 43 routes. Under this approach, the customer will have to access different operators for making calls over different routes. The route-level or sectoral approach may not be pragmatic and there have been no international precedents.
8. Circle-level licensing implies that operators have the option to dispense DLD services within the circles (intra-circle) as well as between two circles (inter-circle). This approach may not be feasible in case intra-circle is excluded.
9. Circle-level licensing provides an operator flexibility to operate within or between the circles of choice. It also encourages wider participation since the telecom unit of operation is a circle. However, the objective of consolidation may not be achieved for all operators in case of limited competition, since there are two or three licensees in each circle. A major drawback is that a national operator may not emerge, since circle-level operators may remain concentrated in certain areas only.
10. A Regional approach will require the region to be defined. This may be as per DoT classification, as per which the state of MP falls under different regions. Alternatively, commonly agreed circles falling under a region may be identified for the purpose of licensing. The analysis indicates that the lack of commercial centres in the east as compared to other regions renders the east less attractive. Hence, for licensing purposes the eastern region will be unattractive relative to other regions.
11. Nevertheless, the regional approach, which mandates a larger area of operation will result in larger entities compared to circle-level, which anticipates emergence of large entities through consolidation of existing entities. Regional approach will also lead to consolidations, with existing operators expanding to occupy regions. Although feasible in a full competition scenario, regional approach is more suited to a limited competition option since imposing boundaries implies restrictive conditions, not desirable in a fully competitive market.
12. Compared to regional approach, circle-level licensing will lend an operator freedom to evolve a region comprising circles of its choice. However, a regional demarcation imposes regional boundaries, thus withdrawing the operational flexibility lent by the circle-level approach. Regional approach will also lead to a three-tier structure, with circles already being units of licensing under current policies.
13. A national operator will be operationally more efficient as compared to both regional and circle level. Technological advances are leading to the emergence of consolidated entities. Nation-wide licensing is essential in a sector as well as in the age of "BIG". Circle and regional operations will only facilitate emergence of small DLD operators.
14. Nation-wide licensing for DLD should be considered to initiate entities, which can compete with DoT on an equal basis since the latter has a pervasive presence through its nation-wide reach. In the short-term, operators may concentrate on lucrative sections alone, and not proliferate throughout the country.
15. The issues in DLD operations are significantly different from those in the local services business. Hence a national-level entity (catering to long distance alone) may be more suitable to deliver DLD services.
16. Also, communication is increasingly becoming distance insensitive, and is being charged irrespective of the distance. Hence, it is imperative to foster emergence of entities, which can compete over a large geographic area.

Degree of Competition

17. The degree of competition is a function of the number of entities in the DLD segment and the restrictions imposed on them. There is no scientific way to decide how many PTOs, facilities-based or otherwise, a particular market can bear.
18. The market structure will primarily depend on the number of PTOs and their geographic area of operation. The numbers may be pre-determined by the policy-maker in case of limited competition (duopoly/multipoly) or left to be decided by market forces in the case of full competition. In the latter case the market may be influenced through imposition of restrictions which lead to limited entry.
19. International experience suggests that countries, which had privatised and restructured their telecom sectors to some extent, opted for market-determined structures. However, countries with a public

sector incumbent sought limited competition during the transition period, while incumbent restructuring was under way.

Limited Competition

20. Limited competition has generally been adopted as a transitional or intermediate strategy with full competition as the natural culmination. This can be achieved either through duopoly or multipoly.
 21. A duopoly structure would entail only two PTOs in a given geographical area. With DoT as the incumbent, a duopoly implies licensing only one additional PTO with exclusivity for a given time period. The options can be national or regional duopoly.
 22. For national duopoly, the alternate PTO will be required to operate on a nation-wide basis. To ensure nation-wide coverage imposition of obligations may also be considered, such as minimum number of points of presence to be established within a given time-frame. One approach could be licensing one of the public sector operators as alternate DLDO. Another way of instituting national duopoly in DLD could be through licensing an association of existing private operators (such as cellular and basic service licensees in the circles).
 23. For introducing regional-level competition, one PTO could be licensed for each of the regions, with inter-regional traffic conveyed through interconnection between the regional PTOs, DoT or inter-regional operator.
 24. An advantage of the regional model may be the possibility of greater penetration since resources will need to be deployed in a smaller area. Also, restriction of operations to regions may lead to dispersed benefits, since the PTOs will aim at expanding services within the designate regions to yield maximum market share and presence.
 25. National duopoly may lead to slower penetration, with the PTO limiting its operations to high-density routes. This may result in neglect of less lucrative sectors, which may not be serviced by the operator.
 26. Duopoly affords an opportunity to the incumbent to adjust through limited competition. It will also make the market sufficiently contestable for the incumbent to take initiatives to improve efficiencies and acquire a commercial focus. The exclusivity provided to PTOs for service provision makes the sector more attractive and acts as an incentive to investors. The PTOs are able to mobilise resources more easily under limited competition since investors perceive higher value.
 27. However limited competition policy such as duopoly requires selection criteria which, if based on bidding, will add to the cost of providing services, while non-monetary criteria will make it less transparent. In case of limited licensing, if the licensee does not invest in the business, then the envisaged level of competition will not materialise.
 28. Multipoly implies a limited number of operators, but more than two. It is understood that a market with four operators is a competitive market. Therefore, a limited competition option cannot consider more than three operators. With DoT as existing operator, only two more licenses will be available for new entrants. These licenses will offer exclusivity to the PTOs for a given time period.
 29. In case three operators are selected, the options are
 - Two national operators
 - Two regional/circle operators
 - One national and one regional/circle level
1. Licensing two national operators may not lead to proliferation of services and the regional/circle may not provide an effective alternative to DoT. The option of one national and one regional will mitigate the above disadvantage while bringing in greater competition.
 2. Multiple operators will provide greater choice to the customer than under a duopoly. It optimises limited investible resources with the need for competition through introducing only a few PTOs

Full Competition

3. The full competition scenario envisages no entry barriers and licenses are available on demand. The selection terms are non-restrictive and simple.
4. Competitive pressures will ensure most cost-effective methods of delivering services, and passing on of these benefits to customers. Competitors will innovate to garner market shares leading to development of new products and technological advancements.
5. Unrestricted entry may lead to a larger number of issues pertaining to interconnection, service quality and tariffs, requiring a higher degree of regulation

6. A pre-decided level of competition provides greater control over the segment and involves less of the surprise element, whereas the market mechanism presents far less predictability and involves a high degree of risk. Since both the approaches have their pros and cons, a mixed approach, restricting competition, may be mooted.

Restricted Competition

7. One approach to introducing restricted competition through application of market dynamics may be by imposing barriers such as entry fees, performance obligations and operational restrictions. Potential operators will assess the attractiveness of the options vis-à-vis the obligations and barriers before entering the sector. Although the sector poses natural hurdles for facilities-based entities, additional hurdles will further lead to elimination of non-serious entities. Restricting entry this way will also make the sector more attractive to the interested entities.
8. In such a scenario, licensing may be on a non-exclusive basis with no restriction on the number of entrants. Licenses may either be available on demand or a timeframe for licensing may be specified.
9. Licences could be issued at circle, regional or national level. However, in a competitive scenario, a circle may be a better option since it offers synergies with existing policies in cellular and basic services, allowing telecom sector consolidation.
10. This approach will provide a transparent mechanism for restricting entry while allowing market forces to influence the operator's decisions. Thus, this approach presents the benefits of both limited competition and market dynamics.
11. The disadvantages are that entry costs would add to the cost of service provisioning. Also, there is no methodology for fixing the optimal level of entry barriers, which will complement and not restrict market dynamics.

Time Frame

12. International trends point towards a limited competition scenario as a transitional arrangement. Time frame for ending limited competition and introducing full competition is dependent upon various factors, such as:
 - Estimated time period required for the new entrant to get established through establishing adequate customer base and/or facilities.
 - The time period required for adjustments to competition by the incumbent
1. In case DLD policy proposes limited competition, a time-frame to review the policy also needs to be specified. International trends indicate a transition period of six years. The indicative viability analysis undertaken based on 40-city data, shows that a PTO would require at least two years for facilities build-out and another two to three years for establishing operations.
2. NTP '99 has proposed that a basic services policy for unlicensed circles will consider a transition period of five years. Moreover, NTP'99 also proposes that DoT corporatisation be achieved by the end of 2001 after which it may require three years for adjustments.

Implications of Competition

Interconnection

3. Since the incumbent's former monopoly position provides it with all the existing customers at the start of market liberalisation, interconnection with the incumbent is critical for new entrants. Particularly in the DLD segment, where the operator needs to connect with the local access networks, interconnection is the crux of its existence.
4. In India, varied degrees of competition have already been introduced in the sector in segments such as value-added services, intra-circle basic and cellular services. To that extent, the sector has experience in the moot issues and pre-requisites for a successful interconnection policy. Since the framework and reference points are being established or are under discussion, interconnection issues may not pose major problems.
5. At present direct interconnectivity between private service providers such as FSPs, CMSPs and Radio Paging Service Providers is not allowed. NTP '99 states that direct interconnectivity between private

service providers in the same service area will be permitted.

6. NTP '99 also states that interconnectivity between different service providers in different service areas is to be reviewed along with DLD policy. Such connectivity over borders will essentially involve conveyance of inter-circle DLD traffic. The DLD policy decision will also determine whether existing operators may be allowed to connect directly over borders.
7. There are a few important points of reference in this respect. First, present licenses are only for services within their service areas, and allowing them to interconnect may not only require amendment to their licenses, but may also invoke legal action from unsuccessful applicants. Second, the DLD liberalisation policy would envisage certain license fees for each service area, in which case, allowing existing operators to provide rival services without paying those fees may be viewed as discriminatory.
8. NTP '99 provides direct connectivity with VSNL for both FSP and CMSP. An international call can be considered to comprise a domestic leg (DLD call to VSNL gateway) and a foreign leg (from VSNL gateway onwards). With the introduction of competition in DLD, the domestic leg will be open to competition necessitating that the DLDO to be allowed to connect directly with VSNL.
9. DLDO may serve as a domestic carrier of calls between the FSP/CMSP and VSNL gateways or alternatively it could serve as the domestic carrier for international calls for its customers, bill them for international calling and settle with DoT as per the TRAI Interconnection Regulation and Tariff Order.

Bypass

10. A DLD service provider needs to access the customer for providing services. This is possible only through APs, to whom the DLDO are required to pay access charges, which often represent a sizeable percentage of their revenues. The access charges often comprise both the cost of providing access and the access deficit of the AP. This encourages DLDO to access customers without paying access charges.
11. A DLDO may identify certain high volume customers and establish a direct connection between the customer and its TAX exchange. The high revenue yield and avoidance of payment of access charges mostly justify the costs of setting up direct links (either through radio or fibre). DLD PCOs may be another mode of bypassing the AP.
12. Bypass needs to be viewed in conjunction with the overall telecom policy and the objectives thereof. In case the license of the AP has granted certain exclusivity to the AP, then allowing bypass may result in violation of these terms. Further, if the AP is required to provide local services at tariffs below costs then the DLD business may be required to contribute to the access deficit in proportion to usage of that AP's facilities. Such objectives can be well supported by not allowing bypass while the full tariff rebalancing is not achieved.
13. At times Universal Service Obligation (USO) contribution may be a part of interconnection charges. In such a case a bypass would result in under-fulfilment of USO and a shortfall. However, in case USO is settled through separate modalities such as contribution to a fund based on percentage of revenues, then a bypass does not pose any problems.

Access Arrangements

14. NTP'99 states that all access providers are required to provide interconnection to the DLDO. This allows subscribers to make long distance calls through any operator.
15. There are principally two ways to provide choice to customers: either through pre-selection or access codes.
16. Pre-selection is a facility whereby a customer can select the DLDO of choice and inform the AP that all its DLD calls are to be routed through that operator only. This requires any DLD call originating from a particular subscriber to be automatically routed to the network of the designated DLD operator. Issues relating to pre-selection are:
 - The APs exchange may require programming or software changes to be carried out for implementing pre-selection.
 - Initially the end users need to select a DLDO. The method may vary, for instance, countries such as Australia and the US have held ballots to implement pre-selection. In the US, customers who did not vote were divided amongst the DLDOs in their area based on voted ratios.
 - The period of pre-selection needs to be decided. The average period can be six months to a year.
1. Another means of facilitating access is through access codes. Carrier Access Codes (CACs) are

unique digits allocated to each of the operators by which they can be identified. Therefore, a subscriber who wants to route a particular call to a specific operator, needs to first dial the CAC and then the called number. This may be inconvenient as extra digits are required to be dialled each time but optimises cost to the user by offering dynamic choice.

2. This raises the issue of equal access. A DLDO will have an advantage, if it can be accessed by dialling fewer digits as compared to a competing operator.
3. Access codes will need to be designed and allocated as per the National Numbering Plan. All DLDOs will need to be allotted a CAC, whereby a customer may select it for the DLD services.
4. Traditionally, access codes is the simpler option for introducing access and precedes introduction of pre-selection modality. In case access code approach is taken then the time frame within which pre-selection is to be introduced will also need to be determined. The implementation of pre-selection will be easier and less expensive in case of limited competition policy.
5. Both the NTP '94 and NTP '99 envisage universal access at affordable prices. At present the majority of the population in the country has access to telecommunications only through PCOs or not at all. With a view to social equity, it is imperative that the vast majority of the population in the country is also able to exercise their choice of DLDO and reap the benefits of increased competition.

Bundling

6. Bundling is sale of two or more goods/services in combination as a package. At present in India, the local access services including the DLD and international services are available to the customer as a pure bundled service.
7. In the DLD context, most countries seeking liberalisation currently are moving in favour of unbundling of services, whereby the customer has to be offered the choice of selecting a different service provider/operator for DLD services. For instance, all countries with competition in DLD have pre-selection and/or dial around codes for facilitating selection of an operator of customer's choice.
8. A standalone DLDO will have little flexibility in bundling services. In comparison, the incumbent is normally an integrated operator offering local, domestic and international services. The access costs need to be unbundled (segregated between local, long distance and international) so that a standalone operator is not at a disadvantage vis-à-vis the integrated operator.
9. At circle level the private operators are allowed to provide bundled local and DLD services to their customers. Introduction of competition in DLD through stand-alone DLDOs, would require certain regulatory safeguards, such as compulsory offer of unbundled services and requirement of separation of accounts pertaining to complementary segments, viz. local and DLD.

Universal Service Obligation

10. NTP '99 proposes that a USO fund be established, with all the operators contributing to the fund in proportion to their revenues. All the fixed service providers, who in turn shall be reimbursed from the fund, will undertake implementation of USO for rural/remote areas. The DLD operators too would be required to contribute to the USO fund based on their turnover. This requires that the modalities and approximate costs be estimated before licensing DLD operators, so that they are aware of the total project costs.

Customer Billing

11. With introduction of stand-alone DLD operators who may not be the customers' AP, the issue of billing may arise. The DLD operator may bill the customer directly or arrange for a single bill to be raised through the customer's AP. In the US, detailed surveys have shown that a customer prefers one bill for all services; therefore the preferred mode of billing is mostly through the local exchange carrier. In certain cases the DLD operator may prefer to bill customers such as high volume business customers. This decision is based purely on cost benefit analysis.
12. The billing arrangements are commercial arrangements between two operators. However, this issue may require regulatory intervention to prevent anti-competitive behaviour wherein an AP may refuse to offer the DLD operator these services on reasonable terms. The customer billing services carry major cost implications, which is another reason for terms of such services being regulated, in the initial phases of competition.
13. Therefore the regulator may mandate that the AP provide customer-billing service to the DLDO at reasonable terms. The regulator may also provide reference terms and conditions, including cost based

charges for this service.

Selection criteria and Licensing

Selection Criteria

14. The selection criteria include attributes, which an entity aspiring to enter the DLD segment must possess. Certain eligibility criteria will need to be fulfilled by the entities, irrespective of the sector strategy. In addition, specific criteria may be laid down in conformance with the objectives of a particular policy option.
15. In case limited competition is to be introduced either through duopoly or multipoly, a detailed evaluation process will be required for awarding the fixed number of licenses. Both the technical and financial proposals will need to be evaluated.
16. In India as well as overseas, bidding has been the most popular mode of awarding licenses in case of a limited competition scenario. However, the experience of according too high a weightage to licence/entry fees has been unpleasant. In view of this, there are three alternative approaches which may be followed:
 - Only technical proposals should be requested for and evaluated, with licences awarded to the best technical proposals with payment of entry fees
 - Technical proposals can be evaluated first, and the financial proposals of only the selected technical proposals opened for evaluation. The financial proposals may be further weighted and the licenses awarded to the entities with the highest overall scores. In such a case, the entities would pay the amounts committed in the financial proposals as entry fees.
 - Technical proposals should be evaluated and only shortlisted entities asked to submit financial proposals. The license should be awarded to the highest bidder. In case the selected entity fails to meet the commitment, the next highest bidder should be awarded the license
1. The technical proposal may be evaluated on ownership parameters, performance record, sector experience, transmission facilities, points of presence and extent of indigenous equipment being used in the network.

Fees

2. The entry fees are determined by the policy objectives and competition strategy. In case of limited competition, entry fee is the key evaluation criterion, due to the bidding approach. In such cases, licenses are awarded to the highest bidder, whose bid is considered as the entry fee. In contrast, in the competitive scenario, where licenses are available on demand, entry fees are nominal pre-fixed amounts, to be paid by all licensees. At times, under restricted competition, the entry fee is also used as an entry barrier, wherein it is fixed at a level so high that only serious entities enter the sector. The entry fees may be linked to the expected revenues from the licensee's areas of operations or may be fixed considering the market potential.
3. NTP'99 proposes revenue share for license fee. It does not provide further guidance on what should be the percentage of revenue. It may, however, be related to profitability or for recovering regulatory expenses.

Network Obligations

4. Network obligations are often imposed in case of limited competition, where these are linked to the objectives of the overall policy. However, there may be no rationale behind imposing network obligations in a fully competitive scenario. Although obligations are used by licensing authorities the world over as a tool for implementation of sector policy, their enforcement remains a problem.
5. In case of DLD policy, imposition of network obligations could be mooted in one of the following scenarios:
 - Under limited competition, where pre-determined numbers of licenses are issued, so as to ensure network roll-out
 - In restricted competition scenario, where entry barriers are imposed to restrict entry.

License Period

1. Globally, license period for a facility-based FSP is in the range of 15 to 30 years. In India, basic service licenses have been issued for 15 years and cellular services licenses for 10 years. NTP '99 has proposed a license period of 20 years (extendable by 10 years) for FSPs, CMSPs, PMRTSP, RPSP, VSAT service providers. However NTP'99 does not provide guidance on DLDO licence period. Further there is no reason for differentiating licence period for local and long distance service. Based on international trends and policy framework a period of 15-20 years may be considered for a DLDO.

ANNEX TO THE EXECUTIVE SUMMARY

ISSUES FOR DISCUSSION

Scope of services

1. Should the scope of DLD services include intra-circle DLD services?
2. In case intra-circle is included in the scope of DLD service, what impact would it have on the viability of existing operators?
3. If intra-circle is excluded will it be only for the existing six licensed circles?

Facilities Regulation

4. Is the usage of backbone network for national long distance data and voice communication limited to entities specifically mentioned in NTP'99?
5. Can any entity (including service providers) build a network and offer it for voice and data communications? Should these entities be allowed to build and manage networks for closed user groups or for private networks?
6. Should infrastructure owners be permitted to become service providers?
7. Should pure infrastructure owners be regulated? If yes, then what should the regulatory mechanism be, as the TRAI Act only regulates service providers?
8. Should pure infrastructure owners be licensed? If yes, what should be the terms and conditions of their license?
9. If they are not under regulation, will the commercial agreement between pure infrastructure owner and service provider be governed by TRAI? For example, will the lease charges be subject to TRAI-notified ceilings or be governed by forces of demand and supply?
10. What steps are required to be taken so that there are adequate facilities in future? Should the policy facilitate development of capacities by a few entities, considering economies of scale and scope?

Type of competition

11. Should the entities compete on facilities based operations, services or both?
12. Can there be effective competition in services when there is no effective competition in underlying facilities?
13. Should non-facility based competition be introduced? If yes, should terms and conditions for non-facility based service providers be similar to those for facility based service providers?
14. In case of non-facilities based competition should both switch-based and switch-less resale be allowed? If switch-less resale is not allowed then should it be reviewed after a certain time period? What should this time period be?
15. Should the policy facilitate emergence of entities with consolidated operations?

Areas of operation

16. What should be the unit area of operation for licensing DLDOs?
17. Should a combination of different areas of operations, such as national level with circle/regional level, be introduced?

18. If a regional approach is adopted how should regions be defined? How should the issue of the relative unattractiveness of the eastern region be addressed?
19. Should regional operators be allowed to interconnect over borders or should there be an inter-regional operator?

Degree of competition

20. What should the competition policy be? Should full, restricted, or limited competition be introduced?
21. What should be the optimum number of players in a DLD segment?
22. If limited competition policy is adopted, then should it be duopoly or multipoly?
23. In case duopoly is adopted then should it be national or regional duopoly?
24. In case regional duopoly is adopted, should there be interconnection at borders or should a separate entity be licensed as an inter-regional operator?
25. In case of national duopoly should it be implemented by licensing one of the public sector operators? Alternatively, should it be implemented by application of the Canadian Stentor model by licensing an association of existing operators such as FSPs and CMSPs?
26. In case multipoly is adopted, should it be two national operators, two regional/circles operators or one national and one regional/circles operator?
27. In case of restricted competition policy, what should be the mechanism to restrict entries? Should there be a monetary entry barrier and/or performance obligations? What would be the optimum level of such barriers? Should there be restriction on the number of entrants? Should there be any time frame for licensing? Should licenses be available on demand or should it be one-time?

Time frame

28. Limited competition has generally been adopted as a transitional arrangement. Should the time frame for limited competition be specified? If yes, what should be the appropriate time frame?

Implementation Issues

Access Arrangements

29. Should the modality of access be pre-selection or dial around? In case dial around is chosen initially then what should be the time period for introducing pre-selection?
30. In initial stages pre-selection will also require facilitation of carrier selection through a neutral selection process such as ballot. What should be the modality?
31. Should CACs with dialling parity be introduced for the APs also?
32. Should DLDO be allowed to set up STD PCOs (without bypassing the AP)? Should the policy make it mandatory for existing PCO operators to give their customer a choice of DLD operator?

Interconnectivity at Borders

33. Should the entities be allowed to interconnect at borders, as envisaged in NTP'99? Will the entities need a license? Should the terms of license be preferential?

Interconnectivity with VSNL

34. What should be DLDOs' status vis-à-vis international calling services? Should DLDOs be allowed to provide this service to customers? In case DLDO is only a carrier then what should be the revenue sharing arrangement between FSP/CMSP and DLDO? Should it be in accordance with the TRAI Interconnection Regulation or based on commercial negotiation?

Bundling

35. What should be the regulatory mechanism to prevent anti-competitive behaviour through bundling?

Bypass

36. Since a bypass by a DLDO will result in avoidance of payment of access charge, what should be the appropriate policy on bypass of local access by the DLDO?

Universal Service Obligation

37. What should be the contribution of the DLDO to the USO fund?

Customer Billing

38. Should the regulator make it mandatory for the AP to provide customer-billing service to the DLDO at reasonable terms? Should the regulator specify the reference terms and conditions including cost-based charges for this service?

Business Service Networks

39. Should business service networks be permitted in view of bypass of USO and access deficit?

Selection Criteria and Licensing

40. What eligibility criteria should be set?
41. What selection criteria should be set? What should be the weightages accorded to each technical parameter? Should the criteria favour existing service providers, planning to become a DLDO by interconnecting at borders?
42. What should be the evaluation criteria? In case the evaluation criteria require relative weightages for technical and financial proposals then what should be the appropriate weightages?
43. What should be the modality for estimating entry fees in case of full, restricted and limited competition that is not based on bidding?
44. How should license fee be estimated? Should it be related to perceived profitability of operations or for recovering regulatory expenses? What percentage of its revenue should an operator contribute?
45. Should network obligations be imposed on a DLDO? What should be the basis? What should be the target and timeframe?
46. What should be the license period for a DLDO?
47. What should be the terms and conditions for a DLDO license agreement?

1. Introduction

1.1 Background

1. The structure of the Indian telecom sector is based on the traditional monopoly model wherein the state has assumed the responsibility of developing and supporting the telecom infrastructure. The Indian Telegraph Act (ITA) 1885 governs the telecom sector in the country.

2. The Government of India (GoI) embarked on major economic reforms program in 1991. The telecom sector reforms started with liberalisation of equipment manufacture followed by introduction of private operators for provision of basic and cellular services. The need for private participation had also arisen from the world-wide transition to a competition model for optimising resources and welfare.

3. The GoI has committed to review opening up of Domestic Long Distance (DLD) communications to competition in 1999, as part of its commitment to introduce telecom sector reforms made at the World Trade

Organisation (WTO) summit held in 1997. The GoI has asked Telecom Regulatory Authority of India (TRAI) to provide recommendations with respect to terms and modalities for opening up of the DLD segment.

4. A preliminary study to identify and study issues relevant to liberalisation of the DLD telecommunications service market with a view to determining the need and timing of introduction of competition in this sector and the manner and modalities of doing so. It now invites entities associated with the sector and consumer interest groups to provide their views via public consultations.

1.2 DLD Service

5. DLD service represents the telecom services within the country but outside the local area of an exchange system.

6. Local area of an exchange system is the area co-terminus with Short Distance Charging Areas (SDCAs) or where any area has been declared by an exchange system to be the local area for the purpose of telephone connections and charging.

7. For telecom administration the country has been organised into circles, each approximately corresponding to the state boundaries². The circles are further divided into Long Distance Charging Areas (LDCAs) which are presently co-terminus with Secondary Switching Areas (SSAs). Each LDCA has an important town designated as the Long Distance Charging Centre (LDCC) for the purpose of charging long distance calls. At present, a call travelling over 50 km is charged as a long distance call. The LDCAs are sub-divided into SDCAs, which approximately correspond to tehsils³. For charging purposes, an important town in the SDCA is defined as the Short Distance Charging Centre (SDCC). There are 321 SSAs or LDCAs and around 2,550 SDCAs in the country. The charges are based on inter-LDCC radial distances for inter-LDCA calls and inter-SDCC for intra-LDCA calls.

8. At present, the Department of Telecommunications (DoT) is the predominant provider of DLD services in the country. The liberalisation of basic services has resulted in licensing of private operators in a few states in the country. These operators are allowed to provide DLD services to their subscribers within the state. Thus there is multiplicity of operators within a state but a subscriber can not select a DLD carrier of choice.

9. The operation and regulation of basic services in the country has meant that each subscriber can route its DLD calls, whether within the state or outside, through its access service provider only, viz. DoT or the private basic/cellular operators. The advent of competition in DLD services will imply that the subscriber will be able to select a DLD operator of its choice.

1.3 Domestic Telecom Sector Status

10. Although the country's network has expanded considerably, it is largely underdeveloped in comparison to other countries. India has the one of the largest network in the world, with over 20 million lines, but the teledensity at two (in 1998) is low against the world average of 13 in 1997. As of March 1998, the unsatisfied registered demand (waiting list) for telephones was 2.7 million lines. Annexes 1 and 2 present comparative telecom indicators for select countries.

11. The Delhi and Mumbai city operations of DoT have been corporatised by setting up a corporate entity - the Mahanagar Telephone Nigam Limited (MTNL). These two cities are the principal commercial centres in the country and account for approximately 20 percent of installed Direct Exchange Lines (DELs) in the country. The GoI has also divested its holding in MTNL and at present holds only 57 percent of MTNL equity.

12. The Videsh Sanchar Nigam Limited (VSNL), under the administrative control of DoT, is the monopoly international telecom service provider. The government has been divesting its stake and at present holds less than 70 percent of VSNL equity. As a part of WTO commitment the international services monopoly is to be reviewed in the year 2004.

13. The Government initiated private sector participation in a phased manner beginning in the early nineties,

initially for value added services such as Paging Services and Cellular Mobile Telephone Services (CMTS) and, thereafter, for Fixed Telephone Services (FTS). National Telecom Policy 1994 (NTP'94) paved the way for private sector participation in basic services with a view to supplement DoT efforts in providing telecom services to the public. After a competitive bidding process, licenses were awarded to eight CMTS operators in four metros, 14 CMTS operators in 18 circles, six Fixed Service Providers (FSP) in six circles and to paging operators in 27 cities and 18 circles. A list of licensed FSP and Cellular Mobile Service Providers (CMSPs) is presented in Annex 3.

14. The telecom services market structure which has emerged subsequent to licensing of private telecom operators is presented in Table 1-1. The policy has adopted a regional approach with distinct licenses for different services and limited competition in each region.

Table 1-: Telecom Market Structure

Segment	Market Structure	Number of Operators	Service Areas	Period of License
FTS	Duopoly	2	Circles	15
DLD	Monopoly	1	Nation	
International	Monopoly	1	Nation	
Cellular	<i>Limited Competition</i>	2	Metros and circles	10
Radio Paging	Limited Competition	4	Cities and circles	10
GMPCS	Full competition	1	Nation	Provisional license for one year

15. TRAI was established in 1997 with a view to provide an effective regulatory framework and adequate safeguards to ensure fair competition and protection of consumer interests.

16. At present DoT is the dominant operator of fixed services including basic, DLD and international long distance. It is also the licensing authority. This duality of roles has contributed towards perpetuation of incumbent dominance, which in turn has impeded competition.

17. National Telecom Policy (NTP'99) was formulated in recognition of the non-fulfilment of some of the objectives of the (NTP '94) as well as the far-reaching developments in the telecom, Information Technology (IT), consumer electronics and media industries world-wide.

18. Main features of NTP'99 that have implications for DLD policy are:

- It permits all Access Providers⁴ (APs) to render both data and voice service utilising any type of network equipment, including circuit or packet switches that meet International Telecommunication Union (ITU)/Telecommunication Engineering Centre (TEC) standards.
- It envisages usage of the existing backbone network of public and private power transmission

companies/ Railways/ GAIL, ONGC etc for voice and data services.

- It recommends that both the FSP and CMSP be allowed direct connectivity with other private operators within their service areas as well as with VSNL.
- It recommends corporatisation of DoT to be achieved by the end of 2001.
- In case of FSP, it espouses that the policy for unlicensed circles will consider a transition period of five years during which multiple operators will be licensed.
- It envisages a uniform license period of 20 years for new licensees for FSP, CMSP, Radio Paging Service Providers (RPSPs), Public Mobile Radio Trunking Service Providers (PMRTSP) and VSAT service providers
- It recommends a one-time entry fee and license fee based on a revenue share.
- It intends that DLD service beyond service area to the private operators will be opened for competition with effect from January 1, 2000.
- It mandates that all APs provide interconnection to the Domestic Long Distance Operators (DLDOs), so that the subscribers can exercise their choice with respect to DLDO.
- It states that resale would be permitted for domestic telephony.

19. Will the DLD services to be opened for competition, be limited to inter-circle DLD service only or will it also include intra-circle? One view is that the existing license agreement with FSP grants exclusivity to licensees for ten years. The alternative view is that they are permitted to carry intra-circle DLD traffic but they do not have exclusive rights to provide intra-circle DLD services. NTP'99 states that DLD will be opened for competition beyond service area. Does this imply that only inter-circle long distance will be opened for competition or will it include intra-circle as well?

20. There are six licensed circles and for the remaining 15 circles, NTP'99 permits multiple operators. This may imply differential terms for licensed and unlicensed circles with respect to exclusivity, which will have implications in terms of area of services to be opened. Will this imply a different DLD services definition for the 15 circles yet to be licensed?

21. If the interpretation is that the DLD service is inclusive of intra-circle then it raises the issue of impact on the existing operators on account of sharing of the intra-circle DLD revenues. The impact on the profitability needs to be assessed in view of their Universal Service Obligations (USO) and licence fees.

22. The domestic telecom sector status and key imperatives are discussed in detail in Annex 4.

1.4 Convergence

23. NTP'99 states "In addition to some of the objectives of NTP'1994 not being fulfilled, there have also been far reaching developments in the recent past in the telecom, IT, consumer electronics and media industries world-wide. Convergence of both markets and technologies is a reality that is forcing realignment of the industry. At one level, telephone and broadcasting industries are entering each other's markets, while at another level, technology is blurring the difference between different conduit systems such as wireline and wireless. As in the case of most countries, separate licenses have been issued in India for basic, cellular, ISP, satellite and cable TV operators each with separate industry structure, terms of entry and varying requirement to create infrastructure. However this convergence now allows operators to use their facilities to deliver some services reserved for other operators, necessitating a re-look into the existing policy framework."

24. Globally operators are acting on the opportunities provided by technological advances. In the US, new fibre-optic networks that are faster, more economical, and better suited to carrying data traffic are coming up. The capacity of such networks is estimated to be a hundred times that of legacy networks. Worldwide data traffic is growing at a much faster rate than voice traffic and it is expected that in future voice traffic will become one of data applications.

25. The traditional networks are designed either to carry data or voice efficiently. At present, a converged network which can carry both data and voice with equal ease does not exist. Although Internet is able to carry both voice and data, it performs better in handling data. Thus, it is one of the archetypes of convergence and currently the most popular modus of the same. Internationally, growth in Internet has been phenomenal, Internet telephony gateways have been developed to allow users to make and receive calls using ordinary telephones instead of computer-based Internet telephony. The international developments in this respect are

discussed in Annex 5.

26. Internet telephony has major implications for long distance communications. The advent of Internet telephony will lead to migration of revenues from traditional networks to converged networks. NTP'99 says that Internet telephony shall not be permitted at this stage. However, the Government will continue to monitor the technological innovations and their impact on national development and review this issue at an appropriate time.

1.5 Structure of the Paper

27. This paper comprises six chapters, including this introductory one.

Chapter 2 provides assessment of DLD facilities in the country.

Chapter 3 presents DLD traffic analysis and estimated market size.

Chapter 4 outlines the policy options for liberalisation of DLD.

Chapter 5 discusses implications of competition and other issues relevant to DLD liberalisation.

Chapter 6 presents modalities for introducing competition including selection process and licence terms.

Annexes provide supporting information and details.

2. Infrastructure Assessment

2.1 Network Elements

28. The key network elements for long distance infrastructure are switching, transmission media and transmission systems.

29. A long distance call, originating from a subscriber, is routed from the local exchange to the Trunk Automatic Exchange (TAX). In each LDCA, there is at least one TAX. There are 379 TAXs in the country (as on 31.3.98), categorised as Level 1 and Level 2 TAXs as per the DoT network hierarchy. There are 21 Level 1 TAXs, each directly connected to all the other Level 1 TAXs. Level 1 TAXs represent high traffic centres and there is generally one Level 1 TAX in each state. A list of cities with Level 1 TAX is provided in Annex 6.

30. Transmission media for DLD carriage are primarily Digital Microwave (DMW) or Optical Fibre Cable (OFC), however the latter is the preferred media. Technological developments are making it possible to create high capacities over a single pair of fibres by installing higher capacity transmission system.

31. The cost per circuit primarily comprises transmission system and media cost. Table 2-1 shows that the system cost for a Wavelength Division Multiplexing (WDM) system is less than one-fifth of the cost of a 140 MBPS system. However, the total media costs are independent of the capacity of the transmission system installed. Hence, the per circuit media cost of the WDM system is almost insignificant as compared to 140 MBPS system.

Table 2-1: Cost Comparison of different Technologies

System	Number of ccts	System cost per cct (Rs.) A	Media cost per cct (Rs.) B	Total Cost per cct (Rs.) A+B
WDM	245,760	670	2,000	2,670
140 MBPS	1,920	3,860	2,50,000	2,53,860

32. With such technological developments and advancement, connectivity acquires greater significance than capacity.

33. The network elements are discussed in detail in Annex 7.

2.1.1 Rights of Way (RoW)

34. Deployment of OFC requires access to space along the routes, since it is a terrestrial medium. OFC can be laid underground or strung along poles and either option requires access to ways along routes.

35. DoT has the RoW due to the statutory authority granted to it by the ITA. There are several other organisations with transmission and distribution networks such as Indian Railways (Railways), State Electricity Boards (SEBs) and, Ministry of Surface Transport (MOST) which have the RoWs by virtue of their existing networks.

36. RoW represent an important asset, which the owner could either sell for a price or leverage to enter the telecom business. MOST charges private operators for deploying their cables along the National Highways. With organisations such as MOST charging Rs. 50,000 per km, access to RoW offer considerable cost advantages. Leveraging its access to RoW, the Railways have drawn up a plan to form a telecom joint venture, where it will contribute RoW and the private partners will provide dark fibres for Railways' usage⁵. Similarly, Power Grid Corporation of India Limited (PGCIL) is entering into an arrangement with SEBs to utilise their RoW for creating telecom transmission infrastructure. State-wise length of networks of the Railways, state and national highways are presented in Annex 8.

37. Apart from costs, RoWs also entail approvals from various authorities, which can be a time consuming and tedious process. NTP '99 states-"The Government recognises that expeditious approvals for right-of-way clearances to all service providers are critical for timely implementation of telecom networks. The Central/State Government/Local bodies/Ministry of Surface Transport etc. shall take necessary steps to facilitate the same." For effecting this, necessary orders are required to be issued by the relevant Authorities/Ministries.

38. A few organisations have access to RoW and therefore are better placed to build facilities. Also the technological development are leading to availability of much higher capacities on a single fibre. Should the policy facilitate development of capacities by a few entities considering economies of scale and scope?

2.2 Infrastructure Assessment

39. At present, most of the DLD infrastructure in the country is with DoT, which is also the pre-dominant DLD service provider. However, the fixed and cellular service licensees have also established limited infrastructure, since they are allowed to carry long distance calls of their subscribers within their service areas. Further, there are certain organisations with captive telecommunication networks being used by them, mainly for their operational purposes. Prime amongst these are Railways, PGCIL and Gas Authority of India Limited (GAIL).

40. Existing and planned infrastructure of entities other than DoT is given in Table 2-2, details for each entity are presented in Annex 9. The route-wise spare capacities existing and under implementation on DMW and OFC networks with DoT, Railways, GAIL, PGCIL and private operators are detailed in Annex 10 and Annex 11. A map showing these spare capacities is provided on page 14.

Table 2-2: Existing and Planned Infrastructure

Region	Type	Railways		PGCIL		GAIL		Cellular Operators		Basic Operators		TOTAL
		1998	2003	1998	2003	1998	2003	1998	2003	1998	2003	
North	DMW	1,077	2,077		2,975			1,514	1,514			
	OFC	342	2,152		1,830				2,695		5,900	
West	DMW	1,523	2,623		1,258			4,212	4,212			
	OFC	585	1,987		383				5,500	1,700	5,555	
South	DMW	1,106	2,385		944			3,327	3,327			
	OFC	168	2,070		2,436				3,780			
East	DMW	0	1,840		2,643			735	735			
	OFC	380	3,611		2,038							
Total	DMW	3,706	8,925		7,820	2,000	2,000	9,788	9,788			15,494
	OFC	1,475	9,820		6,687	550	3,090		11,975	1,700	11,455	3,725

addition:

- Railways have identified 22,000 Rkm to be laid in association with other organisations.
- PGCIL is planning 6,553 Rkm of OFC network linking metros and Bangalore and Hyderabad.

2.2.1 Existing Infrastructure

41. At present, the public utilities and the private sector operators (both basic and cellular) together possess around 3,000 Rkm, which is negligible compared to the current DoT network of over 76,000 Rkm of OFC.

42. The public utilities have existing transmission networks, which lend them an advantage by access to RoW. This implies that they can roll out facilities faster and at lesser costs than other entities. The other entities will need to either approach them for RoWs or obtain approvals and clearances from multiple authorities.

43. The analysis reveals that there are two levels of infrastructure-national and state, with different agencies owning and operating them.

44. There are no existing alternate nation-wide infrastructure available connecting major metros and important locations, which can provide competition to DoT on maximum revenue yielding routes.

45. Railways, PGCIL and GAIL, have spare capacity that is scattered and not easily connectable. In comparison, the state level infrastructure of private operators is tuned to telecom traffic requirements. In a few states, long distance infrastructure connecting major locations exists. In such states spare capacity exists to

cater to long distance traffic.

46. At present, private operators do not have installed spare capacities sufficient to meet the circle's potential or needs. For instance, spare OFC capacity is available only in MP circle, while small capacities on DMW are available with the cellular operators in various circles. However, some circles with high potential like Punjab and Maharashtra have little spare capacities. Therefore, the former circles may see earlier initiation of competition than the latter. This differential will get mitigated once the basic services licensing and policy issues are settled.

47. There are many routes on which capacities are available with more than one operator, implying possibility of greater competition on these routes. For instance, in Kerala and Gujarat, the cellular operators have competing networks.

2.2.2 Planned Infrastructure

48. The infrastructure plans are drawn up by two kinds of entities viz. utilities and private operators. If all the plans of utilities and service providers fructify, by 2003, alternate OFC network in the country will be around 70,000 Rkm (details are as presented in Table 2-2), while as per perspective plan, DoT plans to add 1,36,000 Rkm of OFC by 2003.

49. A large number of entities are proposing to build telecom networks either at state or national level. For instance, PGCIL has developed a National Telecom Plan connecting important cities. It is also negotiating with SEBs for state level networks aimed at extensive intra-state coverage.

50. The Railways' telecom plans include building an OFC network using their RoW. They have identified around 22,000 Rkm of "high density" routes along which OFC will be deployed with an estimated investment of about Rs. 1,800 crore. The scheme will operate on BOOL (build-own-operate-lease) principle in five geographical regions. The planned network will have 24 fibres, of which four will be devoted to Railways' communication needs. This will be given to the Railways free of cost in consideration of their RoW. The surplus capacity will be available to other agencies for commercial utilisation. RITES and IRCON, associate companies of Railways have already been authorised to lay and operate the optical fibre network in two of the five sectors.

51. GAIL does not have any specific telecom sector plans unlike the Railways and PGCIL. However it plans to install high capacity systems along proposed pipeline routes.

52. Table 2-3 presents the parametric comparison of facilities planned by different entities.

Table 2-3: Comparison of Planned Infrastructures

Parameters	Railways	PGCIL	Cellular	GAIL	Basic Operators
Reach	All India, reaching all major towns, with 62,000 Rkm	Operates 31,000 Circuit km implying 15,500 Rkm of RoW.	Inter-state medium reach and intra state high. Mostly in west.	Low reach as limited length of network. Primarily in the west and south	Currently within MP with 1,700 Rkm.

Capacity for backbone	The planned private network connects the golden quadrilateral and can provide backbone facility.	The plans cover golden quadrilateral and Hyderabad to Bangalore connectivity	Presently DMW and OFC planned.		Intra-state, planned for MP, AP, Gujarat, Maharashtra, Punjab and Rajasthan.
Future Expansion	Tenders have been issued inviting proposals to utilise RoW.	Evaluating entry options. Appointed a consultant.	Limited to their circle	Limited to their own business needs	Limited to their circle
Investments	Rs. 1,800 crore for 22,000 Rkm (through JVs) Rs. 500 crore for 6,000 Rkm on own account.	Rs. 500 crore for 6,000 Rkm. (through separate company) Rs 300 crore for 6,700 Rkm on own account.	Rs. 900 crore for 11,000 Rkm	NA	NA
Outlook	Planning JVs with private sector Policy for 24 fibres	Availability of investible surpluses	Public Telephony Experience/Expertise	Availability of investible surplus Planning for STM 16	Public Telephony Experience/Expertise
Time Frame	Three to four years	Two and a half years	Three years	Two years	MP under implementation. Others NA

53. Railways do not plan to invest its own resources and has opted for joint venture approach. PGCIL has developed a telecom plan and has appointed a consultant to look at entry options and financial viability among other things. The decision to invest in telecom infrastructure will be based on the outcome of the study. However PGCIL's initial investment estimates appear to be on the higher side due to planned use of imported cables to be strung on poles. GAIL only plans to build the network on routes where it will be laying the pipeline hence the reach of its network will be limited.

54. Although different entities have indicated plans of networks over the same routes, an operator may review these plans in case another entity's plans fructify earlier. For instance, the planned networks of GAIL in the south are parallel to the proposed backbone network of cellular operators in these states. Since GAIL's network is likely to come up before the cellular operator's backbone, it may preclude the need for a separate backbone network by the cellular operators.

55. The plans show that there are a large number of entities interested in building the facilities. Besides GAIL, and Bharti Telenet Ltd (BTL), none of these plans are under implementation. They are essentially on WAIT & HOLD mode. The fructification of these plans is contingent on favourable business environment. Thus these facilities may or may not materialise. Key issues impacting facilities build-out are discussed in the following paragraphs.

56. The private operator's plans are stuck due to their inability to raise resources to invest. Hence the viability of business plans of the existing operator's will impact facilities build-out.

57. The plans of building facilities were developed before reduction of lease line tariffs. With the cost-based tariffs introduced by TRAI Tariff Order (TO), many of these entities may reconsider their plans of building their own facilities.

58. NTP'99 permits usage of existing backbone network of public and private power transmission companies/ Railways/ GAIL, ONGC etc. immediately for national long distance data communication and from January 1, 2000 for national long distance voice communications. Is the permission to utilise existing backbone network for national long distance data and voice communication limited to entities specifically mentioned above? Can any entity (including service providers) build a network and offer it for voice and data communications?

59. The infrastructure owners may have little incentive to invest, if they are not allowed to provide services. Should these entities be permitted to become service providers?

60. Business users account for a significant percentage of telecom revenues. Increasingly Public Telecom Operators (PTOs) are specialising in catering to private corporate networks or business users networks such as an association of courier or travel companies. Should pure infrastructure owners be allowed to build and manage networks for closed user groups or private networks?

61. What steps are required to ensure development of adequate facilities in the country?

2.2.3 Regulatory Issues

62. There are two categories of entities owning or proposing to build infrastructure: service providers and others including utilities. If utilities remain as pure infrastructure providers, then they are outside the purview of TRAI Act which is applicable only to service providers. Should pure infrastructure owners be regulated? If yes, then what should the regulatory mechanism be, since the TRAI Act only mandates regulation of service providers?

63. It may happen that a service provider, who is dependent on infrastructure owner for provision of services, is unable to meet the commitments for service delivery. Should pure infrastructure owners be licensed? If yes, what should be the terms and conditions of their license?

64. The commercial agreement between infrastructure owners and service providers may have implications for interconnection, quality of service and tariff. In such a scenario should the TRAI regulations be made applicable to such entities? If they are not under regulation, will the commercial agreement between pure infrastructure owner and service provider be governed by TRAI? For instance, will the lease charges be subject to TRAI notified ceilings or be governed by forces of demand and supply?

3.DATA ANALYSIS

65. A study was undertaken to estimate the total DLD traffic in the country and its distribution. Based on the traffic analyses, future traffic and revenues have been estimated. These estimates have been used for viability analysis of new entrants.

66. DoT, being the predominant provider of DLD services in the country, was requested to provide data pertaining to DLD traffic. Since traffic information for all the circles was not easily available, a view was taken that the requirements of the study could be met by an analysis of a representative sample comprising 40 major traffic cities. The criteria for selection of cities and the format in which information was requested from DoT are provided in Annex 12.

67. The sample data was analysed to identify the distribution of traffic in the country vis-à-vis the number of DELs and the type of cities; viz. leading commercial centres or secondary locations. These distribution ratios were utilised to arrive at the total DLD traffic in the country. Further, this traffic was converted into potential DLD market size applying certain assumptions regarding tariffs and traffic flows. DLD traffic has also been projected over a five-year period based on certain hypotheses to estimate the potential DLD market size.

68. Using the sample data the consultants also undertook an analysis to estimate the viability of a DLDO considering various geographical service areas. The sensitivity of these operations to factors such as market shares, tariff discounts, interconnection charges and build/lease options was undertaken.

69. The methodology, assumptions and outcomes of these data analyses are discussed in detail in the following sections.

3.1 Traffic Analysis

70. The number of long distance (trunk) circuits in the country as on March 31, 1998 was 3.26 lakh and the total number of circuits indicated between the sample cities as of March 1999 is 75,000. The number of circuits on a given route represents traffic capacity available on that route. Telecom traffic is measured in terms of erlangs, wherein a unit erlang implies that a circuit is occupied for 60 minutes in a busy hour. Normally circuit capacities are planned to provide 0.7 erlangs per circuit during a busy hour⁶.

Illustration

Erlangs can be converted into minutes of calling by applying a multiplier of 8 (which represents average day to busy hour ratio) and 60 (for minutes in an hour).

For instance, 0.08 Erlangs traffic per subscriber would represent 38.4 minutes of traffic during a day (0.08*60*8). Of these conversation minutes are approximately 90 percent, with the remaining representing call set up time. The conversation minutes can be converted into metered units based on prevalent tariffs.

71. Matrices of originating circuits and traffic between the 40 cities were developed, and are presented in Annex 13 and Annex 14 respectively.

72. Generally traffic between two cities includes:

- Direct traffic flowing between city A and city B
- Transit traffic collected at city A and to be conveyed to city B which is the destination
- Traffic from city A to a destination via city B which is the transit location
- Transit traffic for both city A and city B, where traffic originates from a third city and is destined for another city

73. If traffic between city A and B is beyond a threshold limit then direct connectivity is established, until which traffic is routed through other cities. Generally, Level I TAX cities have higher proportion of transit traffic since they offer inter-circle and inter-regional connectivity.

74. The sample cities account for over 60 percent of the total TAX capacity in the country at 762,000 of 1,261,000 for the country (as of March 1998).

75. These cities, with 9.5 million DELs, account for 54 percent of DELs in the country as on March 31, 1998. Metro cities with 4.58 million DELs together represent 25 percent of the country's DELs. Further, the mini metro cities of Ahmedabad, Pune, Hyderabad and Bangalore together represent over eight percent DELs in the country.

76. An analysis of the distribution of traffic originating from a city vis-à-vis inter-circle and inter-region components was undertaken. For this, the following three ratios were used:

- originating DLD traffic per DEL;
- inter-circle traffic as a percentage of total originating DLD traffic; and
- inter-regional traffic as a percentage of originating DLD traffic.

These ratios for the sample cities are presented in Table 3-1.

Table 3-1: Inter-circle and Inter-region Traffic Distribution

S. No	Cities	DEL	DLD Orig Tfc (erlangs)	Orig Tfc Per DEL (erlangs)	Inter-circle Tfc %	Inter-region Tfc %
1.	Agra	68,772	2,761	0.040	26%	12%
2.	Ahmedabad	338,961	2,821	0.008	16%	8%
3.	Ambala	79,038	2,106	0.027	30%	5%
4.	Bangalore	482,717	4,401	0.009	39%	20%
5.	Bhopal	72,019	1,815	0.025	42%	27%
6.	Calcutta	672,278	4,071	0.006	48%	38%
7.	Calicut	155,304	669	0.004	27%	4%
8.	Chandigarh	132,651	2,556	0.019	20%	3%
9.	Chennai	502,616	4,059	0.008	36%	15%
10.	Coimbatore	193,680	2,055	0.011	28%	11%
11.	Cuttack	47,769	1,163	0.024	42%	31%
12.	Delhi	1,551,111	9,217	0.006	60%	35%
13.	Ernakulam	221,572	2,144	0.010	27%	14%
14.	Ghaziabad	152,497	2,078	0.014	27%	5%
15.	Guwahati	43,508	1,177	0.027	41%	26%
16.	Hyderabad	389,953	3,806	0.010	32%	22%
17.	Indore	127,590	2,002	0.016	20%	8%
18.	Jabalpur	58,992	1,240	0.021	11%	5%
19.	Jaipur	186,581	1,686	0.009	84%	54%

20.	Jammu	35,011	771	0.022	34%	2%
21.	Jalandar	120,419	3,497	0.029	28%	10%
22.	Kanpur	107,071	1,906	0.018	19%	9%
23.	Lucknow	134,280	2,086	0.016	40%	21%
24.	Ludhiana	178,389	2,529	0.014	6%	1%
25.	Madurai	158,490	1,056	0.007	12%	4%
26.	Mumbai	1,855,629	8,725	0.005	43%	31%
27.	Mysore	74,075	490	0.007	12%	3%
28.	Nagpur	114,683	1,015	0.009	69%	43%
29.	Nasik	97,077	924	0.010	4%	0%
30.	Patna	89,058	3,398	0.038	21%	16%
31.	Pune	305,878	1,722	0.006	30%	23%
32.	Raipur	46,898	1,442	0.031	29%	19%
33.	Rajkot	104,947	1,376	0.013	5%	3%
34.	Simla	46,069	994	0.022	41%	5%
35.	Surat	154,763	1,288	0.008	5%	1%
36.	Trivandrum	130,850	654	0.005	18%	5%
37.	Vadodara	121,799	1,440	0.012	8%	0%
38.	Varanasi	61,542	154	0.003	67%	39%
39.	Vijaywada	55,041	1,057	0.019	11%	4%
40.	Visakhapatnam	55,198	733	0.013	20%	14%
	Total/ Average	9,524,776	89,083	0.009	33%	19%

77. The distribution of traffic between intra, inter-circle and inter-region is largely a function of Community of Interest (Col) that exists between the cities and size of the incoming networks. All states have high intra-circle traffic since they were constituted on the basis of linguistic and cultural affinities⁷. The analysis reflects that intra-circle traffic accounts for almost 67 percent of the total originating DLD traffic.

78. The distribution of inter-circle traffic too is linked to Col factor, which is primarily reflective of geographic proximity and socio-economic complementarity. This implies that neighbouring states have higher Col resulting in higher amount of traffic to nearby states as compared to far-flung states. Regional analysis of originating traffic of these cities shows that 81 percent is intra-regional⁸ and only 19 percent flows out of the region representing the inter-regional component.

79. Inter-circle originating traffic from the major cities/state capitals is much higher in comparison to secondary cities. This may be explained by the fact that comparatively, a state capital has a larger population from other states and is also the first one to be linked to nation-wide operations of a business enterprise. For instance, among the 11 southern cities inter-circle traffic is more than 30 percent in case of Bangalore, Hyderabad and Chennai and less than 20 percent in case of Vishakhapatnam, Vijaywada, Trivandrum, Mysore and Madurai.

80. Table 3-1 also shows that inter-regional traffic distribution is more varied as compared to inter-circle. For instance, in case of southern cities, inter-regional traffic is less than five percent of originating traffic from

Calicut, Madurai, Mysore, Trivandrum and Vijaywada. Although Calicut and Ernakulam have almost similar inter-circle traffic, the latter has a much higher proportion of inter-regional traffic because it is a Level I TAX and handles traffic to/from other Level I TAXs. The traffic at Ernakulam may also be higher because it is the only international gateway, apart from Chennai in the region. The higher proportion of inter-circle and inter-regional traffic for Bangalore, Hyderabad and Chennai is on account of their being state capitals. Apart from these cities, Coimbatore and Vishakhapatnam originate greater than 10 percent inter-regional traffic. This could be attributed to the fact that Coimbatore is a Level I TAX and Vishakhapatnam being on the periphery of the region has a higher level of interaction with other regions.

81. For Hyderabad, a more detailed traffic statement was available including traffic to cities other than sample cities. Based on complete data, inter-circle and inter-regional traffic distribution were re-computed. A comparison of traffic and circuits based on sample data and complete data is presented in Table 3-2.

Table 3-2: Traffic details of Hyderabad City

	Total Circuits	Total Originating traffic (erlangs)
Sample Cities ⁹	6,589	1,536
Other Cities		
AP	5,223	2,030
Karnataka	690	159
Maharashtra	181	38
TN	150	28
Other States	90	14
Sub-Total	6,334	2,270
Total	12,923	3,806

82. A comparison of

inter-circle and inter-regional traffic distribution of Hyderabad based on sample and detailed data is presented in Table 3-3.

Table 3-3: Comparison of Traffic Distribution of Hyderabad

Data	Inter-circle (%)	Inter-regional (%)
Based on sample cities	32	22
Based on detailed traffic statement	38	23

83. The inter-circle traffic originating from Hyderabad is higher for detailed traffic statements since traffic flows to cities other than sample cities also exist. Although traffic to non-sample cities is mainly intra-state, a small percentage is also to a few neighbouring states namely TN, Karnataka and Maharashtra. Again, traffic to TN

and Karnataka being within a region, the inter-regional traffic distribution is marginally higher at 23 percent as compared to 22 percent for sample cities.

84. Delhi being a city-state, 100 percent of DLD traffic is inter-circle traffic, whereas Table 3-1 above indicates only 60 percent. For Delhi too, a detailed traffic statement was available and analysed. The detailed statement for Delhi shows that traffic to non-sample locations is mainly to a few northern region cities in close proximity. The inter-regional traffic as per detailed statement confirms the 35 percent ratio reflected by sample cities data.

3.1.1 Market Size Estimation

85. For estimation of DLD market size, ratios derived from sample cities' data were used. For this purpose the sample cities' were analysed based on parameters such as the number of DELs and Level of TAXs in these cities. The approach is discussed in the following paras.

86. The DELs in the four metros exceed five lakh, whereas those in mini metros range from three to five lakh. Apart from these cities, 17 cities possess DELs greater than one lakh. The traffic ratios for cities categorised on DELs in the local system are presented in Table 3-4.

Table3-4: Traffic Distribution of Cities classified on DEL Population

Cities	DELs (Lakh)	Orig. DLD Tfc. Per DEL	Inter-circle Tfc. (%)	Inter-region Tfc. (%)
Metros	5	0.006	48	31
Mini metros	3 to 5	0.008	31	18
17 cities	1 to 3	0.012	26	11
15 cities	< 1	0.022	27	14
Average (40)		0.009	33	19

87. The originating traffic per DEL is highest for cities with a low number of DELs since subscribers in these cities are primarily business users with higher calling needs. The metro cities reflect a lower ratio since their higher tele-penetration includes higher percentage of residential subscribers. This implies that with increase in DELs in the local system, the proportion of residential subscribers rises, resulting in lower originating traffic per DEL.

88. The inter-circle and inter-regional ratios for metros are significantly higher since they are major commercial centres and are more cosmopolitan in nature. These factors are also responsible for relatively higher ratios in mini metros as compared to other cities. However, the ratios for the last two categories do not reflect significant variations. Although originating traffic per DEL is lower for metros, the higher number of DELs and higher level of inter-regional and inter-circle ratios, result in a higher amount of total originating traffic.

89. An analysis was also undertaken for cities other than the eight metros and mini metros on the basis of Level 1 and Level 2 TAXs and the resulting ratios are presented in Table 3-5.

Table 3-5: Traffic Distribution of Level 1 and Level 2 TAX Cities

Cities	Orig. DLD Tfc. Per DEL	Inter-circle Tfc. (%)	Inter-regional Tfc.(%)
Level 1 (14)	0.018	34	18
Level 2 (18)	0.012	17	4
Metros and mini metros (8)	0.006	43	27
Average	0.009	33	19

90. Level 1 cities reflect higher originating traffic per DEL, since they handle a higher amount of inter-circle transit traffic originating from other cities mainly in the same circle. Due to the same reason, these cities have a much higher proportion of inter-circle and inter-regional traffic than the Level 2 cities. Therefore, one can safely assume that higher DLD traffic ratios for Level 1 TAXs are due to traffic which is not originating from these cities.

91. To estimate the size of the DLD market in the country, the traffic for cities other than sample cities needs to be determined. Level 2 TAX cities represent secondary cities, which may be symptomatic of the non-sample locations. Therefore, it is assumed that traffic ratios for non-sample cities will be the same as those of the Level 2 TAX cities. Based on this assumption, the traffic for the non-sample locations will be more localised than sample cities.

92. Total originating traffic for each state will be the sum of the traffic from the sample cities from the state and the balance traffic originating from other locations in the state. The latter has been calculated by applying the Level 2 ratio of traffic originating per DEL (0.012) to the balance DELs of the state.

93. Based on the above assumptions the estimated DLD traffic for the country is 187,152 erlangs while for 40 cities it is 89,084 erlangs. The circle-wise DLD traffic estimates are presented in the Table 3-6.

Table 3-6: Estimated Circle-wise DLD Traffic

State	Orig. Tfc. For sample cities (erlangs)	Sample Cities' inter-circle Orig. Tfc. for balance DELs	Estimated Orig. Traffic for balance DELs	Estimated Orig. Tfc. (erlangs)	Estimated inter-circle Tfc. (erlangs)
	A		B	(A+B)	
A&N			98	98	17
AP	5,596	1,483	7,906	13,501	2,845
Assam	1,177	481	1,398	2,575	722

Bihar	3,398	717	3,673	7,071	1,350
Gujarat	6,925	704	6,777	13,702	1,872
Haryana	2,106	625	4,139	6,246	1,338
HP	994	406	1,609	2,603	684
J & K	771	263	644	1,415	374
Karnataka	4,890	1,758	7,949	12,839	3,128
Kerala	3,466	883	6,828	10,294	2,060
MP	6,499	1,731	5,868	12,367	2,742
Maharashtra	12,385	4,968	11,990	24,374	7,034
NE			1,380	1,380	238
Orissa	1,163	491	2,587	3,750	937
Punjab	8,583	1,668	5,439	14,021	2,605
Rajasthan	1,686	1,410	6,742	8,428	2,572
TN	7,170	2,144	9,640	16,811	3,805
UP(E)	4,146	1,295	4,542	8,688	2,078
UP(W)	4,839	1,295	5,134	9,973	2,179
WB	4,071	1,948	3,725	7,797	2,590
Delhi	9,217	5,541	-	9,217	5,541
Total	89,083	29,809	98,069	187,152	46,709

94. The above estimation of originating traffic is on the higher side since it includes transit traffic and international traffic.

95. The traffic in erlangs is converted to minutes based on the following assumptions:

- Since the sample data traffic figures pertain to the period March-April 1999, the traffic has been discounted by 8 percent to arrive at the average traffic during the year 1998-99.
- Apart from time elapsed during conversation, the traffic figures also include traffic during call set up and the traffic resulting from unsuccessful calls (e.g. called party busy). It has been assumed that of the total traffic, conversation time accounts for 90 percent of the traffic.
- Traffic during the year has been computed using a day to busy hour ratio of eight as discussed in the box on page 15.

96. Based on the above assumptions, inter-circle traffic for the country is 6,710 million minutes while total traffic is 26,887 mn minutes. Table 3-7 presents the respective figures for the sample cities and for the country.

Table 3-7: Traffic Minutes for the year 1998-99

	Inter-circle Traffic Million minutes.	Total Traffic Million minutes.
Sample locations (actual)	4 283	12 708

Sample locations (actual)	7,200	12,100
Country (estimated)	6,710	26,887

97. The inter-circle traffic for sample cities is 29,809 erlangs while estimated inter-circle traffic for the rest of the country is 16,900 erlangs. For the remaining 16,900 erlangs, distribution between states was estimated. For this, the traffic matrix for sample cities was first converted into a state matrix by clubbing cities falling within a state.

98. The traffic distribution for sample cities is distinct from that of the rest of the traffic from a state. Over 50 percent of total inter-circle traffic from sample cities flows out of the region while only 25 percent of the state's balance inter-circle traffic is inter regional. For obtaining state wise distribution of inter-circle traffic, the balance inter-circle traffic from each state was first allocated between intra and inter regional segments. The intra regional portion was distributed between states falling within the region based on the relative flows of sample cities among these states. Similarly, the inter-regional portion was distributed based on traffic flows from sample cities to various states outside the region. The resulting state wise traffic matrix of inter-circle traffic is provided in Annex 15.

99. The state-wise traffic matrix was converted to revenue based on the following assumptions:

- The traffic in a day has been allocated among peak, off peak 1, off peak 2 and off peak 3 periods in the ratio 47:12:28:13¹⁰.
- The tariffs (pulse rates) existing on March 31, 1999 have been used except, for the distance slabs 50 to 200 km, where an average pulse rate of 10 has been applied.
- The distance between the states has been approximated to distance between the capital cities of the states. However, in case of Kerala, North-East, Haryana, Punjab and UP West, cities of Kochi, Shillong, Ambala, Jalandhar and Agra have been used for estimating distances between the states. 40 cities distance matrix is presented in Annex 16.
- A rate of Rupee 1 per metered call has been used.

The state wise inter-circle revenue matrix is presented in Annex 17.

100. In the absence of complete data, intra-circle revenues are difficult to estimate. In larger circles such as MP and Maharashtra, some proportion of intra-circle traffic may flow over 200 km, whereas it is unlikely to flow beyond 200 km in case of smaller circles like HP, Haryana and UP (W). Therefore, for estimating intra-circle revenues it has been assumed that on an average intra-circle traffic will flow in the range of 50 to 200 km. The resultant DLD market size is presented in Table 3-8.

Table 3-8: Estimated DLD Market Size during 1998-99

	Traffic (erlangs)	Revenue (Rs. Cr.)
Inter-circle	46,709	6,746
Intra-circle	140,443	5,695
Total	187,152	12,441

101. The total DLD market size as estimated for 1998-99 is 26 billion gross minutes with revenues of Rs. 12,441 crore.

102. As discussed earlier this traffic comprises transit traffic and it also includes international traffic. The international traffic was 1,500 million minutes in the year 1997-98. A portion of international traffic will be carried within the country due to the cities where there are no international gateways. This traffic may be

available to the DLDO.

103. Further the revenue conversion is based on gross traffic which may result in an under-estimation since the exact duration of calls will invariably be lower than pulse rate multiples.

3.1.2 Alternate Market Size Estimation

104. Alternatively, the DLD market size has been assessed based on telecom revenues for the year 1997-98, after adjusting for revenues from local services. For this purpose, the following assumptions have been made:

- Rental per DEL has been estimated at Rs. 1,750 based on the weighted average distribution of DEL across exchanges with different capacities. Details are given in Annex 18.
- DELs during the year are assumed at the average of opening and closing DELs.
- Bimonthly free calls are 150 per DEL.
- 54 percent of the metered call units are Subscriber Trunk Dialed (STD) calls based on information from DoT.

The resulting estimated market size is presented in Table 3-9.

Table 3-9: Alternate Market Size Estimation for the year 1998-99

A	Telecom Revenue-1997-98 (Rs. Cr.)	16,365
B	Estimated Rental 1997-98 (Rs. Cr.)	2,829
C	Metered Call Revenue-1997-98 (Rs. Cr.) (A-B)	13,536
D	Total Metered Calls-1997-98 (in crore)	11,770
E	Estimated Free calls-1997-98 (in crore)	1,455
F	Chargeable calls-1997-98 (in crore) (D-E)	10,315
G	DLD calls (@54% of D)	6,356
H	Avg. Rev/call (C/F) (in Rs.)	1.3
I	DLD call revenue-1997-98 (Rs. Cr.) (G*H)	8,257
	Total DLD revenue (1998-99) (Rs Cr.) (I*1.25)	10,321

105. Against the earlier estimate of Rs. 12,441 crore, this estimate gives a market size of Rs. 10,321 crore. The latter does not include revenues from domestic conveyance of international traffic.

3.1.3 Regional Market Size

106. For regional level analysis, the country has been segmented into four regions, and the sample cities have been classified as provided in Table 3-10.

Table 3-10: Classification of States in Regions

Region	States
East	Bihar, West Bengal, Orissa, Assam and North East
North	J & K, Delhi, Punjab, Haryana, UP
South	Andhra Pradesh, Tamil Nadu, Karnataka, Kerala
West	Maharashtra, Madhya Pradesh, Gujarat, Rajasthan

107. The distribution classifies four cities in the east, 12 cities in the north, 11 in the south, and 13 in the west. Since the cities were selected based on commercial importance, the lower number in the eastern region is reflective of the lack of commercial centres. The traffic distribution ratios for the regions are presented in Table 3-11.

Table 3-11: Regional Traffic Distribution Ratios

Region	Orig. Traffic per DEL	Inter-circle %	Inter regional %
East	0.012	26	15
North	0.012	28	11
South	0.010	22	9
West	0.009	24	12
Average	0.011	25	11

108. The regional distribution of estimated inter-circle revenues is presented in Table 3-12.

Table 3-12: Regional Distribution of Inter-circle Revenues

Rs in crore

Region	East	North	South	West	Total
East	284	257	145	226	912
North	310	798	306	574	1,988
South	155	216	878	490	1,739
West	234	568	438	867	2,107
Total	983	1,839	1,767	2,157	6,745

3.2 Traffic Forecast

3.2.1 Traffic Estimation

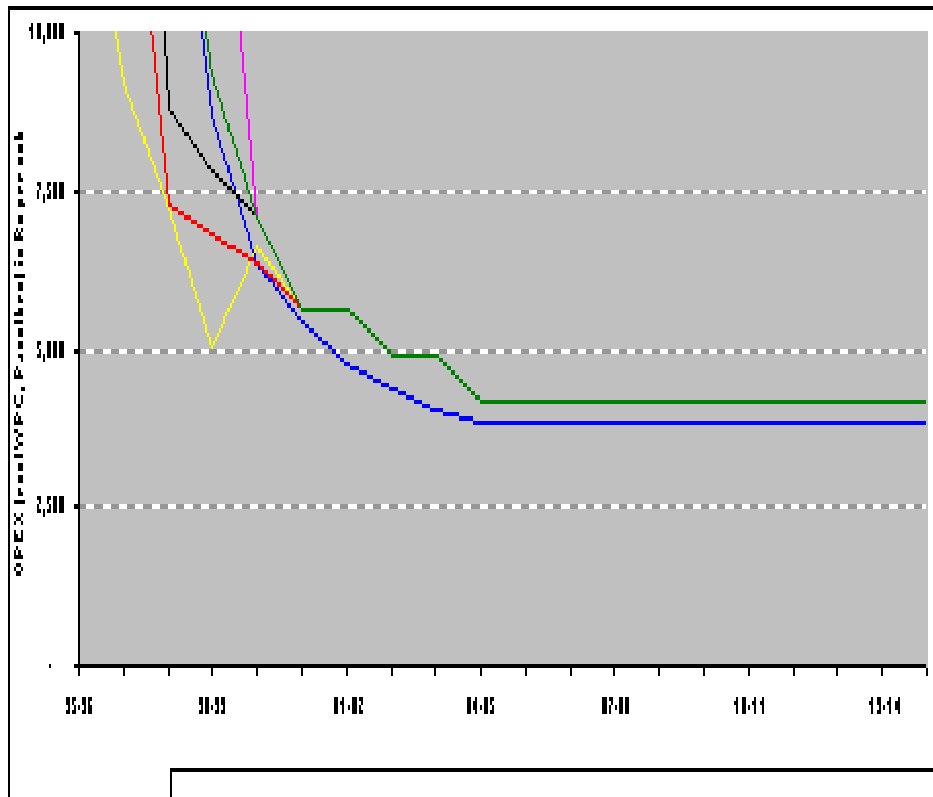
109. Traffic has been forecasted for Year 2002 and Year 2005 based on assumptions discussed in the following paras.

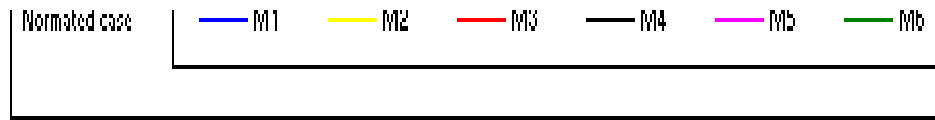
110. The originating traffic per DEL ratio is based on earlier estimates discussed in the previous section. However, that ratio was based on traffic flows in 1999 and DELs for the year 1998. The revised ratio of originating traffic per DEL has been computed by adjusting DELs with the registered demand for the year 1999¹¹.

111. The originating traffic ratio was further normalised to account for the fact that states with low penetration will experience higher traffic growth initially and relatively lower growth in later periods. Therefore revised ratio used for forecasting has been limited to a maximum of 0.010.

112. The inter-circle traffic distribution ratios used in forecasting are presented in Table 3-13.

Table 3-13: State-wise Traffic Ratios





113. CAGR of the DELs during the period 1993-

98 has been calculated for each state. These CAGR have been used for projecting DELs for the period under analysis. However, in case the CAGR exceeded 20 percent, it has been limited to 20 percent for reasons similar to those discussed in para 111. The state-wise CAGR during 1993-98 is presented in Table 3-13.

114. It has been assumed that in Year 2002, DLD traffic per subscriber will be 25 percent higher than in Year 1999, due to price elasticity of demand¹².

115. In future, with traffic growing geometrically, on account of development of new applications such as e-commerce, tele-medicine and tele-education, voice traffic will also increasingly migrate to data or converged networks. It has been assumed that the impact of Internet telephony will lead to reduction in voice traffic due to migration of traffic from Public Switched Telephony Network (PSTN) to Internet. However, this reduction will be offset by the increase in traffic due to new developments.

116. Originating traffic has been apportioned among states based on the size of incoming network, modified by Col factor. The ratio approximating Col has been calculated as discussed below.

$$\text{Ratio} = \frac{(\text{DEL Demand of all states excluding State A}) \times (\text{Traffic from State A to B})}{(\text{DEL Demand of State B}) \times (\text{Inter-circle originating traffic from State A})}$$

$$\text{Where, Ratio is for traffic flows from State A to State B.}$$

117. The ratio was further normalised by dividing it by the highest ratio thus calculated. This ratio matrix which is used as a proxy for Col matrix is presented in Annex 19. The matrix shows that traffic from a state is largely localised. Most of the states have high Col with major cities such as Delhi and low Col with states such as J&K.

118. Based on the above assumptions, a state-wise traffic matrix was developed for Year 2002 and Year 2005. These are presented in Annex 20 and Annex 21 respectively. The revenue estimates based on the above assumptions are presented in Annex 22 and Annex 23 respectively.

119. Table 3-14 presents the total traffic and revenue estimates in FY 2001-02 and FY 2004-05 based on market size of Rs. 12,441 crore in FY 1998-99.

Table 3-14: Estimated Traffic and Revenues in FY 2002 and FY 2005

	FY 2001-02	% Increase p.a. 1999-02	FY 2004-05	% Increase p.a. 2002-05
Traffic (erlangs)	372,070	25	594,720	17
Revenues (Rs. Crore)	15,105	6.5	23,916	16.5

3.2.2 Major Routes

120. Different cities have different levels of connectivity with other cities in the sample. For instance, Delhi with the highest number of circuits is directly connected to most cities except Mysore, Nasik and Vishakhapatnam amongst the sample cities, whereas Mysore is directly connected to only a few cities in its vicinity such as Bangalore, Chennai, Mumbai, Coimbatore, Ernakulam and Hyderabad.

121. Certain routes have more than 500 circuits between them, implying high volume traffic. The list of these routes, which represents 45 percent of traffic and circuits among the sample cities is presented in Table 3-15.

Table 3-15: Major Routes between Sample Cities

S. No.	Route	Circuits	Originating Traffic (erlangs)
1.	Agra-Delhi	951	237
2.	Ahmedabad-Mumbai	522	154
3.	Ahmedabad-Vadodara	646	91
4.	Ambala-Delhi	859	199
5.	Bangalore-Chennai	802	249
6.	Bangalore-Delhi	796	136
7.	Bangalore-Mumbai	956	260
8.	Bangalore-Mysore	618	260
9.	Bhopal-Indore	519	180
10.	Calcutta-Chennai	560	112
11.	Calcutta-Delhi	1337	307
12.	Calcutta-Mumbai	856	237
13.	Calcutta-Patna	610	189
14.	Chandigarh-Delhi	762	244
15.	Chennai-Madurai	706	251
16.	Chennai-Mumbai	953	226
17.	Coimbatore-Chennai	675	276
18.	Delhi-Ahmedabad	575	180
19.	Delhi-Bhopal	550	103
20.	Delhi-Chennai	734	188

21.	Delhi-Hyderabad	708	219
22.	Delhi-Jaipur	1,105	326
23.	Delhi-Jalandhar	940	236
24.	Delhi-Kanpur	510	132
25.	Delhi-Lucknow	1,013	313
26.	Delhi-Ludhiana	667	234
27.	Delhi-Mumbai	1,910	584
28.	Delhi-Patna	549	221
29.	Delhi-Shimla	813	182
30.	Ernakulam-Bangalore	523	89
31.	Ernakulam-Calicut	703	117
32.	Hyderabad-Bangalore	584	185
33.	Hyderabad-Chennai	706	128
34.	Hyderabad-Mumbai	887	231
35.	Hyderabad-Vijaywada	801	178
36.	Jaipur-Mumbai	678	173
37.	Jalandhar- Ludhiana	729	180
38.	Kanpur-Lucknow	720	240
39.	Lucknow-Varanasi	540	223
40.	Mumbai-Nagpur	520	112
41.	Mumbai-Nasik	915	263
42.	Mumbai-Pune	2081	682
43.	Vadodara-Mumbai	585	107
	Total	34,174	9,434

122. Table 3-15 shows that a few of these high traffic routes are intra-circle, linking important cities within a state. This analysis indicates that major traffic routes in the country are those linking up the state capitals to Mumbai and Delhi.

3.3 Viability Analysis

3.3.1 Facilities based Operator

123. The consultants undertook viability analysis of DLD operations. TRAI or TCS are not liable for any damage arising out of decisions based on these estimates. The main assumptions are

- Market size is based on a 40-city network, for which data is available.
- DLDO will be able to access STD Public Call Offices (PCOs).
- DLDO will build its own network. It will not opt for media diversity.
- Transmission media Rkm has been taken as the length of highways linking the cities.
- Switching system capacity has been taken as 25 percent of the estimated requirement for the country in FY 2004-05.
- Capital cost of TAX is taken as Rs. 8,000 per line.
- Cost of transmission system and medium has been taken as Rs. 6.0 lakh per Rkm.
- Annual Recurring Expenditure (ARE) has been assumed to be 25 percent.
- Interconnection has been assumed to be 40 percent of revenues.¹³
- Employee cost has been estimated on normative basis and overheads have been assumed to be equal to salary expenditure.
- Marketing expenditure is assumed to be four percent of revenue.
- Cost related to license fees, contributions to Universal Service Obligations (USO) and regulatory expenses have not been considered.
- Traffic growth has been taken as 10 & 15 percent in Year 1999 and 2000 respectively on account of price elasticity.
- Traffic growth rate has been taken as 16 percent per annum on account of growth in DELs. Revenues have been calculated based on originating traffic of each city.
- Market share has been assumed to be 15 percent
- Per call (per pulse) tariff has been taken as rupee one. Tariff for peak rate are as per the TRAI Tariff Order (TO) for FY 2001-02, while for off peak-1 and off peak-2 rates, they have been assumed at 50 percent and 33 percent respectively of the peak rates.
- Traffic flows during peak, off peak 1 and off peak 2 has been assumed to be 47 percent, 12 percent and 41 percent.
- DLDO will commence network roll out in the Year 2000 and the network will be operational in FY 2001-02.

124. Viability analysis of national level operations has been undertaken based on likely number of cities on the network. An entity is expected to start with major cities and will add the cities to the network, if traffic potential justifies the inclusion. Following geographic areas were considered for the analysis:

- National comprising four metros
- National comprising four metros and four mini metros
- National comprising 40 cities in the sample

125. In case of eight cities market, a further analysis was undertaken by including additional 15 cities from sample cities which are enroute to the eight city market. A brief overview of these analyses is presented in Table 3-16. Annex 24 provides detailed assumptions, and profitability statements with sensitivity to market size (with and without intra-circle), tariff discounts at 10, 15 and 20 percent and market share at 5, 10 & 15 percent.

126. The analysis shows that profitability is more sensitive to market share than price discounts. For instance, at five percent market share the ROCE varies from one percent to negative ROCE of two percent with price discounts ranging from 10 to 20 percent. At 10 percent market share the ROCE varies from nine to 14 percent and at 15 percent market share it varies from 19 to 27 percent.

Table 3-16: Analysis of National Level Operations

	4 City Market	8 City Market	23 City Market	40 City Market
Transmission Media (Rkm)	5,873	7,865	7,865	12,417
TAX capacity (lines)	119,843	176,262	291,103	449,949
(Rs. in Crore)				
Investment	448	613	705	1,105
Market Size	761	1,767	3,983	6,161
Revenue	114	265	597	924
Costs	166	277	459	715
Profits	(52)	(12)	139	209
Rol	3%	13%	35%	34%

127. The operations in metros or eight major cities are not profitable as the analysis is based on the premise that revenues accrue from traffic flows between these cities alone. The profits are estimated to be Rs 139 crore and Rs 209 crore in case of 23 city and 40 city network respectively.

128. Sensitivity of the above analyses to the DLD market if limited to inter-circle only. is provided in Table 3-17.

Table 3-17: Analysis of National Level Operations – Inter-circle

	4 City Market	8 City Market	23 City Market	40 City Market
(Rs. in Crore)				
Investment	448	613	705	1,105
Market Size	761	1,699	3,645	5,389
Revenue	114	254	547	808
Costs	166	272	436	664
Profits	(52)	(18)	110	145
Rol	3%	12%	31%	28%

129. Further a Regional level analysis has been undertaken assuming that each regional operator will provide services only within the region, while inter-regional operator's revenue has been taken for the traffic flowing

among cities in different regions. The regional level viability is presented in Table 3-18

Table 3-18 Regional Operations

	East	North	South	West	Inter-regional
Transmission Media (Rkm)	2,053	1,743	3,077	3,169	12,417
TAX capacity (lines)	29,458	77,673	111,113	115,823	115,887
(Rs in crore)					
Investment	147	167	273	283	838
Market Size	132	673	824	830	3,705
Revenue	20	101	124	124	556
Costs	50	96	132	136	486
Profits	(30)	5	(8)	(12)	70
Rol	(5%)	18%	12%	11%	23%

130. The inter-regional market represents 60 percent of the DLD revenues from these 40 cities. The eastern sector has a very low percentage of intra regional traffic, one reason for which could be that very few cities in the sector are included in the analysis.

3.3.2 Viability over Leased Facilities

131. The above viability analysis assumes building of facilities by an operator. However, if spare facilities are available then an operator may make a build-lease decision regarding facilities. An analysis of metro and eight cities market reflects that an operator connecting a few cities may opt for leasing option as it makes the operations profitable. Table 3-19 presents profitability details in case of lease/build option.

Table 3-19: Analysis of Metro Cities' Operations over Leased Facilities

	Metro Cities Market		Mini & Metro Cities Market	
	Lease	Build	Lease	Build
Transmission cost	Nil	352	Nil	472
Switching Cost	96	96	141	141
Total Investment	96	448	141	613
APF	24	111	35	153

	27	111	55	133
Lease Charges	11	Nil	31	Nil
Other Costs	55	55	124	124
Total Costs	89	166	190	277
Revenue	114	114	265	265
Profits	25	(52)	75	(12)
RoI	42%	3%	61%	13%

4. POLICY OPTIONS

4.1 Background

132. Monopoly provisioning of telecom services has been advocated based on various arguments, including economic rationality and military sensitivities attached to communications. Telecom monopolies have been justified by the nature of the underlying network, key features of which are:

- Economies of scale
- Economies of scope
- Externalities

133. Externalities derive from the rationale that a new subscriber joining a network, increases the overall utility of the network as one more person can be reached over telephone. Thus a larger network is more valuable than a smaller network, since a consumer would prefer to join a larger network than a smaller one. However, these externalities can be contested by interconnection and are only tenable in the absence of connectivity.

134. The externalities, combined with the increasing returns to scale, may result in start-up losses but also imply burgeoning profits once critical mass has been achieved. Nevertheless, if too many companies enter at the same time, none may be able to achieve critical mass and they may all operate sub-optimally. Thus the critical mass argument tends to support the limited competition theory in initial phases.

135. However, ongoing technological changes have reduced the minimum size at which firms can efficiently compete. Evidence suggests that digital technology considerably reduces the investment required to be made by new suppliers. Thus, new entrants can pose sufficient competition to incumbent carriers by introducing newer and superior technologies.

136. Further, a study on Telecommunications Reforms points out that competition stimulates growth of the network and that economies of scale and scope have limited significance for policies towards entry. It argues that in low income countries, given chronic capacity shortages and associated risks, protected incumbents will exhibit inefficiencies of one or other sort, and potential entry is a very important instrument for improving the performance of this sector¹⁴.

137. International telecom sector trends for a few countries are presented in Annex 27, indicating different approaches adopted by various countries towards sector restructuring/liberalisation.

4.2 Determinants of DLD Competition Policy

138. The DLD policy will need to address an array of issues relevant to the introduction of competition. While some of these issues are predicated by the policy, others are either determinants or facets of the policy. The key determinants of DLD policy are as follows:

- Type of competition, that is, whether these entities compete with respect to facilities or services or both.
- Areas of operation, which means geographical boundaries within which these entities will be allowed to operate.
- Degree of competition, which is determined by the number of entities to be licensed in the segment.
- Time frame, which is the period for policy implementation and transition through different stages of competition.

139. These key variables are discussed in the following sections.

4.2.1 Types of competition

140. Competition to the incumbent could be introduced either through facilities-based or non-facilities-based modality. Facilities-based competition involves licensing of entities, which own and operate facilities for provision of services. Non-facilities based competition would entail competition by entities not operating their own facilities. Such entities would provide services over facilities leased from facilities owners including the incumbent.

141. A telecom service provider may do any of the following or a combination thereof to deliver services:

- The service provider may own and operate the facilities required for provisioning services, in which case it will be known as a Carrier (in Australia and USA), Public Telecom Operator - PTO (in Europe) or a Type I Carrier (in Japan). Such operators are known as facilities-based operators and provide basic transmission facilities over which services are supplied to the public. These operators may lease such facilities from facility owners, such as utility companies, who may not want to operate the facilities owned by them, for providing telecom services to the public. At times, these operators may also lease part of their facilities from other operators, so as to achieve end-to-end connectivity
- The service provider may lease all or some of the facilities from the carriers, in which case it may be known as a non-facilities based entity or a reseller. Switch based reseller own switching systems but use leased transmission facilities to create their own long-distance network. Since they purchase transmission services from facilities-based operators with disparate serving areas, resellers are often able to provide services more universally than the carriers, but typically provide originating service to the areas nearest to their switching systems.
- The service provider may neither own switching equipment nor transmission facilities but buy and resell switched services from the other carriers, in which case they are known as switchless resellers. These companies purchase services from major carriers at wholesale prices and offer retail services to customers.

At an OECD meeting the delegate from the European Commission, while responding to a question regarding whether it is sufficient to concentrate on competition in services, taking advantage of the economies of scale that may exist in facilities, or whether one should promote competition in facilities itself, said:

"The experience gained by the Commission over the past few years in the market for value-added services has been, unfortunately, that it is not possible to have well-developed competition in services when there is not effective competition in the underlying facilities. Several phenomena may be observed, but the most important has been the high prices of leased lines, notably those for value added services. The relatively high prices in Europe tend to

demonstrate that, contrary to what has sometimes been said, the regulator does not have the sole objective of promoting competition but rather a number of other legitimate social and economic objectives. It seems, therefore, that if one wishes to have an effective level of competition in services then a certain degree of competition must be progressively introduced in facilities, leading finally to full competition in facilities."

4.2.2 Facilities Competition

142. Most policy makers have hesitated before allowing facilities competition in any segment of telecom. The Organisation for Economic Co-operation and Development (OECD) examined issues related to competition with particular focus on facilities competition in 1993. The findings of the committee indicated that where competition in facilities was introduced, there was evidence that¹⁵:

- facilities competition can bring substantial benefits to users, in terms of increased choice, greater innovation and higher quality of services at reduced prices
- liberalisation stimulates significant gains in market size of the telecommunications market
- universal service has not been impaired by market liberalisation; on the contrary facilities competition can be applied to complement and enhance universal service
- competition encourages improvements in the efficiency of public telecommunication operators and opens up new employment opportunities in and beyond the telecommunications sector.

143. Competition in facilities can be introduced either by allowing utilisation of infrastructure of entities such as utilities for provision of telecom services or by licensing facilities based operators. Trends show that in the case of facilities based competition, utility entities such as Railways, Power and Gas companies are the first ones to enter this segment.

144. Increasingly, such utility companies are entering the telecom business due to the following reasons:

- They own the rights of way, which are critical ingredients in networks businesses such as telecom.
- They own or invest in facilities because of their internal communications needs, and possess spare capacities.
- The business being network based, customer distribution offers synergies with their existing businesses.

145. One of the first such examples is that of Sprint Telecom in the US, which was a subsidiary of South Pacific Railways, established in the wake of MCI's DLD entry in the 1970s. Similarly in the UK, Energis was established as a subsidiary of The National Grid, the owner and operator of the electricity transmission system in England and Wales for public communications. Energis is one of the few network providers in the UK catering primarily to corporate customers.

146. International trends show that utilities entering telecom may either remain carriers' carriers or enter public switched services business. In case of carriers' carrier option, the utilities restrict themselves to either leasing dark fibres or providing services to other operators. However, telecom being a profitable business, more often than not, these entities transition into PTOs. For instance, TELIVO in Finland started as a carrier's carrier but is now a PTO. The option to enter public switched services is purely a commercial decision varying from company to company. Should utilities be permitted to become service providers?

Hermes' Carriers' Carrier Telecom Venture

In Europe, Hit Rail BV, a consortium of 11 national railway companies, has established a telecom joint venture to exploit the RoWs and telecom expertise gained from maintaining

dedicated networks for their railways operations. Hermes Europe Railtel BV is the telecom JV of Hit Rail and Global Telesystems Group, an American telecom operator. Hermes has planned a pan-European network (across the borders of several countries) for offering advanced Trans-border transport and transmission services to PTOs and other communications services companies. Hermes is building a 22,000 Rkm OFC network, ultimately connecting 55 cities in Europe, for providing carriers' carrier services.

147. Entities such as utilities provide competition in facilities, at optimum costs due to their access to RoWs. However, the benefits to the end user are served better through introduction of facilities based operators, as the latter by exercising control over facilities are able to ensure continuous and better quality services at competitive prices.

4.2.3 Non-facilities based competition

148. Non-facilities based competition yields the benefits of competition with minimal investment in facilities. It is an important strategy for small businesses that may lack capital to invest in facilities. Non facilities based competition essentially involves resale since the operators either lease facilities or services for onward provision to public. Therefore they are also popularly known as resellers. At present, such resale markets are thriving in fully competitive markets such as the US and Australia. Such entities may partially own facilities such as in the case of switch based resellers or may not own any facilities as in case of switch less resellers.

Resale

Resale is "the sale or lease on a commercial basis, with or without adding value of telecommunication services from a telecommunications carrier" Resale is the modality for optimising the resources in the sector by facilitating make or buy decisions. It is an important entry strategy for many new entrants, especially in the short-term when they are building their own facilities

Resellers may be switch based or switch-less. Switch based resellers lease transmission facilities from PTOs for providing services to the public whereas switch-less resellers purchase bulk minutes from PTOs for providing retail services to the public .

149. Switch-less resellers contract with long distance carriers to provide telecom services. The carriers offer substantially reduced per minute rates to the resellers in return for volume and term commitments. From a technical standpoint, subscribers are "presubscribed," or connected, to the reseller's underlying network carrier. When the reseller's subscriber makes a long distance call, the call is routed by the local telephone company to the long distance carrier's network used by the reseller, to transport the call. The carrier, which provides network services to the reseller, recognises each reseller subscriber's telephone number(s) as belonging to the reseller and at the end of each month, bills the reseller for all calls made from those numbers at the contracted discounted rate. The reseller is responsible for billing each of their customers at the reseller's retail rate.

150. Switch-based resellers lease inter-exchange circuits from long distance carriers. These circuits, or "facilities", are connected to the reseller's switch, enabling the reseller to create a virtual network. By utilising a switch, the switch-based reseller becomes more competitive in terms of pricing and the ability to offer specialised services. The switch-based reseller also gains greater security and control over how the service is to be configured and provisioned. Being a switch-based reseller makes economic and operational sense for companies with high regional concentrations of subscribers, and which have the technical resources to support network operations. Switch-based resellers may continue to act as switchless resellers in markets

where economies of scale cannot be realised. High initial capital investments, the need for technical resources and an increase in operational complexity are salient issues, which influence the decision regarding switch-based resale.

151. Resellers use a variety of methods and marketing tools to win customers, including lower rates, access code calling, multi-level marketing, telemarketing, agent sales, direct mail, incentive programs, and more. They purchase discounted capacity from established carriers and sell it at competitive retail prices. This gives carriers a route to new niche markets, which they otherwise may not be able to penetrate.

152. Non facilities based competition does not impact facilities build out adversely.

As per FCC "A regulatory distinction between a "facilities-based service provider" and a "non-facilities based service provider" may bear no relationship to the different companies' incentives to build additional facilities. A company's decision to expand its operations depends on a wide range of business factors. These factors include competitive environment, regulatory framework, net present value of customer acquisition, marketing significance of geographic scope, etc. Favourable interconnection/resale terms, along with weak retail competition or regulation, can improve new entrant profitability and make financing expansion easier. The opportunity to lease out capacity is itself an incentive to invest".

The FCC concluded: "Regulators should provide a policy framework to support resale, but should not make discretionary distinctions among carriers with respect to ownership of facilities. Preferential interconnection/resale terms for carriers designated as facilities based are not measures with a well-reasoned connection to the goal of encouraging facilities build-out".

153. Non facility based operators do not entail any additional costs to the economy but provide additional benefits in terms of product innovations and prices customised to end users needs.

4.2.4 Impact of Resale on Facilities-based Operators

154. Non-facilities based competition encourages better utilisation of network capacity, allows a greater variety of service providers to compete, increases customer choice, and facilitates introduction of technological and service innovation.

155. For larger dominant carriers that previously enjoyed lucrative monopolies, switchless resale also offers the potential for staving off competition from a new generation of service providers that are more responsive to the needs of small-and medium-sized enterprises (SMEs).

156. Non-facilities based competition always has a positive impact on the facilities based operators, due to expansion of markets facilitated by the resellers. The non-facilities based operators are generally constrained by their dependence on others for carriage services. Therefore, they introduce product differentiation and innovation to garner market shares. Although resellers corner some of the retail revenues, their presence in the long-term results in growth and maturity of the market, which translates into higher revenues for facilities operators.

4.2.5 Policy Implications

157. As discussed in section 4.3.1, international experience reflects the need for facilities competition to realise maximum benefits to the end users. Moreover, in the DLD policy context, facilities-based PTOs may be encouraged for the following reasons:

- DoT is a nation wide PTO, and for a level playing field, it is imperative that facilities based PTOs should be encouraged to compete with DoT
- Existence of only pure facilities owners and non facilities based PTOs may lead to a skewed industry structure wherein DoT will retain dominance through its integrated operations

158. Further, it has been opined that stand-alone non-facilities based service competition may be perilous and unsustainable, where there is limited availability of facilities. Conversely, experience shows that competition in facilities is essential for effective competition in services, since otherwise the competitors remain dependent on the monopolist of bottleneck facilities. Can there be effective competition in services where there is not effective competition in underlying facilities?

159. NTP '99 envisages usage of existing facilities for voice and data services. The economic rationale implies that their facilities may be used in the sector. Moreover, cost-based leasing charges offer great economies¹⁶ since analysis shows that on an average, leasing costs are five to 15 percent of revenues. Leasing also offers the operator flexibility in capacity planning. Moreover, leasing options are not hampered by the time lag associated with facilities deployment and can lead to earlier introduction of competition. Should non-facility based competition be introduced? If yes, should terms and conditions for non-facility based service providers be similar to those for facility based service providers?

160. Non facility based competition would entail introduction of resellers (switch based or switchless), which lease capacities or buy services from PTOs for onward provision of service to public. Such entities may not be restricted since they are the prime initiators of innovations and lead to product differentiation and market expansion. However, international trends show that resellers are a feature of more mature markets representing unrestricted competition in services. Most developing countries do not allow third party resale in the initial phases of liberalisation. The spare capacities' assessment (see Annex 10 and 11) shows that currently there is limited availability of facilities in the country. However, in the next two to three years adequate facilities may materialise. Adequate level of facilities accompanied by competition in facilities are pre requisites for introduction of non facilities based competition.

161. Should the entities compete over facilities, services or both? In case of non-facilities based competition should both switch-based and switch-less resale be allowed? If switch-less resale is not allowed then should it be reviewed after a certain time period? What should this time period be?

4.3 Areas of operation

162. For introducing competition in DLD, the geographical area of operation could be national or smaller units. In India, the smallest unit in DLD telephony is an LDCA, with the total number of LDCAs at 321. The next higher unit is a circle and each circle comprises a few LDCAs. The country can also be demarcated into regions, with each region including a few circles. Licensing could also be considered at the national level. Alternately operators may be licensed for specific routes.

163. Licensing a DLD operator at LDCA level is not in consonance with the current policy wherein basic services have been licensed on circle basis. The other approaches are discussed in the following sections.

4.3.1 Route level

164. DLD services are dispensed over routes, which presents a possible unit for licensing. However, route level licensing may not be desirable in a country of such proportions as India. With 321 TAXs, there are about 51,360 possible routes available. To assess the relative attractiveness and pre-requisites for adopting such an approach will be very cumbersome and will not yield any benefits. Traffic analysis shows that 50 percent of the traffic between 40 sample cities is concentrated along 43 routes. The major routes are presented in Table 3-15 in Chapter 3. This reflects that by and large most of the routes may not be perceived as attractive and may have no takers. Under this approach, the customer will have to access different operators for making calls over different routes. The route level or sectoral approach may not be pragmatic and there have been no international precedents.

165. Route level approach may be justified for mitigating the unequal and limited coverage expected from a national DLD operator. If there are adequate quality facilities available, an entity with a substantially lower cost structure may operate on sectors not addressed by the national operators. Considering the large number of options available and lower entry requirements, such a system is likely to function on a "file-and-operate"¹⁷ basis. However, such an option can only be considered after full competition has been introduced.

4.3.2 Circle level

166. The next higher level at which a DLD may be licensed is a circle¹⁸. Circle level licensing implies that operators have the options to dispense DLD services within the circles (intra-circle) as well as between two circles (inter-circle). The circle approach provides an operator flexibility to operate within or between the circles of choice. It also encourages wider participation since the telecom unit of operation is a circle. For instance, an operator licensed for MP and Maharashtra would be able to provide intra-circle DLD services in MP and Maharashtra as well as inter-circle services between MP and Maharashtra. Therefore the operator will be able to convey a call say between Bhopal and Mumbai; or Indore and Nasik; or Gwalior and Pune. This option can be considered only when scope of DLD services includes intra-circle DLD services.

167. The traffic distribution trend in the country appears to indicate that 75 percent of the DLD traffic is intra-circle and 25 percent is inter-circle (see section 3.1 and Table 3-6 in Chapter 3). However, for metros, inter-circle traffic accounts for over 48 percent of total traffic. The revenue distributions reflect the reverse trends with 54 percent of revenues being from inter-circle segment (refer section 3.1.1 and Table 3-8 in Chapter 3).

168. Inter-circle traffic and revenues are not evenly distributed across the country. Analysis shows that the traffic flows out of a circle are concentrated in a few states which are primarily in geographic proximity (see section 3.1, in Chapter 3). Further NTP '99 proposes removal of restrictions on the number of service areas per operator. Therefore, a circle level approach will encourage operators to expand their services to service areas offering community of interest, in time leading to the emergence of regional operators. For instance, in case of Tamil Nadu, 30 percent traffic is inter-circle, 60 percent of which flows to neighbouring states. Therefore, typically an operator will tend to establish its operations in adjoining service areas leading to emergence of regional operators.

169. Facilities assessment shows that the existing cellular and fixed services operators have facilities in various states. For such operators it would make business sense to consolidate their offering between their service area by being able to provide inter-circle services too.

170. Circle level approach is a bottom-up approach. The objective of consolidation may not be achieved for all operators in case of limited competition since there are two to three licensed operators in each circle. A major drawback is that a national operator may not emerge since circle level operators will remain concentrated in certain areas only. Circle level may not be a feasible option in a limited competition scenario as it may not result in introduction of competition in all the circles or even between all the circles, resulting in restricted choices to customers.

4.3.3 Regional level

171. A regional level geographic area can either be considered as per DoT regions or as per community of interest classification as discussed in Section 3.1.3. However we understand that as per DoT, MP is allocated between two regions viz. west and north which may not present ease of implementation of a policy or licensing. Hence the following classification may be preferred:

- East: Bihar, West Bengal, Orissa and North-Eastern states.
- North: J&K, Delhi, Punjab, Haryana, UP.
- South: Andhra Pradesh, Tamil Nadu, Karnataka, Kerala.
- West: Maharashtra, Madhya Pradesh, Gujarat, Rajasthan.

172. The analysis of 40 cities shows that 81 percent of DLD traffic is within a region and 19 percent to other regions implying that regions are homogenous operational units.

173. The data analysis results indicate (see section 3.3.1 and Table 3-18) that lack of commercial centres in the east (four centres) as compared to other regions (over ten centres each) renders the east less attractive. Moreover, the analysis shows that intra-regional revenue per city is far less for the east as compared to other regions. Further an intra-regional operator in the eastern region will earn a negative ROCE of five percent against a positive ROCE of eleven to eighteen six percent in other regions. How should regions be defined? If

a regional approach is adopted then how should the issue of the relative unattractiveness of the eastern region be addressed?

174. Circle level licensing will lend an operator freedom to evolve a region comprising circles of its choice. However, a regional demarcation as suggested above imposes regional boundaries, thus withdrawing the operational flexibility lent by the circle level approach. Regional approach will also lead to a three-tier structure, with circles already being units of licensing under current policies. Also, regionally bounding areas for DLD services may be incongruous in an era where distance insensitive strategies are being adopted by PTOs across the world.

175. The regional approach will require either licensing of an additional entity: inter-regional operator or the regional operator be allowed to interconnect over borders

176. Nevertheless, the regional approach which mandates a larger area of operation, will result in larger entities compared to circle level, which anticipates emergence of large entities through consolidation of existing entities. A regional level approach will also lead to consolidations, with existing operators expanding to occupy regions.

177. Though feasible in a full competition scenario, regional approach is more suited to a limited competition option since imposing boundaries implies restrictive conditions, not desirable in a fully competitive market.

4.3.4 National

178. The technological developments are enabling creation of large capacities at declining costs. A national operator will be more operationally efficient as compared to both regional and circle level. Should the policy facilitate emergence of consolidated entities as opposed to fragmented entities?

179. The analysis of 40 locations shows that 34 percent of the traffic flows over a distance-exceeding 1000 km, which is the highest tariff slab. This implies that this component accounts for over 50 percent of revenue generated by the 40 locations matrix. Regional level operators will not be able to address the needs of this segment adequately.

180. Nation wide licensing for DLD should be considered to initiate entities, which can compete with DoT on an equal basis since the latter has a pervasive presence through its nation wide reach. Nation wide licensing is essential in a sector as well as in the age of "BIG". Circle and regional operations will only facilitate emergence of small DLD operators.

181. The issues in DLD operations are significantly different compared to local services, hence a national level entity (catering to long distance alone) will be more suitable to deliver these services.

182. Also, communications is increasingly becoming distance insensitive, and is being charged irrespective of the distance. Hence, it is imperative to foster emergence of entities which can compete over large geographical areas.

Total Telecommunications : 'Death of Distance' tariffs

Across the world PTOs are introducing flat tariff plans whereby calls are charged at distance insensitive rates. Espirit Telecom offers one price across Europe for business users in Germany at a flat rate of Euro 0.15 per minute at any time of the day. In US too many carriers offer flat rate plans at 10-12 cents a minute for DLD calls depending on the time of the day.

183. This approach is representative of a top-down approach. This option may not lead to emergence of

national alternatives to DoT, since the operators may concentrate on lucrative sections only, and not proliferate throughout the country.

184. What should be the unit area of operation for licensing DLDOs? Should a combination of different areas of operations such as national level with circle/regional level be introduced?

4.4 Degree of competition

185. The degree of competition is a function of the number of entities in the DLD segment and the restrictions imposed upon them vis-à-vis area of operations, performance obligations and access terms and conditions. The desirable degree of competition is also linked to various exogenous factors, of which incumbent structure and ownership are two of the more critical ones.

Extract from *International Facilities Competition-Towards A Policy Framework*, OECD document

There is no scientific way to decide on how many public telecommunication operators, facilities based or otherwise, a particular market can bear. The market is perhaps the best judge. The experience of countries, which allowed open entry, has shown that many new entrants have targeted niche markets, or are providing service to specific geographic locations or customers. There have also been cases where operators have had to withdraw services because continued provision was uneconomical. The issue of number of facility based operators that a market can sustain is complicated by the fact that the different technologies available in the market are becoming increasingly competitive with each other.

186. The number of PTOs to be allowed entry could range from one to many in a given geographic area. With DoT already operating in the market, additional PTOs to be licensed could present varying degrees of competition ranging from a duopoly situation to full competition. The number of operators varied with the geographic coverage offer various alternatives. While the probable options emerging by varying any or both of these variables are numerous, the pragmatic alternatives are few. Alternate structures are discussed on the number of PTOs to be licensed in the sector, which may either provide services over their own facilities, or over the facilities leased from entities such as facilities owners. What should be the optimum number of players in the DLD segment?

187. The market structure will primarily depend on the number of PTOs and their geographic area of operation. The numbers may be pre determined by the policy maker or left to be decided by the market forces. In the latter case the market may be influenced through imposition of restrictions which lead to limited entry.

Therefore, the policy foresees numerous licensees within a circle, with two cellular operators and DoT already existing. In such a scenario limiting DLD licenses may not be rational, since long distance is perceived to be more competitive than local services. Further, it may be incongruous to limit customer choices in inter-circle telephony while providing them a wide choice for intra- circle services. Limiting DLD licenses may also restrict choices to intra-circle entities for conveying inter-circle traffic, where the customer has not exercised his choice of selecting the DLD operator. 188. Limited competition has generally been adopted as a transitional or intermediate strategy with full competition as the natural culmination. Therefore, limited competition strategies are time bound. Should the time period be specified?

189. Limited competition strategies are the outcome of various considerations such as:

- Attributing high values to the concessions/licenses by granting exclusivity for limited periods
- Attracting investments into a capital intensive sector through providing an assured market size for a period
- Providing the policy makers and regulators time for preparing for competition
- Preparing a public sector incumbent for competitive markets
- Attributing high values for privatising incumbents

190. The limited competition scenarios are discussed in the context of duopoly and multipoly with varying areas of operation. If limited competition policy is adopted then should it be duopoly or multipoly?

4.4.1 Duopoly

National duopoly as an initial phase has been one of the common approaches of the Commonwealth countries. UK set the example in 1984 by introducing Mercury Communications as a competitor to the incumbent, British Telecom (BT). However, the duopoly was not so much a matter of choice as the available alternative. UK was one of the pioneers in telecom liberalisation in Europe. In 1980, the government was contemplating introducing competition with the intent to curb the inefficiencies of the monopoly BT. Cable & Wireless (C&W), an erstwhile government company along with Barclays Bank and British Petroleum, offered to set up a digital transmission network connecting the main business centres in England-the Mercury project.

The decision for duopoly was also a function of the initiative for privatising BT. For the last few years the government had been trying to find ways to finance BT's massive investment needs for modernisation. The treasury refused to support a private debt program and budgetary financing did not succeed. This led to the government deciding to privatise BT. This decision had an implication for the liberalisation of the sector. Since BT was an established monopoly new entrants will need to be protected against abuses which required strong regulation. However, overly strong regulation could also hinder materialisation of benefits of privatisation and liberalisation. Secondly, British investors were not sure of the viability of BT as a private operator and required assurance before investing. At the same time C&W, the sole owner of Mercury by 1984 anticipated greater risks in the market with a privatised dominant BT and light regulation. Finally, both BT and C&W investors expected limited licensing providing certain exclusivity for these operators. With this view, the government assured C&W that further licenses would not be contemplated until 1990.

191. A duopoly structure would entail only two PTOs in a given geographical area. With DoT as the incumbent, a duopoly implies licensing only one additional PTO with exclusivity for a given time period. Since limited competition strategy is time bound the time frame for transition period may be determined as discussed in section 4.6.

192. As discussed in section 4.4.2, circle level duopoly may not be a feasible option. Thus, under duopoly only regional and national licensing can be considered, whereby different options are:

- One additional PTO at National level: National Duopoly
- One additional PTO licensed for each of the four regions: Regional Duopoly

A. National Duopoly

193. For national duopoly one more PTO apart from DoT may be licensed. The alternative PTO will be

required to operate on a nation wide basis. To ensure nation wide coverage, imposition of obligations may also be considered such as minimum number of points of presence to be established within a given time frame.

194. One approach to introducing duopoly could be as adopted by Australia. In Australia as well as during the limited duopoly phase in Spain (where the broadcasting company was sold), alternate license was bid as a part of sale of one of the incumbent communication companies. A similar approach could be considered by licensing one of the public sector operators as alternate DLDO.

195. Another way of instituting duopoly in DLD could be through allowing usage of existing private operators' (such as cellular and basic service licensees in the circles) facilities and operations. In Canada, for a long time, the only licensed DLD operator was Stentor Alliance. Stentor Alliance was an association of existing regional operators, wherein the respective DLD facilities of these operators were made available as a single facility for conveyance of DLD traffic in the country. The alliance collectively and the individual operators had a settlement arrangement for sharing the revenues. However, such an approach may have implications in view of the extant circumstances, wherein there is more than one operator in a few states and none in many other states. In the former case, such a co-operative will exclude operators with existing facilities, since most of them own parallel facilities. Whereas in the latter case, it will result in no competition being introduced. Therefore, the Stentor model may be more appropriate in a multipoly option.

196. Analysis of 40 cities operations, (see Table A-28) show that a single new entrant with a 15 percent market share and ten percent tariff discount, will earn profits of over Rs. 131 crore in the first year of operations, indicating profit margins of around 14 percent.

B. Regional Duopoly

197. For introducing regional level competition, the country could be segmented into four regions in consonance with the operational regions identified by DoT. One PTO could be licensed for each of the regions, with inter-regional traffic conveyed through interconnection between the regional PTOs, inter-regional operator or DoT.

198. In case the traffic is conveyed through an inter-regional player, then would it provide intra-regional services. If yes, it would be equivalent to national operator negating duopoly policy. Should interconnection at borders be permitted or should a separate entity be licenced as an inter-regional operator?

199. An advantage of the regional model may be a possibility of greater penetration since resources will need to be deployed in a smaller area. Also restriction of operations to regions may lead to dispersed benefits, since the PTOs will aim at expanding services within the designate regions to yield maximum market share and presence.

200. Analysis undertaken, assuming only intra-regional operations for regional operators, showed that all operators except eastern region earn positive ROCE in the very first year of operations (see section 3.3.1 and Table 3-18). However, these profits only reflect intra-regional revenues, with interconnection at borders. These operators will have access to inter-regional markets too (which is 60 percent of the total market), which will lead to further accretion in revenues.

Advantages of Duopoly

201. National duopoly will lead to minimal duplication of facilities with one alternate PTO licensed with an option to build or lease facilities from facilities owners.

202. While affording an opportunity to the incumbent to adjust through limited competition, this will make the market sufficiently contestable for the incumbent to take initiatives to improve efficiencies and acquire a commercial focus.

203. Duopoly through offering exclusivity to PTOs makes the sector more attractive and acts as an incentive to investors. The PTOs are able to mobilise resources more easily under limited competition since the investors perceive higher value.

Disadvantages of Duopoly

204. National duopoly may lead to slower penetration, with the PTO limiting its operations to high-density routes. This may result in neglect of less lucrative sectors, which may not be serviced by the operator. *(This could be countered by mandating obligations, such as a minimum number of Points of Presence to be established in a given time frame.)*

205. There are existing (such as basic and cellular operators) as well as potential (such as IR, PGCIL) owners of facilities in the country who may be interested in becoming PTOs. Duopoly restricts the opportunity and hence the incentive to invest in facilities.

206. It requires selection criteria, which if based on bidding will add to the cost of providing services, while non-monetary criteria will make it less transparent.

207. Since licenses are given at the time of entry, which is one time entry, this may lead to profiteering in the licenses, which may add further costs to service provisioning.

208. In case of limited licensing, if the licensee does not invest in the business, then the envisaged level of competition will not materialise.

209. In case duopoly is adopted then which duopoly option is preferable - National or Regional? In case of National duopoly should it be implemented by licensing one of the public sector operators? Alternatively should it be implemented by application of the Canadian Stentor model by licensing an association of existing operators such as FSPs and CMSPs?

4.4.2 Pre Determined Multipoly

210. Multipoly¹⁹ implies a limited number of operators, but more than two. However, at times multipoly may be an outcome of industry or sector structure wherein the sector dynamics do not encourage more than limited entry. When it occurs naturally it may be deemed as a competitive scenario. Prima facie, there is no evidence of any country following pre-determined multipoly as a telecom sector strategy.

It appears that facilities based multipoly may be a characteristic of the sector. For instance in the US after over fifteen years of effective competition, there are four major facilities based operators, while there are numerous switched and switchless non facilities based operators, who also own (in some cases) limited facilities. However these developments are an outcome of the market dynamics in that particular country. In Australia since introduction of competition in 1997, over twenty carriers have been licensed. However, these carriers have the freedom to operate in both local and long distance markets using any technology whether fixed or cellular. Also they may not be operating throughout the country and may own only small parochial network units.

211. It is understood that a market with four operators is a competitive market. Therefore, a limited competition option cannot consider more than three operators. With DoT as existing operator, only two more licenses will

be available for new entrants. These licenses will offer exclusivity to the PTOs for a given time period.

212. Multipoly may be either or both at circle/regional and national level. Scenarios with multipoly options include:

A. Two PTOs licensed to operate at National level

213. This option may portend limited and concentrated services roll out by the PTOs, which could be countered by imposition of obligations. However, past experience shows that obligations are not easily enforceable.

214. The analysis indicates that under a duopoly an operator earns over Rs. 131 crore profit in the first year of operations (with 15 percent market share and ten percent tariff discount), while with the presence of two operators (each with ten percent market share and offering ten percent discounts) losses are incurred (see Table A-28). However, the operators were able to earn a return of 14 percent ROCE.

B. Two PTOs licensed to operate in each of the regions/circles

215. This scenario will imply licensing of two PTOs in each of the regions or circles. For inter-regional or inter-circle calls they may either interconnect at borders or hand over the calls to DoT. This introduces a slightly higher degree of competition than duopoly and may result in greater penetration. One major disadvantage is that such an approach does not lead to emergence of a national alternative to DoT and may not ensure effective competition since the entities will be competing in restricted areas.

216. Implementing circle level multipoly may not result in competition in all circles and further it restricts the benefit of circle level licensing to only a few existing operators (see section 4.4.2).

C. One PTO licensed to operate in each of the regions/circles and one PTO licensed to operate at national level

217. This option mitigates the disadvantages of some of the other options, while achieving the objective of restricting entries. This approach will imply two PTOs operating at national level (DoT and the new entrant) and three PTOs operating at regional level since the national PTOs will also have presence in the regions.

218. Regional PTOs will have the option to convey inter-regional traffic either through DoT, or through the alternate national licensee or through interconnecting with each other.

219. Viability analysis (see section 3.3 and Table 3-18 in Chapter 3) was undertaken assuming that regional operators will be restricted to their regions and national operator to inter-regional markets.

220. Based on sample cities' traffic analysis, revenue distributions in the country reflect that inter-regional to intra-regional ratio is at 60:40. Inter-regional operations earn substantially higher profits than the regional operators do, with the former obtaining an ROCE of 11 percent. Analysis further shows that while the total intra-regional investments are comparable to inter-regional investments, revenues are higher by 50 percent for the latter.

Advantages

221. Multiple operators will provide greater choice to the customer than under a duopoly.

222. It optimises limited investible resources with the need for competition, through introducing only a few PTOs.

223. Restrictive entry for PTOs would limit duplication of facilities. This will also facilitate efficient entry through selection of a few serious entities.

224. Limited competition will provide the incumbent time and impetus for adjustments to competitive scenarios.

Disadvantages

225. Since there is one time entry, this may lead to profiteering in the licenses, which may add further costs to service provisioning.

226. In case of limited licensing, if the licensees do not invest in the business, the envisaged level of competition will not materialise.

227. In case multipoly is adopted, should it be two national operators, two regional/circles operators or one national and one regional/circles operator?

4.4.3 Unrestricted competition

228. This alternative considers full competition in the DLD segment. The key features of the scenario are:

- No entry barriers
- Licenses available on demand
- Simple selection criteria with non-restrictive terms and requirements

229. The operators may retain the right to define their service areas as per their perceived attractiveness of a particular option.

230. No obligations will be imposed on the operators, since in a full competition scenario where entry is unrestricted, obligations cannot be fixed.

Advantages

231. Operators will compete with each other to offer packages to meet the varied needs of customers, while ensuring the desired quality of service, since the customers will have the choice of selecting DLD operators.

232. Competitive pressures will ensure the most cost effective methods of delivering services, and passing on of these benefits to customers.

233. Competitors will innovate to garner market shares leading to development of new products and technological advancements.

234. Market pressures will yield economic efficiency, which will to a large extent also prevent duplication and redundancy beyond commercially feasible locations. It will lead to development of facilities in the requisite areas and creation of certain redundancy necessary for innovations. For instance, if multiple facilities were available then an operator would undertake a feasibility exercise to decide whether to build or buy the facilities. At the same time facility providers will compete with each other to offer best possible deals leading to optimal costing and efficient operations.

Disadvantages

235. Unrestricted entry may lead to higher number of issues pertaining to interconnection, service quality and tariffs, requiring higher degree of regulation. In USA regulation is at two levels – federal through FCC and state through the PUCs.

236. Introducing full competition directly to an incumbent, which has yet to acquire a commercial focus and structure, might lead to frittering away of the position acquired over the years.

237. The competitors may remain centred around high traffic and high yield routes such as Delhi-Mumbai. This may restrict the benefits of competition to a few areas in the country and to limited members of society. Business customers always obtain the maximum discounts due to high volumes generated by them. *(Conversely if business customers gain, inevitably market dynamics ensure that these benefits get passed on to the economy at large).*

238. This may lead to excess investment in facilities in an economy which is not totally market dominated.

4.4.4 Market vs. Pre determined

239. The degree of competition could either be pre-decided or determined through the application of market forces. A pre-decided level of competition provides greater control over the segment and involves less of the surprise element, whereas the market mechanism presents far less predictability and involves higher degree of risks. A simple comparison of the two approaches is provided in Table 4-1.

Table 4-1: Comparison of Pre determined and Market determined Competition

Competition	Advantages	Disadvantages
Market determined	<ul style="list-style-type: none"> Higher allocative and technical efficiencies Rationale offers optimal number of entries Presents transparent entry mechanism 	Does not always pay heed to society's needs Market exits and inefficiencies accrue considerable economic costs
Pre-determined	<ul style="list-style-type: none"> Provides planning in view of socio-economic exigencies 	No scientific methodology for deciding the optimal number May not foster innovations

240. International experience suggests that countries which had privatised and restructured their telecom sectors to some extent, opted for market determined structures. However, countries with a public sector incumbent sought limited competition during the transition period, while incumbent restructuring was under way. For instance in the US, a market determined structure was chosen as in Philippines and Chile. In the case of Chile, the incumbents were privatised prior to introduction of competition. In Philippines, the dominant incumbent, PLDT, was always a private entity. In contrast, Australia and UK chose an evolutionary or gradual approach, where their incumbents although corporatised, were not privatised.

241. Since both the approaches have their pros and cons, a mixed approach attempting to apply controlled market dynamics may be mooted.

4.4.5 Restricted Competition

242. One approach to introducing restricted competition through application of market dynamics may be by imposing barriers such as entry fees, performance obligations and operational restrictions. The potential entities will assess the attractiveness of the options vis-à-vis the obligations and barriers before entering the sector. Although the sector poses natural hurdles for facilities based entities, additional hurdles will further lead to elimination of non-serious entities. Restricting entry this way will also make the sector more attractive to the interested entities.

243. In such a scenario, licensing may be on a non-exclusive basis with no restriction on the number of entrants. There may not be any time frame for licensing and licenses may be available on demand.

244. Licences could be issued at circle or national level. However, in a competitive scenario, circle may be a better option since it offers synergies with existing policies in cellular and basic services allowing telecom sector consolidation. It may not be necessary to offer circle level option along with regional and/or national options since any operator may apply for requisite number of circles to emerge as a regional or national operator.

245. This approach however would require determining the appropriate level of the entry barrier. This in turn may also be a constraint to successful implementation.

Advantages

246. The entry barriers will encourage efficient entries since only capable and serious entities will cross the hurdles.

247. This approach will provide a transparent mechanism for restricting entry while allowing market forces to influence operator's decisions. Thus this approach presents benefits of both limited competition and market dynamics.

Disadvantages

248. Entry costs would add to the cost of service provisioning.

249. There is no methodology for fixing optimal level of entry barriers, which will complement and not restrict market dynamics.

250. In case of restricted competition policy, what should be the mechanism to restrict entities? Should there be monetary entry barrier and/or performance obligations? What should be the optimum level of such barriers? Should there be restriction on the number of entrants? Should there be any time frame for licensing? Should licenses be available on demand or should it be one-time?

251. What should the competition policy be? Should full, restricted, or limited competition be introduced?

4.5 Time Frame

252. International trends point towards a limited competition scenario as a transitional arrangement. Time frame for ending limited competition and introducing full competition is dependent upon various factors, such as:

- Estimated time period required for the new entrant to get established through establishing adequate customer base and/or facilities.
- The time period required for adjustments to competition by the incumbent

253. Vast economic resources, expended in developing the incumbent and not giving adequate opportunity to the incumbent to adjust and prepare for competition, may spell an economic loss. This is another facet of a level playing field wherein the incumbent has to be on the same managerial and perceptual plane for effective competition. However, the country has been experiencing varied degrees of competition in basic and value added services for the past few years, while there have been no visible initiatives in this direction.

254. In Brazil, the time frame for duopoly has been set at three years, after which all the regional operators will be allowed to operate throughout the country. The time frame appears to have been decided in view of the network obligations and the linked roll out period being set at three years. In Brazil, the incumbent companies were privatised before introduction of duopoly. However, prior to privatisation, an extensive strengthening and

restructuring exercise of incumbent companies was undertaken spread over three years (1995-1998). This implies that estimated telecom restructuring transition period totalled six years, with three years for incumbent restructuring and three years for competition establishment.

255. In Australia, Telstra²⁰ had a six-year preparatory period for full competition that commenced in July 1997. Telstra used that period to recruit senior management from overseas telecommunications companies that had experience in competitive markets. The management, in turn, began the process of turning a state-owned enterprise into a nimbler commercial organisation capable of responding to the strategic challenges that privately owned competitors would soon present. Duopoly was introduced through auction of the state owned satellite company – AUSSAT- as the alternate licensee. Thus the six-year duopoly period also offered exclusivity to the privatised incumbent for establishing itself while aiming at obtaining adequate values for its sale. In a sense, therefore, the 1997 reforms forced two incumbents to face the challenge of open entry²¹.

The new carrier arrangements will be subject to a sunset clause to come into effect on 30 June 1997.**4.5.1 Policy Implications**

256. In case DLD policy proposes limited competition, a time frame to review the policy also needs to be specified. As discussed in preceding sections, in Australia and UK, about six years were taken for transition. Brazil, too, effectively opted for six years in transition.

257. The indicative viability analysis undertaken based on 40 city data, shows that a PTO would require at least two years for facilities build out and another two to three years for establishing operations

258. NTP '99 has proposed that basic services policy for unlicensed circles will consider a transition period of five years. Moreover, NTP '99 also proposes that DoT corporatisation be achieved by the end of 2001 after which it may require three years for adjustments. Against this backdrop, a transition period of five years may be considered for DLD policy.

259. What should be the appropriate time frame for a limited competition scenario?

5. Impact and implications of competition

260. Successful implementation of intended strategy and realisation of policy objectives is also dependent on the manner in which certain other issues are addressed. There are a few imperatives for competition in the DLD sector, without which it cannot be mooted. These include interconnection, equal access and unbundling. These issues, which are critical to DLD operations, are discussed in the following sections.

5.1 Interconnection

261. Since the incumbent's former monopoly position provides it with all the existing customers at the start of market liberalisation, interconnection with the incumbent is critical for new entrants. Particularly in the DLD segment, where the operator needs to connect with the local access networks, interconnection is the crux of its existence. A note on interconnection is given in the Annex 25.

262. The regulators generally require that the APs should provide access at the points requested by the DLDO to the extent technically and operationally feasible. The Point of Interconnection (PoI) is a physical point of demarcation between the facilities/networks of the AP and the DLDO. Calls originated on a Customer Access Network (CAN) operated by an AP are handed over to the DLDO at the PoI. PoI for connectivity between CAN and DLD network may be located between the Local Access Switch and TAX as shown by dotted line in Figure 5-1.

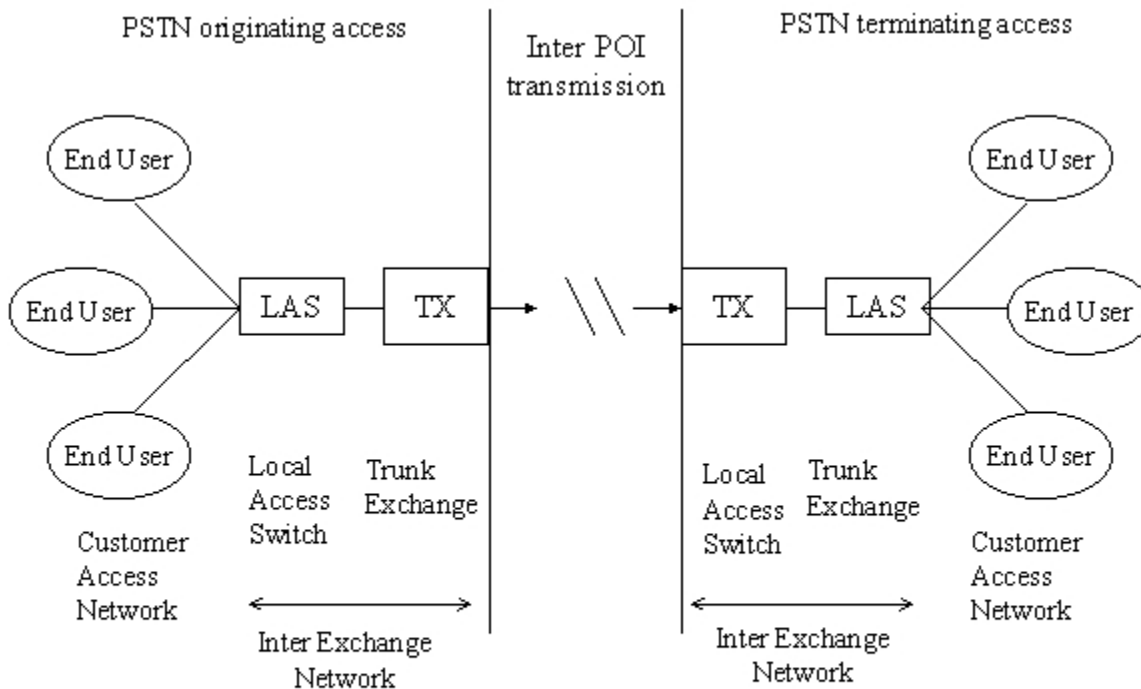


Figure 5-1: DLD Interconnection Arrangement

263. A DLDO would require interconnection of the following types:

- Access interconnection
- Transit Interconnection

A. Access interconnection

266. A DLDO will have to access customers through the APs for origination and termination of a call. Conversely the APs will provide the DLDO originating and terminating access to their CANs.

267. Domestic originating access is the carriage of telephone calls from the calling party to a Point of Interconnection (PoI) with the DLDO. Domestic terminating access is the carriage of telephone call from PoI with the DLDO to the party receiving a call. This arrangement is presented in Figure 5-1.

- Access services would be provided by the AP to the DLDO, where that DLDO is:
- Pre-selected by the end-customer for DLD services
- Selected by the customer for that particular call through access codes assigned to that DLDO

267. Originating and Terminating access services may include the following elements:

- Access via pre selection or access codes for originating access and access for calls forwarded for termination in the AP's network.
- PoI location
- Forwarding a call beyond the PoI
- Signalling

- Provision of switchports
- Fault Handling
- Billing

B. Transit Interconnection

268. Transit interconnection comprises a connection between two networks for conveying a call or signals, but not for originating and terminating the calls. This will facilitate conveyance of a call in the Inter Pol Transmission segment shown in Figure 5-1 There may be various scenarios, wherein a need for these services could arise, including:

- When a DLDO does not have facilities for connecting to the Pol of a terminating exchange, it may hand over the call to another operator with such a Pol for termination of the call.
- When a DLDO has Pols, both in the originating and terminating exchanges but does not have facilities throughout the inter Pol route, it may obtain transit services from another carrier while terminating and originating calls on its own.

5.1.2 Policy Implications

A. Interconnection Terms

269. In most countries, interconnection issues are a major factor contributing to delays and deferment in introduction of competition. To obviate these, interconnection guidelines and a policy framework need to be established in advance. In India, varied degrees of competition have already been introduced in the sector in segments such as value-added services, basic and cellular services. To that extent, the sector has experience in the moot issues and pre-requisites for a successful interconnection policy. Since the framework and reference points are already established, interconnection issues may not pose major problems.

270. DLDOs will need to interconnect with each other as well as other service providers such as FSP and CMSP.

271. There are no technical limits on the number of operators who can interconnect at any given point.

272. Interconnection terms need to be in conformance with the National Telecom Plan specifically with Switching and Traffic Routing Plan. For seamless operations and feasible interconnection, it is imperative that the interconnection is established in accordance with the DoT network hierarchy. As per the charging plan, the trunk or DLD calls are switched at the LDCAs. Therefore, to be able to offer services in a particular LDCA, the DLDO will need to interconnect at the tandem/TAX of the APs. For carriage and conveyance of traffic over the LD segment, the DLDO, while handing over traffic to another operator would need to interconnect at the other operator's tandem/TAX exchange.

273. As per the TRAI Interconnection Charges Regulation (ICR) the operators are required to mutually agree on the interconnection charges within three months time, failing which TRAI may intervene and settle.

274. The TRAI ICR addresses requisites of network interconnections only. At present, an AP (including both FSP and CMSP) is allowed to carry intra-circle DLD calls over its own facilities before handing them over to DoT. For this, the AP is required to pay DoT, Rs. 0.48 per metered unit of the call at a pulse rate applicable from the point of handover to the destination.

275. However, the framework for access interconnection is not as yet in place. Introduction of competition in DLD requires that both originating and terminating access tariffs are determined. A DLDO would be required to pay charges to the APs at both the call originating and terminating end towards using their facilities for picking up and delivering the DLD calls. These are termed as access charges and are usage based charges payable on a per minute basis. These charges could include carriage charges if in case AP also carries the call over its long distance network. The total access charges per conversation minute could be a sum of originating charges, terminating charges and the amount towards call set-up/dialling²².

5.2 Interconnectivity with other Service Providers

276. At present private service providers such as FSPs, CMSPs and RPSPs are allowed to connect directly with DoT only, direct interconnectivity between service providers was not allowed. To convey traffic to other private service providers in the same service area they needed to connect through DoT. NTP '99 states that direct interconnectivity between private service providers in the same service area will be permitted.

277. NTP '99 also states that interconnectivity between different service providers in different service areas is to be reviewed along with DLD policy. Such connectivity over borders will essentially involve conveyance of inter-circle DLD traffic. The DLD policy decision will also determine whether existing operators may be allowed to connect directly over borders.

278. However, their tenders and present licenses are only for services within their service areas, and allowing them to interconnect may not only require amendment to their licenses, but may also invoke legal action from unsuccessful applicants.

279. Second, the DLD liberalisation policy would envisage certain license fees for each service area, in which case, allowing these operators to provide rival services without paying those fees may be viewed as discriminatory. However, this approach may lead to early introduction of competition in DLD segment.

280. Should the entities be allowed to interconnect at borders? Will the entities need a license? Should the terms of license be preferential?

5.3 Co-location

281. In order to promote competition in telecommunications markets, it is important that:

- any benefits in infrastructure investments that incumbent operators have enjoyed from the monopoly era should be shared with new entrants to ensure that competition is fair
- new entrants can develop their networks as quickly as possible with minimum external costs and negative effects on the environment
- the overall level of investment is cost effective in that needless duplication of infrastructure is avoided
- there are economies of scale due to lower marginal cost

282. These objectives have led to the concept of co-location and facilities sharing that is an integral part of interconnection policies.

283. The operators are required to provide, on rates, terms, and conditions that are just, reasonable, and non-discriminatory, for physical co-location of equipment necessary for interconnection or access to unbundled network elements at their premises. However, the operator may provide for virtual co-location if physical co-location is not practical for technical reasons or because of space limitations.

284. Physical co-location is an offering that enables an interconnector to locate its own transmission equipment in a segregated portion of the interconnecting operator's central office, serving wire centres, tandem switches or certain remote nodes. The interconnector pays the interconnecting operator a pre-determined (negotiated) charge for the use of that central office space, and may enter the central office to install, maintain, and repair the equipment.

285. The interconnecting operator would recover the total installed cost of the equipment required for interconnection, either as a non-recurring charge or over the years through a charge for depreciation and taxes. The interconnecting operator would also recover recurring operating costs such as maintenance expenses for that equipment through a recurring charge. For promoting competition in DLD segment, the DLDO may also be offered co-location arrangements at reasonable and non-discriminatory terms.

5.4 Bypass

286. A DLD service provider needs to access the customer for providing services, which is only possible through the APs. For this the DLDOs are required to pay access charges to the APs, which often represent a sizeable percentage of their revenues. The access charges, more often than not, comprise both the cost of providing access and the access deficit of the AP. This provides an incentive to the DLDO to access the customer without paying the access charges.

287. This is achieved by bypassing the AP by not utilising the AP's facilities for accessing the customer. A DLDO may identify certain high volume customers and establish a direct connection between the customer and its TAX exchange. The high volumes of revenue yield and avoidance of access charges payable mostly justify the costs of setting up direct links (either through radio or fibre).

288. Some of the DLDOs also bypass the APs by setting up optic fibre rings or loops around business centres (buildings) in urban areas. These rings are then connected to the TAX of the operator thereby providing access to all the occupants of that building who are mostly business entities offering high volume DLD traffic.

289. A bypass may also be achieved through enfranchising DLD PCOs directly linked to the TAX of the DLDO. In such a case the customer would be dialling directly on the operators network and not being routed through the local AP's network.

290. Bypass needs to be viewed in conjunction with the overall telecom policy and the objectives thereof. In case the AP licensing has granted certain exclusivity to the AP, then allowing bypass may result in violation of these terms. Further, if the AP is required to provide local services at tariffs below costs then the DLD business may be required to contribute to the access deficit in proportion to usage of that AP's facilities. Such objectives can be well supported by disallowing bypass while the full tariff re-balancing is not achieved.

291. Further at times USO may be a part of interconnection, which though not a desirable policy, is sometimes exigent. In such a case a bypass would result in under-fulfilment of USO and a shortfall. However, in case USO is settled through separate modalities of contribution to a fund based on percentage of revenues, then a bypass does not pose any problems. Since a DLDO's USO fund contribution would be adjudged on its total revenues, the bypass will not result in a deficient contribution.

5.4.1 Policy Implications

292. Until now, the basic services licenses have been issued on an exclusive basis for ten years. For the circles for which basic services licenses have not been issued, the NTP '99 prescribes a five year transition period during which entry of multiple operators (although limited in number) maybe allowed. After the transition period market forces are envisaged to determine the number of operators.

293. The recent TRAI TO initiated partial tariff re-balancing which is to be implemented over three years. As long as the tariffs are not fully re-balanced, the LD tariffs will remain on a higher side, carrying a legacy of cross subsidisation elements of local access. However, with different entities providing local and LD services, there needs to be a mechanism for transferring the subsidy elements to maintain the viability of operators in the local segment. This could be through access deficit charge as a part of interconnection charges. A bypass by a DLDO will result in avoidance of payment of access charges and thus a shortfall in contribution to the access deficit. The issue of bypass needs to be considered in this background.

294. Since a bypass by a DLDO will result in avoidance of payment of access charges, what should be the appropriate policy on bypass of local access by the DLDO?

5.5 Access Arrangements

295. NTP'99 states that all access providers should be required to provide interconnection to the DLDO resulting in choice for subscribers to make long distance calls through any operator

296. There are principally two ways to provide choice to customers: either through pre-selection or access codes

297. Pre-selection is a facility whereby a subscriber can select the DLDO of choice and inform the AP that all its DLD calls should be routed through that operator only. This requires any DLD call originating from a particular subscriber should be automatically routed to the network of the designated DLDO.

- It will be required that the APs switch to perform the call routing function. It requires programming or software changes to be carried out before this can be implemented.
- Pre-selection also involves issues regarding the modality of selection of DLDO by the end-user. For instance, countries such as Australia and the US have held ballots to implement pre-selection. In US the customers who did not vote were divided amongst the DLDOs in their area based on voted ratios.
- The subscriber has to pre-select the DLDO for a fixed period. The average period can be six months to a year.

298. Another means of facilitating access is through access codes. Carrier Access Codes (CACs) are unique digits allocated to each of the operators by which they can be identified. Therefore a subscriber desirous of routing a particular call to a specific operator, needs to first dial the CAC and then the called number.

In this approach the subscriber is required to dial CAC every time a call is made. This may be inconvenient as extra digits are required to be dialled every time. However, this also enables the subscriber to optimise its costs by exercising dynamic choice of selecting a DLDO on call by call basis.

- The subscriber should be required to dial equal number of digits (known as dialling parity) to access any operator. A DLDO will have an advantage, if it can be accessed through dialling less numbers as compared to a competing operator.
- Associated with CAC is the issue of equal access. The ability of a subscriber to make a long distance call over a competing operator (other than its AP) with equal convenience is generally known as equal access. Conversely, it implies that all DLDOs to receive equivalent connections to the AP's network. In case it is required for a subscriber to dial access codes for the new entrant, it provides unfair advantages to the APs and predominantly the incumbent since they are the default service providers.

299. Equal access is considered a pre-requisite for establishment of effective competition, since it is aimed at ensuring that services from all operators are available to end-users. This issue first arose in the US, when MCI entered the switched DLD market and AT&T/Bell Companies and affiliate LECs refused to provide trunk side connections to MCI. Therefore MCI had to operate its DLD service through line side connections by leasing business lines from AT&T. The lower connectivity resulted in lower quality of services. When the decision regarding structural separation of AT&T into LECs and Long Distance (LD) companies was taken, the DoJ mandated that equal access be provided to all the other LD operators too by the LECs (See Annex 27).

300. Traditionally, access codes is the simpler option for introducing access and precedes introduction of pre-selection modality.

301. In France, with the introduction of competition, single digit access codes have been allocated to the nation wide operators, while four digit access codes (16XY) have been provided to other licensed operators. Autorite de Regulation des Telecommunications (ART) decided that a single digit would be restricted to network operators licensed to provide a public telephone service and which agreed to roll out and operate a national network and to fulfill the territorial coverage obligations.

302. ART conducted a draw to determine the order in which operators would be given the choice of the the value of their "E" digit- the digit which will be used by telephone subscribers to select their long distance operator from 1st January 1998. Digit 0 is reserved for the AP.

303. Thus from 1st January 1998, subscribers had the choice to select their long distance operator for national calls. For instance, if the user wishes to use the service of Siris for conveying a long distance call, he has to prefix the called number with the digit 2. Thus, for calling a number 01 40 54 70 01, the customer would have to dial 21 40 54 70 01 to access Siris. If the user dials 01 40 54 70 01, the call is routed to the long distance operator chosen by the AP of the subscriber.

304. It is intended to provide for pre-selection by Year 2000. If the user selects a long distance operator, then on dialling, the call is automatically routed to the pre-selected long distance operator. If the user does not select a long distance operator, the call is handled by the long distance operator chosen by the AP to which the user subscribes. Along with pre-selection the user will however have option to exercise call by call choice, as discussed above.

305. In Malaysia, dial access has been introduced with effect from January 1, 1999, whereby customers will have access to up to five operators for national and international calling. Customers will be required to dial three digit codes to select operators of their choice. In case no digits are pre-fixed, the call gets routed through the default operator being the AP for that customer. The pre-selection modalities are going to be introduced in Year 2000 and fully implemented by Year 2001.

5.5.1 Policy Implications

306. Each AP will need to introduce changes to incorporate selection modalities for DLDOs whether through access codes or pre-selection.

307. Access codes will need to be designed and allocated as per the National Numbering Plan. All DLDOs will need to be allotted a CAC, whereby a customer may select it for the DLD telephone services.

308. With digitised and computerised networks, the technical modifications are easier to accomplish. The introduction of CACs will require changes in the software at the Operations and Maintenance Controller (OMC) level in every local system.

309. For introducing pre-selection modalities, certain changes will be required at the switching centre of the AP, so that the call automatically gets routed to the pre-selected operator of the customer.

310. Generally dial access arrangements are easier to implement and precede pre-selection. In case such an approach is taken then the time frame within which pre-selection is to be introduced will also need to be determined.

311. In initial stages pre-selection may also require facilitation of carrier selection through a neutral selection process such as ballot. Modalities for undertaking such an exercise will also need to be determined. It will also be required to specify the duration for which pre-selection will be made.

312. The implementation of pre-selection will be easier and less expensive in case of limited competition policy.

313. As per DoT hierarchy, all the long distance calls originating in a district are switched at the TAXs which are located at the LDCA level. At present DoT has 321 LDCA with 379 TAXs, as there are multiple TAXs in certain districts. A DLDO will need to have a Point of Presence whether virtual or physical at an LDCA of a district which it intends to serve.

314. Should the modality of equal access be preselection or access codes? In case dial around is chosen as the modality initially then what should be the time period for introducing pre-selection?

315. In initial stages pre-selection may also require facilitation of carrier selection through a neutral selection process such as ballot. What should be the modality?

316. Should access codes along with dialling parity be introduced?

317. All DLDOs should be allowed to install/franchise/operate DLD PCOs. Both the NTP'94 and NTP'99, envisage universal access at affordable prices. At present majority of the population in the country has access to telecommunications through PCOs or not at all. With a view to social equity, it is imperative that the vast majority of the population in the country is also able to exercise their choice of DLDO and reap benefits of

increased competition. If DLDOs are not allowed to install DLD PCOs, this part of the populace will remain deprived of an opportunity to access competitive services.

318. Should DLDO be allowed to set up STD PCOs (without bypassing the AP). Should the policy make it mandatory for existing PCO operators to give their customer a choice of DLD operator?

5.6 Bundling

319. Bundling is sale of two or more goods/services in combination as a package. Bundling may be pure or mixed bundling. Pure bundling implies that individual goods/services are not available separately but can only be obtained as a package, whereas in case of mixed bundling both individual services and package are available. Bundling may provide economies in joint provisioning of services as a bundle. Such economies can arise from savings on customer information costs or billing and collection costs.

320. Table 5-1 presents the status of bundling of services in a few countries.

Table 5-1: Bundling of Services in a few Countries

Country	Type of Bundling
USA	Unbundled ²³
Australia	Mixed Bundling
France	Mixed Bundling
Spain	Mixed Bundling
Philippines	Mixed Bundling
Malaysia	Mixed Bundling
Brazil	Pure bundling of intra regional services, with inter regional DLD available separately

321. At present in India, the local access services including the domestic long distance and international services are available to the customer as a pure bundled service with the option of purchasing separate services not available. This is similar to scenario in Brazil.

322. All countries with competition in DLD have pre-selection or access codes for facilitating selection of the operator of customer's choice. This availability of choice leads to mixed bundling as the AP provides individual services as well as packaged services.

323. In comparison to a standalone DLDO the incumbent is normally an integrated operator offering local, domestic and international services. This may result in bundling of services by the incumbent. The local access network is used jointly for providing basic and long distance services. Hence, the access network costs need to be unbundled so that a standalone operator is not at a disadvantage against the integrated operator.

In US, the regulation has been at two level: State and Federal. This has necessitated development of Uniform System of Accounts (USOA) and Separations Manual. USOA provides both the vocabulary and data for cost definitions developed by the regulator, in consultation with traditional industry. Separations Manual provides the rules for assigning USOA recorded accounts to separation categories. USOA broadly comprises of plant related net investment and annual non-plant related expenses.

The pre-divestiture AT & T cost were categorised on following categories:

Non plant related costs comprising of commercial expenses, traffic expenses (including costs for operators and for supervision of the network) and revenue accounting expenses.

The main categories of plant related costs are station apparatus, subscriber equipments, local dialling (bifurcated into traffic sensitive and non-traffic sensitive), exchange equipment, and inter-exchange apparatus.

Long lines cost associated with switches, circuit equipment and transmission lines

The actual method of apportionment of cost varies from category to category. Even subscribers were divided by various methods, such as minutes of use, weighted relative use, or traffic units. Although these methods appear to be technical measure, however the choice of a particular measure amounts to choosing a particular policy

324. Bundling of local and DLD services can lead to anti competitive behaviour by the entities with access to bottleneck facilities. An LEC may have the incentive and ability to decrease competition in local and DLD markets through various actions, a few of which are listed below.

- Cross subsidisation of long distance service from local service revenues

325. Multi product firms with market power in one product market are able to cross subsidise other lines of business. A cross subsidisation in effectively competitive markets may not be so much of a problem as in near monopoly or monopoly markets. This is possible since the LECs with control over access network may try to cross subsidise the DLD market from local revenues. However, local services always tend to be regulated while DLD markets are less regulated. In such a case, the LECs would indulge in predatory pricing, while recovering deficit in local exchange through access deficits.

- Imposition of vertical price squeeze

326. An entity with control over bottleneck facilities, which also sells complementary services (on its own or through affiliates) can impose a vertical price squeeze on the competitor in the complementary product market. Since the LECs control the price of the input of the DLDO (in this case the local access), it can price local access to the other DLDOs significantly above costs, thus squeezing competitors' margins.

- Non price discrimination

327. The LECs can discriminate in the quality of interconnection they provide to their rivals and thus foreclose

their markets.

- Discounts on bundled services

328. LECs may offer discounts on bundled services, which may prevent a customer from migrating to a new service provider. The direct effect is a reduction of competition from providers who sell only one component of the bundle.

5.6.1. Policy Implications

329. In view of the possibilities of anti-competitive behaviour arising out of availability of bundled services, the regulators lay down safeguards for monitoring such behaviour. Usual practices include mandatory separation of accounts or requirement of separate subsidiaries for different service segments.

330. At circle level both the FSPs and CMSPs are allowed to provide bundled local and DLD services to their customers. Introduction of competition in DLD through stand alone DLDOs, would require certain regulatory safeguards such as mandating offer of unbundled services by the operators and requirement of separation of accounts pertaining to complementary segments viz. local and DLD. What should be the regulatory mechanism to prevent anti competitive behaviour through bundling?

5.7 Universal Service Obligation

331. Universal service concept encompasses the objective of providing a connection to every household at affordable prices. Universal access in contrast implies that every citizen of the country should be within reasonable distance of a telephone. In developing countries, given the economic, demographic and geographic exigencies, provision of universal access is more achievable and a more realisable goal.

332. In the past, USO has been funded through cross subsidisation of local access services from the revenues of LD services. With introduction of competition and cost based pricing of LD services, this is no longer possible. Therefore alternative means of funding USO have been identified and implemented. These include access deficit charges for interconnection, funding from government budgets and USO levy.

5.7.1 Policy Implications

333. NTP'99 proposes that a USO fund be established, with all the operators contributing to the fund in proportion to their revenues. Implementation of USO for rural/remote areas will be undertaken by all the FSPs who in turn shall be reimbursed from the fund. The DLDOs too would be required to contribute to the USO fund based on their turnover. The modalities and approximate costs related to USO should be taken into account by the operators while assessing project viability

334. What should be the contribution of the DLD operator to the USO fund?

5.8 Customer Billing

335. Since the stand-alone DLDO is not an AP, the issue of billing may arise. The DLDO may bill the customer directly or arrange for a single bill to be raised through the customer' AP. In the US, detailed surveys have shown that a customer prefers one bill for all services, therefore the preferred mode of billing is mostly through the local exchange carrier. In certain cases the DLDO may prefer to bill customers such as high volume business customers. This decision is based purely on cost benefits analysis.

336. The billing arrangements are commercial arrangements between two operators. However, this issue may require regulatory intervention to prevent anti competitive behaviour wherein an AP may refuse to offer the DLDO these services on reasonable terms. The customer billing services carry major cost implications, which is another reason why terms of such services are regulated in the initial phases of competition.

337. Therefore should the regulator mandate that the AP provide customer-billing service to the DLD operator

at reasonable terms? Should the regulator specify the reference terms and conditions including cost based charges for this service?

5.9 Interconnectivity with VSNL

338. The NTP '99 provides direct connectivity with VSNL for both FSP and CMSP. An international call can be considered to comprise of domestic leg (DLD call to VSNL gateway) and foreign leg (from VSNL gateway onwards). With the introduction of competition in DLD the domestic leg will be open to competition necessitating that the DLDO to be allowed to connect directly with VSNL.

339. At present international services are the monopoly of VSNL, with the APs billing customers and sharing the revenues with DoT as per TRAI TO and ICR. DoT in turn has the settlement arrangements with VSNL. In such a scenario, the DLDO may provide either of the following services:

- It could serve as a domestic carrier or conveyor of calls between the FSP/CMSP and VSNL gateways
- It could serve as the domestic carrier for international calls for its customers, bill them for international calling and settle with DoT as per the TRAI ICR and TO.

340. In the first case the modalities for call charges and settlement issues will be settled by the APs and DLDO through mutual negotiations and in the second case as per TRAI regulations in that respect. However in either case the FSP, CMSP or the DLDO can offer discounts on ISD peak tariffs within the existing ICR as the domestic leg revenue will accrue to them.

341. What should the DLDOs' status be vis-à-vis international calling services? Should DLDOs be allowed to provide this service to customers? In case DLDO is only a carrier then what should be the revenue sharing arrangements between FSP/CMSP and DLDO? Should it be in accordance with the ICR or subject to commercial negotiation?

5.10 Business Services Networks

342. Increasingly PTOs are specialising in catering to business users who are incidentally also the largest contributors to national telecom revenues. For instance Concert, a JV of BT and MCI specialises in providing call centre facilities to multinational organisations. Energis, of UK too started out by targeting business users and provides a range of services to them.

343. The PTOs are also setting up national and trans-national corporate networks such as travel networks, banking networks and stock exchanges. These networks facilitate transactions among and with members of these groups and public.

5.10.1 Policy Implications

344. As per the TRAI TO, 2.7 percent of subscribers account for 46 percent of call revenues. Most of the business users are major users and fall into this category. To meet their communication needs they are also the first ones to opt for private networks and facilities.

345. Usage of leased circuits by business users may result in bypass of major revenue streams, and also loss of contribution to USO and access deficits. Therefore a mechanism may need to be introduced to allow for obtaining contributions to such funds.

346. should such networks be permitted in view of bypass of USO and access deficit?

6. Selection criteria and Licensing

6.1 Selection Criteria

347. The selection criteria include attributes which an entity aspiring to enter the DLD segment must possess. Eligibility criteria will need to be fulfilled by the entities, irrespective of the sector strategy. In addition, specific criteria may be laid down in conformance with the objectives of a particular policy option.

348. The points of reference for the selection criteria include:

- Transparency
- Non discrimination
- Ensuring only serious entities enter
- Simplicity and ease in implementation
- Least cost

349. Only the eligible entities will be considered for selection as DLDO. Therefore, the selection process will involve delineation of eligibility criteria, selection parameters and evaluation criteria. The eligible entities will submit proposals based on the listed selection parameters. The Licensing Authority will then select DLD on the basis of the evaluation criteria.

350. The selection parameters and evaluation process will be determined by the market structure option. Introduction of unrestricted competition will require a simple selection process, aimed at eliminating undesirable entities, while not undertaking a relative evaluation of different proposals. NTP'99 envisages permitting interconnection at borders. This will provide an opportunity to existing service providers to become DLDO by interconnecting at borders. Should the criteria favouring existing service providers be preferential?

6.1.1 Eligibility Criteria

351. The eligibility criteria set the basic standards which need to be fulfilled by all the entities under any of the market structure options discussed earlier. These are pre-qualifying or threshold conditions for operating in the DLD segment.

352. An applicant will have to be an entity registered in India (Public, private, unlimited co., partnership, proprietary, listed, or unlisted.).

353. The shareholding pattern will be in accordance with the FIPB guidelines for telecommunications sector regarding foreign equity participation.

354. Total net worth of the entity will be the sum of net worth of both, the Indian and the foreign companies, holding equity in the company. The promoter should have a stake of at least 26 percent in the entity.

355. For eligibility, the areas of operation of an applicant will determine net worth criterion. In case a company proposes to be a national level PTO, a minimum of Rs. 100 crore net worth may be required. A regional level PTO should have a net worth of Rs. 50 crore and a circle level PTO of Rs. 25 crore to qualify.

356. What should be the eligibility criteria?

6.1.2 Selection parameters

A. Ownership Parameters

357. The ownership parameters will comprise details of promoters, major shareholders, and directors of the applicant company, such as their names, shareholding and nationalities. This should also include details of the persons who have an interest in the company due to cross holdings²⁴.

B. Sector Experience

358. The applicant Company should provide details of its experience in the sector, whether in the country or overseas. This includes experience of all the member companies in case of a consortium. In case of a consortium, the experience of each member may be weighted by its percentage of financial interest in the entity. The applicant may submit details of projects already accomplished or underway in India and abroad to support its application.

359. The sector experience would include experience as PTOs in basic and cellular services. An entity with sector experience of over a year may be accorded 15 percent weightage. A further weightage of 10 percent may be accorded for experience in DLD segment.

C. Performance Record

360. In case the applicant, including any member of the consortium, has sector experience, information regarding failure in fulfilling obligations with the Licensing Authority or sector regulator should be required. Cases of defaults and penalties imposed in any of those capacities should also be explained.

361. An entity that has defaulted on any obligation in the past may be accorded a negative marking of five percent.

D. Transmission Facilities

362. The extent of network planned in the DLD sector should also be one of the evaluation parameters. An entity planning to deploy an extensive network should be accorded preference. Therefore, transmission facilities to be laid down in Rkms in the next three years should also be considered since these reflect the extent of network coverage. However, only limited preference should be accorded to this criterion. Primary entities, such as Railways and PGCIL, should be encouraged to invest in this area, since with their RoWs they can do it at the earliest and in the most cost-effective way. A weightage of 35 percent, therefore, may be accorded to the extent of transmission facilities planned.

E. Points of Presence

363. The applicant company's project plan should be evaluated on the proposed number of PoPs in the next three years. This implies that in the case of limited competition, the applicant proposing the highest number of PoPs will get the most weightage. The weightage for the number of PoPs may be 30 percent.

364. The diversity in coverage should also be evaluated in terms of the geographic area covered. At regional level, this would mean the applicant covering a larger number of circles should get a higher weightage than the applicant covering a few circles should. The weightage for the number of circles may be 10 percent.

365. At national level, wider coverage would imply that a company proposing to cover higher number of circles as well as higher number of regions should be accorded higher weightage than the one concentrating in a smaller area. In this case, weightage of five percent each may be accorded for both the number of circles and regions covered. Hence the total weightage for PoP may be 40 percent

F. Indigenous Component

366. One of the objectives of NTP '94 reinstated by NTP '99 is to promote development of domestic telecom equipment industry. NTP '99 also aims at encouraging investment in this segment by giving incentives to the service providers for utilising indigenous equipment. The DLD proposals may also be evaluated by according higher weightage to the applicants offering to use indigenous equipment. A weightage of five percent may be appropriate in this regard.

G. Proposed Tariffs

367. In a limited competition scenario, it is desirable to include tariffs as evaluation criteria since tariff is an

important parameter from the customer perspective. The applicants may be required to present a proposed tariff structure for the next three to five years. The proposal with the least tariffs will be accorded maximum weightage.

368. However, in case tariffs are decided to be included in the evaluation criteria, the following approaches may be applied:

- Proposed tariffs could be compared on the basis of simple average of peak tariffs proposed by the applicant for each distance slab (as specified by TRAI TO)
- Alternately, tariffs pertaining to the distance slab that accounts for the maximum traffic flow may be compared.

369. There are certain limitations in incorporating tariffs in the selection criteria. Tariffs are regulated with peak tariff mandated by TRAI, which will be notified from time to time. At any point of time the regulator may revise the tariffs. In such a scenario it would be difficult for any bidder to commit a particular tariff for a longer duration.

370. The technical proposals may be evaluated on the basis of the weightage described in Table 6-1.

Table 6-1: Suggested Evaluation Criteria Weightages

S. No.	Criteria	Limited Competition	Unrestricted Competition
		Weightage (%)	Weightage (%)
A.	Ownership Parameters	Accept/Reject	Accept/Reject
B.	Sector Experience	25	Accept/Reject
C.	Performance record	-5	Accept/Reject
D.	Transmission facilities	35	NA
E.	PoP (Nos.)	40	NA
F.	Indigenous Component (%age)	5	NA

371. In case of limited competition, only a few selected entities will require relative evaluation of their proposals. The evaluation can be done on the basis of the parameters and weightage plan described in Table 6-1. For criteria A, B and C, the evaluation is in absolute terms and does not require ranking. The criteria D, E and F may require relative evaluation for ranking the proposals. For this, a ranking formula may be applied, whereby the applicant proposing the maximum in a category would get the highest weightage. All the other applicants will be accorded a weightage by benchmarking their commitments to the maximum in a category. The ranking formula is suggested below:

The units proposed by the applicant = X

The maximum units proposed by any applicant = Y

Weightage of that category = W

Weightage accorded to an applicant = $(X / Y) * W$

372. What should the selection criterion be? What should be the weightages accorded to each technical parameter?

6.1.3 Evaluation Criteria

373. In case limited competition is to be introduced either through duopoly or multipoly, a detailed evaluation process will be required for awarding the fixed number of licenses. Both the technical and financial proposals can be evaluated. The technical proposal could be evaluated on criteria provided in the following paragraphs.

374. In India as well as overseas, bidding has been the most popular mode of awarding licenses in case of a limited competition scenario. However, the experience of according too high a weightage to license/entry fees has been unpleasant. In view of this, there are three alternative approaches which may be followed:

- Technical evaluation with fixed entry fees: Only technical proposals should be requested for and evaluated with licenses awarded to the best technical proposals with payment of entry fees (discussed later in this chapter)
- Weighted Technical and Financial evaluation: Technical proposals can be evaluated first, and the financial proposals of only the selected technical proposals are opened for evaluation. The financial proposals may be further weighted and the licenses awarded to the entities with the highest overall scores. In such a case, the entities would pay the amounts committed in the financial proposals as entry fees. For instance, technical proposal may be accorded an overall weightage of 80 percent and financial proposal 20 percent. The relative weightages to be accorded need to be discussed.
- Technical Evaluation with financial bidding: This will be a two step process where technical proposals are evaluated first and a shortlist of interested entities is prepared. The shortlisted entities will submit a financial bid. In case only one applicant is to be selected, the highest bidder gets the licence. If the highest bidder fails to pay the bid amount then the second highest bidder may be given the licence at its bid amount. In case of a tie at the highest bid level then the applicant scoring higher in the technical bid should be considered for licensing. In this scenario there is no relative weightage required for technical and financial proposals, however the basis for technical evaluation needs to be decided.

375. What should be the evaluation criteria? In case weightages are to be given to the technical and financial proposals, what should be the appropriate weightages?

6.2 Fees

376. The fees will comprise a one-time entry fee and the license fees based on revenue sharing principle.

6.2.1 Entry fees

377. The level and modality of entry fees are determined by the policy objectives and competition strategy. In case of limited competition, entry fee is the key evaluation criterion, due to the bidding approach. In such cases, licenses are awarded to the highest bidders, whose bid is considered as the entry fees. In contrast, in the competitive scenario, where licenses are available on demand, entry fees are nominal pre-fixed amounts, to be paid by all licensees. At times, under restricted competition, entry fee is also used as entry barrier, wherein it is fixed at a level so high that only serious entities enter the sector.

378. In the past, governments have considered grant of licenses, as conferring of an asset which requires to be compensated through a payment of fees. Telecom licenses, too, have been used towards contributing to the exchequer. In principle, any subsidies or contributions from a sector should be appropriated through taxes instead of less efficient means, such as license and entry fees. The latter tends to distort pricing structure in the sector, since service providers add these costs to their inputs.

379. It is more significant in the Indian context where teledensity is among the lowest in the world, and there is a need for greater investments. Both NTP '94 and NTP '99 envisage provision of services at affordable prices. To that extent, any fees charged should be towards contributions to modalities, such as the USO fund.

6.2.2 International Trends

380. In countries with competitive markets, entry fees are linked to the cost of examining and processing license applications, including the costs of notifications and advertisements, if any. The amount of entry fees charged in some countries is presented in Table 6-2.

Table 6-2: Entry fees in a few countries

Country	Entry Fees
USA	None
Australia	Au \$ 10,000 ²⁵
Brazil	Bidding
Malaysia	RM 500,000 for nation wide and RM 3,00,000 for international operations ²⁶
France	264,610 ECU (for infrastructure) and ECU 113,400 (for services) at national level
Spain	Bidding (licensing was started in December 1998 only)
Sri Lanka	One percent of investment

381. Generally, entry fees are not fixed at high levels in free markets. In Australia, the application fee is only Au \$ 10,000, while the DLD market size is in the range of Au \$ 3 billion. The EU directive on licensing requires that "...any fees imposed on the undertakings as part of authorisation procedures seek to cover only the administrative costs incurred in the issue, management, control and enforcement of the applicable licenses". In France, the administrative fees for infrastructure licenses are double those required for services licenses.

382. Among the sub continent countries, Sri Lanka requires that the applicant deposits one percent of committed investments as fees. Every time the operators expand their networks, one percent of additional investment planned has to be deposited with the government.

6.2.3 Policy Implications

383. In India, high license fees are responsible to a large extent, for rendering telecom projects unbankable and for the slow take-off of sector liberalisation. Four years of liberalisation in basic services has not resulted in introduction of competition in the sector.

384. The alternate methods for estimating entry fees are:

- The entry fee linked to expected revenues from the licensees area of operation can be estimated based on the number of DELs in each circle and average revenue per DEL. The entry fees may be charged at a reasonable percentage of the circle level revenues in case circle level licensing is undertaken. For regional licensing, entry fees may be charged as the sum of the circle level fees of the circles within a region. National and inter regional fees may be charged at 60 to 70 percent of the sum of all circle level fees in the country. The percentage of fees may be varied, depending upon the competition policy and whether entry fees is intended to be used as an entry barrier. Indicative fees are presented in Annex 26 as per the estimation of DLD market size for FY 1998-99 for each circle. However, these fees being at a relatively high level may be considered only in case of limited/restricted competition scenario.
- Entry fees may be linked to the market potential and perceived viability. However, due to rapid advances in technology and structural changes in the market, there is greater uncertainty in estimating market potential. This is based on the principle of what the market can bear. If the entry fee is fixed at a lower level, it will lead to rent seeking by the new entrant. The bidding approach provides an estimate of the amounts an applicant is willing to pay for acquiring an asset
- Entry fees may be fixed just high enough to encourage only serious entities only enter the sector

385. What should be the modality for estimating entry fees in case of full, restricted and limited competition?

6.2.4 License Fees

386. Regulatory expenses are recovered through annual fee contributions from operators on the basis of their revenues. The principles of proportionality are applied whereby higher license fees are sought from entities entailing higher regulation, viz. dominant entities, mostly based on revenues. The license fees in case of facility based services may be higher since the regulatory issues pertaining to interconnection and network structure will be larger. Fees for mere service provision may be lower depending on the degree of competition. In many countries, the resellers or mere service providers do not require licensing, and hence pay no license fees.

387. US regulators do not require any licensing for long distance telephony segment except for allocation of spectrum. However, operators are required to pay specified fees for filing tariffs, or applying for extension of networks . In addition, the FCC may levy additional fees every year to cover the cost of regulation for a particular year, which is not covered by the budgetary allocations. Some of the charges to be paid by operators in the US are illustrated in Table 6-3.

Table 6-3: US Regulatory Fees

Category	Fees (in US \$)
Common Carrier tariff filing	490.00
Regulatory fees (per '000 pre-subscribed access lines)	60.00
Annual contribution to regulatory expenses	Percentage of revenue, varying from year to year
Annual contribution to USO	Percentage of revenue, varying from year to year (app. 0.04 % in '97)

388. In Australia, only carriers require licenses, for which the government has fixed the maximum licensing entry fee at AU \$ 1,00,000, whereas the regulators have finally fixed the fees payable at AU \$ 10,000. The annual fees payable are linked to regulatory costs and were estimated at 0.06 percent of revenues in 1997.

389. In France, the annual fees have been fixed separately for infrastructure providers and service providers, with the latter being lower than the former. The fees are also classified on the basis of geographic areas covered by licenses, with higher fees for national licenses.

390. Though there is no announced limit on the number of licences in Malaysia, six licenses were issued between 1995 and 1997. The annual fees for licenses appear to have been based on areas of operations and services provided. Since the erstwhile incumbent had pervasive wireline access networks, lending it a consumer base, fees have been fixed at a higher level, whereas for others fees have been fixed at comparatively lower rates. The annual renewal fees to be paid by some of the licensees in Malaysia are presented in Table 6-4.

Table 6-4: License Fees in Malaysia

Licensee	Services	Amount
Telekom Malaysia	Nationwide	0.5 % of annual gross turnover
Bina Sat-Com	Nationwide	RM 5,00,000 or 0.08% of annual gross turnover
Celcom0 Transmission	Nationwide	RM 50,000 or 0.08% of annual gross turnover
Mutiara Telecom	Nationwide	RM 50,000 or 0.08% of annual gross turnover
Measat Global	International	RM 30,000 or 0.08% of annual gross turnover
Time Telekom	International	RM 30,000 or 0.08% of annual gross turnover

6.2.5 Policy Implications

391. For levying fees or requiring contributions based on revenue which is also generally known as revenue sharing arrangement, operators are required to report their revenues. In the US for the purpose of USO levy, carriers are instructed to report the amounts actually billed to customers. This means that carriers should report revenue net of discounts, but without making any adjustments to reflect uncollectible revenue. In certain cases only end-user revenues are considered while in other cases even the revenues earned from other service providers through resale are included.

392. NTP'99 proposes revenue share for license fee. It does not provide further guidance on what percentage of revenues it should be. What should be the purpose of licence fees? How should it be estimated? Should it be related to perceived profitability or for recovering regulatory expenses?

393. If the purpose of the license fee is to recover regulatory expenses then an approach to calculate may be the annual expenditure envisaged by the regulator as its expenses, including the expenditure on research and studies for sector development. This expenditure may be recovered from the operators in proportion to their revenues. At the end of the year, actual expenses may be adjusted against the collections and the shortfalls recovered while credits may be carried forward. The modality for estimating these expenses remains an issue as there are no past indicators to this.

394. What percentage of its revenue should an operator contribute?

6.3 Network Obligations

395. Network obligations are often imposed in case of limited competition, where these are linked to the objectives of the overall policy. For instance, in Brazil, a mandatory roll out and achievement of PoPs within the duopoly time frame accompany duopoly. The network obligations could also be linked to universal service goals, where a certain level of expansion is a condition for the license. Although these obligations are described as the conditions of the license in post licensing period, they often act as entry barriers. The new entrants view these obligations in the light of the investment commitments entailed by them, and therefore, link it to the cost of the project. Moreover, such obligations are generally accompanied by penalty clauses in case of non-fulfilment.

396. However, there may be no rationale behind imposing network obligations in a fully competitive scenario. Although obligations are used by Licensing Authorities world over as a tool for implementation of sector policy, their enforcement remains a problem.

397. In case of DLD policy imposition of network obligations could be mooted in one of the following scenarios:

- Under limited competition, where pre-determined number of licenses are issued, so as to ensure network roll-out
- In restricted competition scenario, where entry barriers are imposed to restrict entry.

398. A PoP requirement can be enforced in terms of population, or in accordance with DoT facilities. As per the 1991 census, there are 466 districts and 3,000 towns in the country. Of these, 23 towns account for an urban population of more than 10 lakhs, 31 towns for an urban population of 5-10 lakhs, and 246 for an urban population of 1-5 lakhs. One approach could be to make it obligatory for the DLDO to provide connectivity in all towns with an urban population of more than a specified number within a given time frame. This may be implemented gradually, with a requirement to cover at least 10 percent, 30 percent and 50 percent in the first, second and third years, respectively.

399. However, for facilitating interconnectivity it is desirable that the competing operators' network corresponds with that of DoT's. Therefore, alternatively DLDO may be required to install PoPs in terms of DoT SSAs.

400. Should network obligation be imposed on a DLDO? What should be the basis? What should be the target and time-frame?

6.4 License Period

401. Globally, license period for a facility-based basic service provider is in the range of 15 to 30 years. There is no inherent benefit in making a distinction between the licence period of the local and long distance operator, or a facility or non-facility based operator.

402. In Australia, the licenses issued during duopoly are for a period of 25 years. Post 1997, after introduction of competition, there is no fixed period of licenses.

403. The licensing period in some other countries is presented in Table 6-5.

Table 6-5: License Periods in a Few Countries

Country	Period
USA	No licenses
Australia	No fixed period
Spain	30 years
France	15 years
Malaysia	20 years
Brazil	20 years

404. In India, FSP licenses have been issued for 15 years and CMSP licenses with 10 years duration. NTP '99 has proposed a license period of 20 years (extendable by 10 years) for FSP, CMSP, RPSP, PMRTSP and VSAT service provider. The NTP has not proposed licence period for DLDO.

405. Based on international trends and the policy framework, the licence period for a DLDO may be 15-20 years. The appropriate license period needs to be discussed. The license should clearly specify the period of exclusivity or protection, if any, given to the licensee. In view of the earlier discussions in a limited competition scenario, for a transition phase of five years, the exclusivity will be limited to five years.

406. What should be the license period for a DLDO?

6.5 License Terms

407. License terms and conditions will vary with the policy approach adopted. Varying degrees of competition may also affect some of the terms, which may not be required or may be different.

408. International trends too support the linkages between the sector policies and the licensing terms. For instance, in the US at the federal level there is no licensing of carriers. It is understood that in Australia, a simple four-page application form needs to be filled up.

409. In India, license agreements are available for basic, cellular and other value added services. The agreements for telecom services are more extensive than for ISP, which also reflects the underlying policies. The basic and cellular services have followed a limited competition policy while the Internet segment is fully competitive.

410. This section discusses some general terms and conditions to be considered for license agreement.

6.5.1 Scope of Service

411. NTP '99 specifies that both the CMSPs and FSPs may provide both voice and non voice messages as well as data services. Similarly DLDO too may be required to provide all DLD services including voice and non-voice messages and data services. The terms will define the scope of DLD service which may include the following:

- DLD services to end users/subscribers
- Carriage services to other carriers including FSPs, CMSPs and other DLDOs as well as VSNL
- Leasing capacities, circuits, bandwidth

412. The terms will also specify that the operator will provide all the above services and not foreclose any of the above.

413. One element of service that depends on the outcome of consultations and ensuing policy decisions is regarding PCOs. In case a DLDO is allowed to operate PCOs, this will need to be included in its scope of services.

414. The DLDO will also be required to provide STD Area/Cities Code services. Such services will be available free of charge and will provide listing of STD codes for different areas/cities in the country. The DLDO may arrange to provide this service on its own or enter into an agreement with another operator to provide the same. In either event the responsibilities and obligations in this respect will rest upon the DLDO.

415. The DLDO may also be required to arrange for provision of operator assisted calling facilities at all its PoPs. In case it does not provide them directly, it may enter into an agreement with another operator to provide the same. In either case the obligations and defaults thereof will be the responsibility of the DLDO.

6.5.2 Area of operation

416. The license agreement will clearly define the area of operation in consonance with the policy option adopted. The DLDO's operations will be restricted to its service area.

6.5.3 Duration

417. The license will be for a specific duration and the same will be specified in the license, along with the modalities and conditions for extension. The duration will be determined as per discussion in Section 6.4. The extension period for the license will be linked to the policy option adopted and the estimated time after which the licensing terms may need to be reviewed.

6.5.4 Exclusivity

418. The period of exclusivity of license will be the sunset date for a limited competition scenario. In case a limited competition scenario is adopted, the period for which the DLDO will face limited competition will be specified. The terms will also include the type of exclusivity vis-à-vis facilities or services. For instance, the licensee may have exclusivity of operating and managing facilities, with no restriction on introduction of service resellers.

419. The period of exclusivity may be decided as discussed in Section 4.6 on Time Frame.

6.5.5 Tariffs

420. The licensee will establish the tariffs for services as per the TRAI regulations issued in this regard from time to time. The licensee shall also fulfil requirements regarding publication of tariffs, notifications and provision of information as directed by TRAI through its regulations issued from time to time.

6.5.6 Customer Service

421. The terms will also specifically include a provision regarding non-discriminatory offer of services by DLDO.

422. The licensee shall be required to publish its standard tariffs and terms and conditions for consumers with regard to the services provided by it. It shall ensure that tariffs for end-users, any minimum contractual period and conditions for renewal/termination of contract are clearly presented along with a description of respective telecom services. Publication of such information shall be in accordance with the TRAI directives in this respect.

423. The terms and conditions will also specify the compensation or refund arrangements or both for the subscribers, in case the contracted services are not supplied. In case no such arrangements are available, it is required that a statement to that effect is included in the offer of services.

424. In case of PCO services, it is required that terms and conditions for using the services are clearly displayed.

A. Customer Billing

425. The DLDO will have an option to either offer billing services itself or arrange for another operator to provide such services to its customer. The license terms will specify that in both these cases the DLDO will be responsible to customers and shall ensure fulfilment of all obligations in this regard. Any violations of any directives and regulations or terms in this respect will result in penalties for DLDO only.

426. In this section, the usage of the word 'Customer' will denote end-users or subscribers and not other operators. The licensee will be required to follow a billing process as per TRAI directives/regulations in this respect. The licensee will maintain records necessary for the billing process and as specified by TRAI.

427. This term will also include the need for itemised billing without extra charges. The basic level of itemised billing format will be as specified by TRAI. The itemised bill shall provide sufficient details to allow verification and control of the charges incurred by the customer. However, in case a customer requires additional details, the same may be supplied at extra charges.

428. In case the licensee avails of billing services from other operators such as the APs, then it will be obliged to ensure that all the terms in this respect are complied with by that AP.

429. All complaints of customers in this regard will be addressed/handled as per TRAI regulations/directives issued by TRAI from time to time.

B. Non payment of bills

430. The terms of license shall also include a reference to the system to be followed in case a subscriber defaults in payment of bills. The licensee will give due warning to the subscriber before discontinuing service. The procedure followed in this respect will be as specified by TRAI from time to time.

431. Information in this regard will be published by the licensee from time to time as well as made available to customers at the time of contracting and later, on demand.

6.5.7 Confidentiality of customer information

432. The licensee shall take all reasonable steps to safeguard the privacy and confidentiality of any information about a third party and its business to whom it provides services and from whom it has acquired such information by virtue of those services.

433. The terms will also require the licensee to ensure protection of privacy of communication of its subscribers. This will include prevention of unauthorised interception of messages.

6.5.8 Interconnection

434. The licensee will be required to enter into interconnection agreements with other operators as per TRAI directives/regulations in this regard. The interconnection charges shall be in accordance with TRAI regulations in this regard.

435. The terms and conditions of interconnection including standard interfaces, points of interconnection and technical aspects will be as per directives of TRAI and Telecom Authority, issued by them from time to time.

6.5.9 Network Standards

436. This term in the license is required to ensure that the DLD operator adheres to the network technical standards. In this respect the DLDO will have to adhere to the standards specified by the designated National Authority. The DLDO will also adhere to the National Fundamental Plans.

437. In case of new technologies where no standards have as yet been determined by TEC, the DLDO will seek the approval of TEC before deploying them. In such cases it will adopt the standards specified by ITU. However, such technologies should have been tested for use internationally for at least one year.

6.5.10. Quality of services

438. The quality of services (QoS) aspect will be governed by directives and regulations issued by the TRAI from time to time. The terms of license shall require the licensee to adhere to such directives and provide timely information as required therein. Defaults in compliance in this respect will also be penalised as specified by the TRAI QoS regulations.

6.5.11 Accounting separation

439. As discussed earlier, in Section 5.5 on Bundling, a DLD operator may own or manage telecom facilities for providing services in other segments of telecom or other convergent media services (cable networks). In such a case, the DLDO will have certain control over bottleneck facilities, which could result in foreclosure of DLD market by it, or anti-competitive behaviour.

440. To counter this, the license may require the DLDO to keep, draw and publish independent accounts for each segment of services, to the extent required, if such services were provided by separate/independent companies. This would facilitate recognition of each element of cost and revenue, with the basis of their calculation and itemised breakdown of fixed assets.

441. This term in the license is important to discourage anti-competitive actions as well as to provide a level playing field. Especially in the case of vertically integrated operators, such a condition will ensure that they do not indulge in cross-subsidisation between regulated and competitive services/segments.

442. The operators will also be required to submit regularly specified reports to the TRAI in this respect, as directed by TRAI from time to time.

6.5.12 Performance obligations

443. If the policy options include imposition of performance obligations, the same will need to be included in the terms of license. The performance obligations could be in terms of network rollout including time period and extent. The latter will be defined in terms of number of PoP. The obligations could also be linked to service delivery which may again be defined by PoPs.

444. The terms will enumerate performance obligations clearly along with the time frame and milestones.

6.5.13 Payment of charges

445. The terms will also indicate that the licensee will be obliged to pay all charges determined by TRAI from time to time. These charges may include contribution towards regulatory expenses and USO.

6.5.14 License Fees

446. The terms of the license will specifically provide modalities for estimation and payment of license fees. The issues relating to license fees are discussed in Section 6.2.4. The licensee will be required to submit annual reports and any such information to the TRAI/Licensors which may be necessary for determining

license fees.

6.5.15 Notification of changes in shareholdings

447. The terms will require the licensee to notify the Licensor and TRAI in case of a change in the shareholding pattern. This will ensure that the shareholders whose holdings have been considered for experience and other attributes while selecting the DLDO remain associated with the DLDO. For this reason the terms will require approval of the Licensor before changes in shareholding pattern may be undertaken.

6.5.16 Requirement to furnish Information to TRAI

448. The term will specifically require the licensee to submit information to TRAI under its directives/determinations or regulations which may be issued by it from time to time.

6.5.17 Security considerations

449. The Licensor may take over the entire services, equipment and networks of the licensee in part or in whole or revoke/terminate or suspend the license in the event of national emergency or in the interest of national security.

6.5.18 Arbitration

450. The terms will also specify the procedure for arbitration, in case of any difference or dispute arising under the license.

6.5.19 Revocation

451. The conditions under which the license may be revoked will also be specified. These will include violation of any terms of license and default in any obligations.

452. Are the license terms and conditions appropriate?

¹Including Fixed Service Providers and Cellular Service Providers

² The exceptions are Calcutta and Chennai which are city circles. The six states in the north-eastern region are organised to form a single North-East circle. MTNL operates services in Delhi and Mumbai which are in addition to DoT circles.

³ There are 466 districts and 3987 tehsils as per 1991 census

⁴ Including Fixed Service Providers and Cellular Service Providers

⁵ Dark fibres are those fibres where transmission system needs to be installed.

⁶ Busy hour traffic is the peak time traffic during the day and is normally used for capacity planning.

⁷ Unlike in the US, where straight line geographical demarcation was undertaken.

⁸ For instance inter-regional traffic from Bangalore is traffic flowing to the states other than the southern states

under analysis viz. Karnataka, Kerala, AP and TN.

⁹ These include Vijaywada and Vishakhapatnam

¹⁰ These ratios have been arrived at by converting metered calls during peak, off peak 1, off peak 2 and off peak 3 in the ratio 72:9:14:5, based on information from DoT.

¹¹ This is based on 1998 actual demand adjusted by CAGR during the period 1993-98.

¹² This indicates that with an average 75 percent reduction in tariffs elasticity of .35 has been assumed.

¹³ The interconnect charges will be governed by TRAI's Interconnection Charges Regulation (ICR) as applicable. This will depend on various parameters including access charges, call travel charges etc. However for the purpose of this analysis, it has been assumed to be 40 percent of revenue. The sensitivity analysis with interconnect charges at 30% and 50% of revenue shows significant changes.

¹⁴ World Bank Study 'Telecommunications Reforms in Asia' : Peter Smith

¹⁵ OECD Paper : The Benefits of Telecommunications Facilities Competition

¹⁶ TRAI TO has initiated cost based leasing charges

¹⁷ "File-and-operate", is representative of a fully competitive market such as the US, where an operator simply files the tariffs with the regulator and starts operating services.

¹⁸ For licensing private DLD operators the definition of circle should be as per the basic service licenses definition. For instance basic services licensing considered Mumbai as a part of the Maharashtra circle, while as per DoT, Mumbai is a separate circle.

¹⁹ Multipoly envisages multiple operators without cartelisation.

²⁰ Telstra is the erstwhile Australian incumbent

²¹ Competition in Australian Telecommunications: Report by G Sidak.

²² This is primarily to account for non-conversation period/call failure for which no access charges are payable. However AP's are compensated as their network is used during this period.

²³ Prior to 1996 Act, the LECs were not allowed in DLD and the DLDOs were not allowed in local services with the regime prohibiting bundling of local and DLD services. The 1996 Act has allowed them to operate in other segments while not allowing bundled services.

²⁴ This is required to ensure that interests of the citizens of hostile or unfriendly countries are not involved.

²⁵ One Australian Dollar was trading at 0.63 US Dollars on April 7, 1999.

²⁶ One RM was trading at 0.26 US Dollars on April 7, 1999.