

Recommendations of the TRAI on Universal Service Obligations

Table of Contents

	<u>Page Nos.</u>
<u>Section 1 –Background and Context</u>	3

<u>Section 2 – Public Phone and Information Services</u>	8	
Background	8	-
Access to voice telephone service through VPTs	9	
Upgradation of VPTs to provide low speed digital data service	11	-
Estimation of Net Cost incurred in the provision of VPTs	13	-
Approach 1	14	
Approach 2	14	-
Approach 3	14	
Recommended Approach	15	-
Replacement costs	17	
Average unit capital cost for installation/ replacement of VPT	17	-
Capital recovery	19	-
Operating expenses recovery	19	
Average revenue per VPT	20	-
Installation of Public Tele Info Centres(PTICs)	20	
Low speed data service	22	-
Selection of villages for provision of low speed data services	23	
High speed PTICs (HPTICs)	24	-
Funding of PTICs	25	-
<u>Section 3 - Phones to households(DELs) in rural and remote areas</u>	28	-
Net cost of providing telecom service in a SDCA	32	
Methodology for determining payments from USF	32	-
Verification of the NC figures submitted by BSOs with the help of a proxy model for a SDCA	33	-
Quantum of USL	38	-
<u>Section 4 - US Fund Administrator</u>	40	-
Constitution of USF Administration Board	43	
Functions of the Universal Service Fund Administrator	43	-
Fund Administration Expenses	44	
Collection of USL by the Administrator	44	-
<u>Section 5 – Summary of recommendations</u>	46	-
<u>Annexure –A Summary of inputs received in the consultation process</u>	58	-
<u>Annexure-B Proxy Models</u>	86	-
<u>Annexure-C PLAN –ITU</u>	101	-
-		
-		

Section 1

Background and Context

1.1 In the context of low teledensity, most of the developing countries have given a high priority to the provision of public phones particularly in rural and remote areas to

provide accessibility to basic telecom facilities, within a reasonable distance of population centers or cluster of villages. In India, the Government first adopted provision of public phones as a policy objective in the 1970s. It involved provision of Long Distance Public Telephones (LDPT) on the basis of population of a village. The scope of the policy was progressively enlarged to include provision of a Public Telephone within five km of any habitation. Subsequently the public phone policy objective was further enlarged to include the provision of Public Telephone in every Village with a Gram Panchayat, and finally a Village Public Telephone (VPT) in every village. All these public phones were installed by the DOT, and generally involved incurring net costs, i.e., these were installed even if they were unremunerative.

- 1.2 Policy relating to provision of public phones even by incurring net costs, is only a subset of a much wider concept of providing universal service, which aims to provide nation wide telephone connection to both households and public places at an affordable tariff, even when some of these connections, particularly in rural areas, may be un-remunerative and may not be justified on purely commercial considerations. The concept of universal service was first enunciated in USA, about 100 years back by Theodore Vale, President of AT&T and a great visionary, and has been adopted by most of the countries as a policy objective, since then. However, in India, universal service was embodied in a policy document for the first time in 1994, when the government announced its first National Telecom Policy in 1994. This policy is known as NTP '94.
- 1.3 The focus of NTP'94 was to bring telecom facilities within the reach of all citizens of the country, including provision of telecom facilities in every village. The policy document defined Universal Service, as the availability of certain 'basic telecom services at affordable and reasonable prices', to all citizens.
- 1.4 In 1999, the Government announced a New Telecom Policy called NTP'99. This new policy document also lays considerable emphasis on access to basic telecommunication facilities, and availability of these services at affordable rates, thereby providing effective means of communication to all citizens. Specifically, provision of telecom services to all low teledensity areas, including rural areas and remote, hilly and tribal areas is one of the main objectives of universal service obligation, imposed on Telecom Service providers under NTP'99.
- 1.5 In accordance with the broad objectives outlined in pre para, NTP'99 has set the following specific goals in respect of spread of telecommunications in the country:
 - *Provide voice and low speed data services to the balance (i.e. uncovered) villages in the country by the year 2002;*
 - *Provide Internet access to all district head quarters by the year 2000;*
 - *Make available telephone on demand by the year 2002, and sustain it thereafter so as to achieve a teledensity of 7 by the year 2005 and 15 by the year 2010.*
 - *Encourage development of telecom in rural areas, making it more affordable by*

suitable tariff structure and making rural communication mandatory for all fixed service providers;

- *Increase rural teledensity from the current level to 0.4 to 4 by the year 2010 and provide reliable transmission media in all rural areas;*
- *Provide reliable transmission media to all the exchanges by the year 2002;*
- *Provide high-speed data and multimedia capability using technologies including ISDN to all towns with a population greater than 2 lakh by the year 2002.*

While the first two objectives relate to public telecom facilities including access to Internet, the third and fourth objectives relate to provision of individual household telephones in unremunerative rural areas by introducing suitable tariff structure etc. to make it more affordable. This is aimed at increasing rural teledensity from the current level of 0.4 to 4 by the year 2010. This implies low and, if necessary, even below cost rentals and call charges particularly in rural areas, so that phones are made affordable to the masses, and demand for basic services picks up. Thus, public phones such as VPT as well as household phones are covered under the obligation imposed on fixed service providers i.e BSOs under the universal service policy objective.

- 1.6 Taking into account the affordability criteria and the need to subsidise loss making phones, the NTP'99 has also laid down the following guidelines for raising financial resources for the purpose:

"The resources for meeting the USO would be raised through a 'universal access levy', which would be a percentage of the revenue earned by all the operators under various licences. The percentage of revenue share towards universal access levy would be decided by the Government in consultation with TRAI. The implementation of the USO obligation for rural/remote areas would be undertaken by all fixed service providers who shall be reimbursed from the funds from the universal access levy. Other service providers shall also be encouraged to participate in USO provision subject to technical feasibility and shall be reimbursed from the funds from the universal access levy. "

- 1.7 In pursuance of the objectives of NTP'99, DOT vide their letters no. 5-2/99-Regln.-II dated 21.5.99 and 13.10.99 has sought TRAI recommendations on the following:

"a) Class of operators to fund the UAL.

b) Various possible cost models/approaches to determine:

- i) Percentage contribution from revenue of the operators and the mechanism for computing it;*
- ii) Per unit subsidy for VPTs and rural DELs separately to cover capital & recurring expenditure;*
- iii) Whether per unit subsidy will be the same or different in different geographical areas/tribal and non-tribal areas of the country; and*
- iv) Per unit subsidy for low calling urban DELs."*

- 1.8 While making the reference, DOT has brought to the notice of the Authority the following points:
- *NTP-99 stipulates raising of resources to meet the Universal Service Obligation through the Universal Access Levy (UAL). UAL is required for providing VPTs and Rural telephones and should cover both capital expenditure and recurring expenses to run the service. UAL would be a percentage of the revenue earned by the operators under various licenses. The percentage referred to above has to be decided by the Government in consultation with TRAI.*
 - *Voice communication facility has been provided to 3,40,640 villages and the remaining villages are proposed to be covered by the year 2002; Internet access to all all district headquarters (DHQ) has already been achieved through 172 code and efforts are being made to provide nodes at all DHQs progressively by the end of year 2000;*
 - *Making telephone on demand in rural and urban areas of the country is also proposed to be achieved by the year 2002;*
- 1.9 At the outset, the Authority would like to clarify that although the expression used by the DOT is 'Universal Access Levy (UAL)', what is meant is a levy to support both public phones such as VPTs, as well as household phones that may require to be supported. Therefore, it will be more appropriate to use the expression Universal Service Levy (USL) to cover both public or community phones, and household telephones, which are required to be supported by the Universal Service Fund (USF), as clearly brought out in the DOT letter under reference. Globally, universal access i.e., provision of public phones is treated as a subset of universal service. We will, therefore, use the abbreviation USL instead of UAL to avoid a possible confusion.
- 1.10 In accordance with its established practice, the Authority initiated a public consultation process, with the release of a consultation paper on 'Issues pertaining to USO' which was followed by Open House discussions. In arriving at the recommendation contained in the following sections, the Authority has duly considered the inputs provided during the public consultations. A summary of the inputs received is placed at Annexure A.
- 1.11 These recommendations are presented in five Sections. Section one gives the Background and context. Section two deals with the provision of public phone & information services through VPTs and Public Tele info-centres (PTICs) respectively. Section three deals with the broader objective of Universal Service, i.e. provision of affordable individual telephones in rural/remote areas at affordable tariffs even if such tariffs are below cost. It covers inter alia availability of telephone` on demand, in rural and remote areas even though a large number of such phones may not be commercially viable. In section three, we also present various methodologies adopted in some of the developed countries for assessing the net costs of providing the local loop in the Net High Cost Areas, by using proxy cost models. The Authority has recommended development of similar Proxy Cost Models for VPTs as well as for the access loop in the net high cost areas. Some of these

models are presented in Annexure B to this report. Section four deals with the Authority's recommendations in respect of the administration of the fund. Section five gives a summary of Authority's recommendations on the points of reference made by the DOT, and other related issues.

Section 2

Public Phone & Information Services

(a) Background

2.1 Taking note of the extremely low teledensity of only 0.4% in rural and remote areas, the policy makers have rightly given the highest priority to bring affordable telephone facility within reach of the masses. In a developing economy like ours, where a majority of the population, particularly in rural, hilly and tribal areas, may not be able to afford a household personal telephone, the only viable alternative is to provide them access to public telecommunication facilities. To achieve this objective, a target of about 607,491 phones i.e, one in every village has been set by the Government under the Village Public Telephone (VPT) programme. A roll out plan has been drawn up by the DOT to cover all villages in the country by 31st March, 2002. The same is given in Table 1 para 2.3 of this section.

Taking note of the explosive growth of Information Services based on Internet, the NTP'99 has further enlarged the scope of the original VPT programme to include provision of low speed data service in the balance uncovered villages also by 2002. In line with the NTP'99 objectives, the Authority is of the view that the task of providing Access to voice and low speed data services in all villages be given the top most priority, as it would make available both Telecommunications & Information Services, to the poorer section of our population, within a reasonable distance of their habitation. The Authority, therefore, recommends that implementation of USO should be divided in two clearly identifiable streams.

Stream- I Provision of Public Telecommunication & Information Services

Stream- II Provision of Household Telephones in Net High Cost Areas.

While implementation of the two streams would be simultaneous, Stream-I, i.e., stream relating to provision of common access (VPTs and PTICs) should receive priority. In this section, implementation of Stream- I of the Universal Service

programme is discussed. The Authority feels that adequate emphasis must be given to provision of not only public phones such as VPTs, but also to their subsequent upgradation into Public Tele Infoservices Centres (PTICs) to provide Information services in rural areas. Such a policy will go a long way in stimulating economic activity in rural and remote areas, and will help in bridging the existing digital divide between urban and rural areas. At present, such Information Services are confined to prosperous urban population centres, thus adding to the so called Digital Divide or a gap between Information Haves and Have Nots. Therefore, the Authority would like to lay adequate emphasis on installation of as many Public Tele Info Centres (PTICs) as possible, in rural and remote areas in the first phase of the programme itself, commencing 1-4-2002. The Department of Telecom (DOT) may draw up a programme to upgrade as many of the 607,491 VPTs as feasible to PTIC capability as discussed later in this section. The Authority recommends support from USF to the provision of public telecommunication and information services.

(b) Access to voice telephony service through Village Public Telephones (VPTs)

2.3 The NTP'99 has set a target of providing at least one Public Telephone in every village of the country by 2002. The total number of VPTs provided as on 31.7.2001 is 4,10,757 out of a total of 607,491 villages. In order to meet the stipulated targets of NTP'99, DoT has drawn up a VPT Roll-out plan for the period 2001-02 which is indicated below. The plan indicates the number of VPTs to be provided by BSNL and Private operators jointly.

Table 1
VPT Roll out Plan - Targets and Achievements (as on 31-3-2001)

Annual Targets					
	Prior to 98	98 – 99	99 – 00	2000 – 01	2001 - 02
DOT (now BSNL)		45000	45136	85509	143255
Private		16755	23119	27912	55182
Total		61755	68255	113421	198437

Achievement

	Prior to 98	98 – 99	99 – 00	2000 – 01	2001 - 02
DOT (now BSNL)	303582	37058	33965	33848	
Private		Nil	12	457	
Total		37058	33977	34305	
Cumulative Total	303582	340640	374617	408922	

- 2.4 It will be observed from the above Table that against a combined target of 1,13,421 VPTs for both BSNL/ BSOs in 2000 / 2001, installation of only 34,305 was actually achieved, the contribution of Private sector being only 457. To meet the target of 6,07,491 VPTs by the stipulated date i.e., 31-3-2002, about 200,000 VPTs are required to be installed by both BSNL / Private BSOs. The Authority would, therefore, recommend that the Government, in its role as the Licensor of basic Services, direct both BSNL/ private BSOs to give the highest priority to the installation of all the 607,491 VPTs by the target date i.e, 31-3-2002.
- 2.5 The Authority recommends that after achieving the target of one VPT in every village, a second phase of Rural Community Phones (RCPs) programme may be initiated. This should include improvement of the existing VPTs by making them more reliable and serviceable, increasing substantially the number of VPTs with STD facilities and also installing second public phone in villages where population exceeds 2000. There are about 75,000 such villages all over the country. [1]

Beyond the completion of the current programme for providing one VPT in every village by 2002, additional Rural Community Phones (RCPs) will be installed as per annual programmes, which will be finalised at the beginning of each year by the USF Administrator in consultation with the BSOs. Rural Community Phones (RCPs) i.e. the second public phone in villages may be provided in public places such as schools, primary health centres etc. The support from USF for RCPs will be on similar lines as to VPTs.

In parallel, a programme to upgrade VPTs to Public Tele info centres (PTICs) may be undertaken so that every SDCA has at least 10 to 12 PTICs, each one of them providing Tele-info services to a rural population of about 20 - 22,000 residing in contiguous villages. The aim should be to provide most VPTs with PTIC capability in a phased manner, based on techno-economic considerations, by the year 2010.

(c) **Up gradation of VPTs to provide low speed digital data service.**

- 2.6 It should be possible to draw up a phased programme to upgrade nearly 35,000 VPTs to function as Public Telecom and Info Centres by the year 2004. This will mainly involve incurring incremental expenditure to condition the local loop for carriage of data service at low speeds, as envisaged in the NTP' 99. The Authority has taken note of the fact that these speeds are limited by the condition of the line,

distance of the data terminal equipment (DTE) from the PSTN node, noise parameters on the line etc. At present a vast majority of the VPTs are not capable of even 4.8 kbits/s data transmission rate. However considering the induction of the latest WLL technologies such as DECT, higher speeds are feasible. Considering all these factors, a speed upto 28.8 kbits/s on terrestrial line should be considered adequate to enable the PTIC to offer data applications most commonly sought by end users such as e-mail, internet access to world wide web (WWW) and on-line business information, as well as access to sites run by State Governments for e-Governance.

Since data rate capabilities through the PSTN are limited by both the length and grade of the copper line between the exchange and the CPE and also considering the fact that most VPTs are provided on long lines, a data speed of greater than 28.8 Kbits/s will involve considerable expenditure to upgrade the rural telecom infrastructure and may therefore impose considerable burden on the USF. At present majority of the dial up access of Internet is provided by 28.8 Kbps modems even in urban areas. The Authority expects WLL technology to play a dominant part in the country's USO programme. It would, therefore, like to specify the speed of 28.8 kbps for PTICs engineered on terrestrial lines and 9.6 Kbps for PTICs provided on WLL technologies.

- 2.7 The process of upgrading VPTs to PTICs should continue even after 10-12 VPTs in each SDCA have been upgraded as PTICs/HPTICs, as mentioned in paragraph 2.5 above. In fact, after the first set of 35000 PTICs are in place, the programme of upgradation should be accelerated and extended to other villages which with the passage of time will be ready to absorb the tele-info services. The ultimate aim should be to equip all rural areas with this facility by 2010. Although at present the demand for such services in remote and smaller villages is almost non-existent or limited, it must be remembered that as more villages are equipped with these facilities, this itself will generate demand for information services and also act as a catalyst for economic and social growth.

(d) Estimation of Net Cost incurred in the provision of Village Public Telephones:

- 2.8 To make the policy of Universal Service sustainable, there appears to be no

alternative at present but to compensate all BSOs including BSNL, the net cost incurred by them on setting up village public phones. For this purpose, the Net Cost (NC) of providing VPT i.e. relevant cost of the access network upto the VPT, minus total revenue earned, would need to be assessed. To ensure that BSOs do not over estimate the cost figures of providing an optimal VPT connection, the USF Administrator (as detailed in Sections 3 and 4) should quickly develop proxy cost model(s) to assess the most optimal cost of providing VPTs based on their location, technology employed, and distance from the nearest exchange. There are two options available to engineer the 'last mile' upto the VPT, i.e., wireless and wireline. In case of wireline, variables like cost of digging, cost of underground cable, poles, drop wires as well as labour cost will have to be taken into account, for each location within a SDCA. These will vary based on teledensity and other factors such as topology of the SDCA in which the VPT is proposed to be provided by the Operator. Cost of fixed link wireless will depend on the technology employed like Digital MARR, Point to Multipoint system, WLL etc. Majority of the VPTs in remote and rural areas are likely to be engineered based on wireless techniques. These cost figures of network elements will be used by the proxy model as an input to estimate the cost of an optimal VPT connection for a particular location. The concept of proxy model is discussed in greater detail in Section Three.

Approach to costing

A number of costing principles have been used by Regulators in other countries such as forward-looking costs, Fully Allocated Current Costs, Long Range Incremental Cost(LRIC) etc. For the Indian telecom environment, the Authority recommends adoption of Fully Allocated current Costs (FAC) as the basis of cost calculations. In its earlier deliberations also the Authority has used FAC as the basis for its cost calculations.

2.9 Following three approaches can be adopted to compute the reimbursable Net cost of VPTs.

2.9.1 Approach 1 - This takes into account only operational expenditure for computation of NC for VPTs/PTICs. The NC estimated in this approach is the difference between the Annual Operating expenses and total revenue earned from the VPT/PTIC. As for the capital cost, this approach proceeds on the basis that the deficit accruing on account of capital, has been/ shall be met from the significant margins that have been available in the long distance calls and will continue to be available to the BSOs

till full rebalancing of tariff takes place.

2.9.2 Approach 2 - In this approach, capex and opex for public telephones/ PTICs installed prior to the date from which USO Funding is introduced are to be treated differently than for those established after this date. In this approach, only operational expenditure will be taken into account for public phones installed before introduction of USO Funding, while both capital and operational expenditure on Fully Allocated current cost (FAC) basis will be taken into account for VPTs/PTICs installed after introduction of USO Funding. Since PTICs will be installed only by upgrading an existing VPT, only incremental capital cost of upgrading the access loop to provide low speed (28.8 Kbps) data carriage and for data termination equipment (DTE) will have to be reckoned.

2.9.3 Approach 3 – In this approach, for VPTs/PTICs, both capital and operating expenditure are to be taken in account for assessment of NC.

(e) Recommended Approach

2.10 The questions that arise include inter-alia whether capital recovery should be provided on VPTs installed prior to the introduction of USF i.e. 1.4.2002.

2.11 DOT (now BSNL), as a monopoly service provider, has been funding the provision of public phones like VPT as part of its Universal Service Obligation. It has also been subsidising rural telephones and residential telephones for Low Calling Urban Subscribers, from the surpluses earned from the highly cost plus long distance and international call charges. However, consequent upon the opening of both Basic Service & NLD Service for private participation, such a cross subsidy from one segment i.e., Long distance to another i.e., local, is not sustainable for long. The Authority has already initiated a tariff rebalancing exercise which will mean further reduction in Long distance call charges. These charges have already fallen by more than 30% since March, 1999, when the Authority issued its first Telecommunications Tarrif Order (TTO). The long distance call charges are expected to fall further, due to opening up of the NLD market. In view of this, in NTP'99, the policy makers have provided a Funding mechanism for the USO, as loss making public as well as household telephones cannot be funded from the surpluses generated in the long distance market, in a vertically integrated operation, indefinitely. Govt. has already taken steps to break the vertically integrated market into three segments, i.e, Basic,

NLD & ILD. Each of these market segments has to stand on its own profitability in the long run.

- 2.12 The Authority is of the view that for the purpose of support from USF, public phones should be divided in two categories viz., those installed before the proposed introduction of the USF Scheme i.e., 1-4-2002 and those after. These two categories would differ in respect of capital recovery. No Capital recovery will be allowed on VPT/ PTICs installed before 1-4-2002, as it would amount to an over- compensation because the prevailing tariff structure itself provides the relevant subsidies required for funding the loss making VPTs. However, the Authority is of the view that capital recovery should be provided for the VPTs installed after 1-4-2002 i.e., the date of implementation of the third phase of the tariff rebalancing exercise initiated by the Authority vide TTO March 99. . The Authority accordingly recommends that NCs for these two categories of VPTs should be computed as follows:-

Category I :-

VPTs installed before 1-4-2002

$$NC = \text{Annual Operating Expenses} - \text{Annual Revenue}$$

-

Category II :-

VPTs installed after 1-4-2002

$$NC = (\text{Annual Capital Recovery} + \text{Annual Operating Expenses}) - \text{Annual Revenue.}$$

For both these categories, the costs should be calculated on Fully Allocated Current Cost basis.

- 2.13 Existing private basic service licensees in six circles had undertaken to provide a certain number of VPTs in their respective circles as part of the license agreement. These contractual obligations would need to be discharged. For USO support, these VPTs shall be treated in Category I i.e. only operating expense will be compensated from USF in these cases irrespective of the date of their installation.

(f) Replacement Costs

2.14 The Authority, has taken note of the fact that all network elements including a VPT need to be replaced after some time, and that many of the VPTs installed prior to 1-4-2002 would need to be replaced. A large number of VPTs working on MARR systems would also need to be replaced to ensure their reliable operation. It is clarified that for computation of NC, all replacement of VPTs, including replacement of VPTs installed before the proposed cut off date i.e., 1-4-2002 should be treated as new installations. These will fall in category II mentioned in paragraph 2.12 above and will be entitled to reimbursement of both capital and operating expenses from the USF.

2.15 The capital cost items should include the terminal equipment, local loop and the line card in the exchange to which the VPT/PTIC is connected. For an accurate estimate of NC on the basis outlined above the following inputs may be required, from each of the operators, who make a claim for support from the USF.

- i) Number of VPTs/PTICs installed with details of their location, technology employed, distance from exchange etc;
- ii) Rate of capital recovery and operating expenses;
- iii) Average Revenue per VPT/PTIC.
- iv) Average Unit Capital Cost for installation / replacement of VPT/PTIC

(g) Average Unit Capital Cost for installation / replacement of VPT

2.16 The Authority is of the view that cost effective, reliable and maintainable systems of assessing and providing the required support have to be deployed extensively to make a success of the VPT programme. Cost of providing VPTs/PTICs depends upon various geographical, demographic and technological factors. A variety of technologies like digital MARR, landline, satellite, WLL etc could be deployed by an operator for providing a VPT/PTIC at a particular location. It is expected that the service provider will choose the most cost-effective solution for a particular location based on its topology and its distance from his exchange. As a general trend, the cost per line is coming down due to economies of scale, and development of digital products such as digital MARR, WLL etc. On the other hand, villages in distant and remote areas which are still to be covered, are likely to have higher than average deployment costs as distance of a village from the nearest exchange is one of the important factors that affect costs. These are likely to be much more than the average. Necessarily, there is going to be a wide variation in the cost of providing

VPTs in the different parts of the country. For example, in North East, where satellite technology may be optimal the costs could be more than three times compared to UP, where a wireline solution may be optimal, due to the availability of a nearby exchange.

The capital investment required in providing VPTs/PTICs will therefore be required to be estimated for each connection taking into account, inter alia, the variation in cost due to its geographical location, distance from the nearest exchange, technology deployed and topological factors. The cost of setting up a particular VPT/PTIC would need to be provided by the service providers while making a claim for support. This would be cross checked with reference to a Proxy Cost Model to ensure that the claimed costs, are for an optimal solution taking into account the appropriate technology. Proxy cost Model for VPTs/PTICs should be developed on priority by the USF Administrator, preferably by the middle of the next financial year 2002-2003, so that the USO funding scheme could be made operable w.e.f 1.4.2002 as recommended for public phones as well as info subsidi.

(h) Capital recovery

2.17 The rate of capital recovery on a VPT permissible for support under the scheme, would be estimated by taking into account the relevant debt equity ratio, interest on debt, return on equity and depreciation. In its consultation paper, TRAI had estimated the Annual Recurring Expenditure (ARE) including depreciation for the capital investment to range between 22% and 24%. However, the USF Administrator (see Section 4) may review this figure depending upon what is considered from time to time the acceptable level of debt:equity ratio and rates of interest and return on equity that are to be applied in calculating the Annual Recurring Expenses (ARE). If there are any changes in the ARE, the rate of permissible capital recovery will also be modified.

(i) Operating expenses recovery

2.18A Service Provider has to incur certain expenses to run and maintain an existing service. These expenses include cost of O&M staff, tools and plants for maintenance and spares. Normally any estimate of the operating expenses should be based on costs incurred to run the operations efficiently.

2.19 The data available in Annual reports of DOT indicate an average expenditure on operations in the years 1996 – 97 & 1997 –98 at 10.7% of capital investment. BSNL, in a communication dated 22nd January 2001, has also indicated that currently their operating expenses are 10% of capital investment. These figures are indicative and the USF Administrator may review them on the basis of the latest data available in arriving at a reasonable estimate of operating expenses.

(j) Average Revenue per VPT:

2.20 The indicative figures of revenue generated by VPTs have been given in the USO consultation paper prepared by the Authority. It was observed from these figures that although the pattern of revenue generation should be independent of the technology used, the revenue generated from VPTs based on MARR technology has been quite low, presumably because of higher downtime experienced in such VPTs. The reliability and maintainability of the technology deployed is a critical factor affecting the revenue generating potential of a VPT.

2.21 There is also a significant variation in the revenue generated from VPTs with and without STD facility. Based on the data made available by BSNL, the ratio of VPTs having STD facility to non-STD VPTs was about 1:56 upto the end of the financial year 2000-2001. Concerted efforts should be made by the incumbent and other operators through better marketing of innovative applications, and by providing reliable transmission system connecting rural/remote areas with the rest of the network, to improve this ratio substantially. Considering the impact of STD to non-STD ratio of VPTs on annual revenue, the Authority considers that all operators provide STD facilities at all VPTs, and indicate their year-wise targets for conversion of all non-STD VPTs to STD-VPTs to the Licensor i.e DOT. These targets should be achieved within the next three years.

(k) Installation of Public Tele Info Centres (PTICs)

2.22 With the convergence of Information and Telecommunications technologies, a telephone connection can be used not only for voice but also for carriage of low speed data services such as Internet access. Taking note of the information revolution, one of the objectives laid down by NTP'99 is to provide voice and low speed data service to

the balance uncovered villages in the country by the year 2002.

2.23 The issue of accessibility to voice telephony or POTS (Plain Old Telephone Service) in rural areas is being addressed by provision of VPTs. While the need for basic voice service or POTS is obvious, the immediate need for low speed data service at each village in the country may not be so obvious. However, the need to extend data services to villages has undeniably arisen from the variety of computing applications that are now available thanks to the advancement of digital data processing and transmission technologies during the last decade. Various Information services like Commodity Pricing, Land records and Teleservices such as Tele Banking, Tele – Education, Tele Medicine, etc, can be made available in the rural areas by making VPT a means of accessing the Internet to enhance the economic activity of the entire community. One example of such services helping the community in our country, is the Thiruvarur district in Andhra Pradesh, where some of the government transactions are being done electronically. As soon as access to internet is provided by upgrading VPTs to PTICs capability, more SDCAs which correspond to a Tehsil, will be able to emulate the example of Thiruvarur. Other such examples include the setting up of Internet Kiosks in a number of places, by NIC through Sugar Mill Association in Maharashtra, by M.S. Swaminathan center in Pondicherry, by Zee TV in UP (West), by M.P. government in Dhar district and Delhi State Govt. in Delhi and other NGOs in different parts of the country. These endeavours have helped to boost economic activity in remote and rural areas. It is therefore not only desirable but necessary to provide access to internet in the rural areas, by setting up Public Tele Info Centers (PTICs). With this objective in view, as many VPTs as are technically feasible would ultimately be upgraded to PTICs. The Authority feels that this will act as a catalyst to boost economic activity in rural areas adding to the country's capability of generating economic wealth and will fulfil the objectives set out in the NTP'99.

2.24 These VPTs can be upgraded to provide either narrow band (upto 64 Kbps) or on a selective basis to provide wide band access (144 Kbps) to the internet based on ISDN. The latter may be required to transfer high speed data and provide services such as Tele-Medicine, Tele-education, Medical Imaging and other types of multi media services. Spread of these tele and infoservice Centres would help the country substantially in bridging the digital divide.

2.25 Key questions for consideration in this context are:

- i) What should be the speed of data transmission specified for low speed or

- narrow band data services as envisaged in NTP'99?
- ii) Should this low speed data service be provided in all villages or should it be on selective basis by giving priority to the villages where its requirement is more justified on the basis of techno-economic considerations as well as availability of infrastructure facilities like reliable power supply, roads etc.
 - iii) Should we go beyond narrow band services and provide wide band services i.e, data speeds greater than 64Kbit/s in some selected areas?
 - iv) Extent of funding of the PTICs.

These issues are discussed in the following sections.

(i) Low Speed Data Service

- 2.26 The low speed data services as stipulated in NTP' 99 can be provided by dial up lines with modems of 2.4 Kbps to 56 Kbps bandwidth. These modems are connected to the local loop and provide access to the ISP node via the local telephone exchange. During discussions with stakeholders, the majority view was that a minimum dial up speed of 9.6 Kbps for providing Internet, FAX and E- Mail services be specified. These speeds could go up to 56 Kbits/sec in case the latest high speed modems are employed. However the speed at which information is downloaded is mostly limited by the weakest link in the Internet chain. It could be a congested router or a website itself. Therefore, even a 9.6 Kbits modem is able to provide a number of non time sensitive data applications such as E-Mail. For high speed PTICs i.e, where the need for greater than 64Kbits/s speed exists for applications like tele-education and tele-medicine access based on two basic channels i.e. 128 Kbits/s may be justified.
- 2.27 The technology options for providing internet access include Wireline as well as Wireless Radio solutions. In the latter category WLL could be the preferred option. Currently available technologies for WLL such as CDMA, GSM etc employing macrocellular architecture do not provide data speeds higher than 9.6Kbps. However. Some of the wireless technologies such as DECT can give 32 Kbits/s data transmission capability. The Authority is therefore of the view that minimum data transmission speed of 9.6 Kbps and 28.8 Kbits/s for wireless access and wireline access respectively be specified as low speed data services from PTICs. However, the choice of access technology should be left to the operators, who will no doubt employ the most optimal technology, either of the wireline or wireless type, depending upon the topology of the area, and their roll out plans. Support from USF will be based on the assumption that the operator has actually done so. The proxy model for access will be developed based on such an assumption.

(ii) **Selection of villages for provision of low speed data services**

2.28 It may not be feasible to provide data service in every single village in the country considering the slow progress of the VPT programme and the quality of the line, which, at present, is unable to provide even reliable voice transmission. Provisioning of data transmission services in villages may, therefore, have to be phased. It would be a good beginning to have PTICs at places with digital exchanges. The objective should be to install in the first phase approximately 35000 PTICs, or about 10-12 PTICs per SDCA by the end of 2003-04. Assuming a rural population of 75 crore, this translates to an average of one PTIC per 22000 rural persons by the end of 2003-04. It will be important to ensure that all these rural exchanges have reliable transmission media connecting to the core network and the last mile is reconditioned to provide for reliable data transmission upto 28.8 Kbits/s for land lines. Till date more than 99% of VPTs have been provided by the incumbent, and although because of that, in the beginning, most of the PTICs will be provided by the BSNL, the private BSOs should also be asked by the licensor to provide a substantial number of PTICs for which suitable subsidy should be made available.

2.29 The Authority feels that by 2003-04, it should be possible to complete the programme of providing 35,000 PTICs all over the country by upgrading selected VPTs in the first phase of this programme. About 20% of these PTICs will be provided with higher speed data transmission capability and will be known as High Speed Public Info Tele-Centres.(HPTICs). This has been discussed further in the paragraph below. Subsequent phases of upgradation would also be undertaken in the light of the experience gained in the first phase i.e., upto March, 2004, by which time, it is expected that additional demand for these services would have been generated. After 2004, a fresh programme for creation of PTICs/HPTICs can be embarked upon. It has to be our endeavour to provide data transmission facilities within 5 Kms of every village and atleast at all those villages where there are regular post offices.

High Speed PTICs(HPTIC)

2.30 The speed of data access is mainly dependent on type of transmission system and the access node deployed by the operator for provision of PTICs. Since all the villages may not have digital systems in the last mile through ISDN local loops

capable of carrying the data at higher speed i.e. 64 Kbits and higher, provision of 9.6 kbps for wireless and 28.8 Kbits/s for wireline has been envisaged for PTICs in general. This speed limitation is basically imposed by WLL technologies such as CDMA at present. However, since in accordance with broad objectives of NTP' 99, SDCAs Headquarters are likely to have a reliable transmission system through either optical fibre system or digital microwave or UHF and some of the local exchanges will have ISDN capability, it will be technically feasible to provide high speed (128 Kbits/s) PTICs in selected SDCAs. The Authority recommends that at least two HPTICs be set up in each SDCA. With HPTICs in each SDCA, those who want to access this facility for applications like high quality tele-education and tele-medicine etc will be able to do so by subsidize only a reasonable distance.

2.31 With two HPTICs per SDCA, the total number of HPTICs for the whole country works out to approximately 5400. This number is not very large and it may be possible to install an HPTICs in every block Headquarters by 2005 in a phased manner^[2]. The Authority envisages completion of this programme in two phases. In the first phase about 5000 nodal points, where possibilities of the facilities being utilized fully and becoming self-sustaining are higher may be selected. All these centers need not necessarily be at the block Headquarters. This phase of the programme may be completed by 2004 along with the 1st phase of the larger programme of providing PTICs. This will generate demand and further help in marketing this type of services in smaller villages and towns. In the second phase, more HPTICs at other locations in the SDCAs may be installed, based on techno-economic considerations, by 2005.

(iii)Funding of PTICs

2.32 At the time of public consultations opinions were expressed, both in favour and against funding the Customer Premises Equipment (CPE) required at PTICs from the USF. While one view was that an initial support from the USF needs to be provided because most PTICs are likely to become financially viable only after a certain gestation period, there were others who felt equally strongly that the Basic Telecom Services should not be burdened with the cost of CPEs required to provide Applications i.e, PCs, Modems, UPS etc. Those supporting funding of PTICs from USF argued that unless both Capital Expenditure (CAPEX) and Operation Expenditure (OPEX) are supported for a minimum configuration of CPE from the USF, PTICs are not likely to be installed by the service providers and the rural masses could remain deprived of these services for a long time to come, defeating the NTP'99 objective of providing Low Speed Data Transmission

Services to people in the rural areas. There was support for the view that, in order to encourage installation of PTICs in the rural areas, some financial support may be provided from the USF to the Service Providers by way of long term credits on soft terms. There were also some suggestions for providing funds from the USF for training of PTIC operators. Others who opposed funding of PTICs from the USF argued that instead of gross subsidy to PTICs, the Government should give incentives to the low speed data services in rural areas by reduction/waiver of duties and taxes on CPEs. It was also argued in this context that USF should not be subsidizing for giving cross subsidy for procurement of Customer Premises Equipments (CPE) which may be quite sophisticated in case of PTICs. This group, therefore, argued that the PTICs should be financed, if necessary, from Rural Development Funds including resources of Gram Panchayats rather than from funds generated by the Telecom sector.

2.33 The Authority having considered all these views carefully and in view of the need and urgency of providing at least low speed data transmission services in the rural areas, has come to the conclusion that the PTIC programme is unlikely to take off if the issue of their funding is left open ended. The Authority recommends that PTICs should be considered as an upgradation of the VPTs as the dial up access is provided through a direct exchange line. These will have to be developed on the same lines as Public Call Offices (PCOs), a programme which has met with considerable success in the country. However, owing to their location, generally in non-remunerative areas, there may not be much demand at present for these services. It is, therefore, recommended that the BSOs be fully compensated for the amount of NC that would arise if the PTICs are engineered by upgrading an existing VPT, with the minimum configuration of a PC, a modem and an UPS.

Support to HPTICs should be on the same lines as for PTICs i.e., capital cost of required ISDN interfaces, a work station and UPS.

2.34 The BSOs could operate these PTICs/HPTICs themselves, or through the village Panchayat or a local entrepreneur who may function as a franchisee or through other intermediate agencies like NGOs, cooperatives, utility service providers etc. Efforts should be made to entrust the responsibility of operating these PTICs to local entities, which have the necessary minimum infrastructure like available premises and possess basic skills or can employ skilled personnel to manage, maintain and develop new applications on the PTIC platform. The BSOs should be compensated from the USF to meet their deficits till these PTICs become self-sustainable. The compensation on capital cost and operating expenses will be on lines similar to category-II VPTs mentioned above, i.e. both capital and operational costs should be taken into account to determine the level of support available from USF. Having received support from the USF, the agencies operating the PTICs/HPTICs should be obliged to ensure reliability

of this service.

Section 3 Phones to households(DELs) in remote areas

- 3.1 In the previous Section, we have discussed the financial support required to provide access to public Telecom and Information services as part of USO. However USO as stipulated in NTP'99 not only covers provision of public phones such as VPTs, but also household phones in loss making rural and remote areas. The authority has recommended enlargement of the scope of VPT programme to include information services provided through the PTICs and HPTICs, which will involve up-gradation of a number of VPTs to PTIC and some to HPTIC capability. However, as far as the scope of household telecom service is concerned, the Authority feels that for the present, its scope should be limited to basic telephone service or POTS (also called Plain Old Telephone Service).
- 3.2 Universal Service embodies the policy objectives of the Government to provide basic telecom service to homes at affordable tariffs, particularly low rentals and local call charges. NTP'99 has not only laid specific objectives in respect of public phones such as VPTs, but has also laid down specific targets relating to Universal Service. It aims to achieve by 2002 in urban as well as rural areas a state in which telephone would be available on demand at an affordable tariff and to sustain it thereafter so as to achieve an overall tele-density of 7 by the year 2005 and 15 by the year 2010. As per NTP'99 rural tele-density in the year 2010 should be 4%, which is a ten times increase from the figure 0.4% in 1999. Unless tariffs remain affordable, these figures would be difficult to achieve. In a vertically integrated monopoly market, such affordable local tariffs, which are generally below cost, are cross subsidized from highly cost plus long distance charges. However, with the opening up of the NLD market and due to the steps already taken and being taken for tariff rebalancing, such cross subsidy may not be sustainable in the long run. Therefore, the Policy also lays down the means for raising the resources required to support such a programme, i.e., to subsidise loss making telephones in high cost rural and remote areas. NTP'99 stipulates that the resources for meeting USO, i.e., to make telephones affordable in net high cost areas, would be raised through a Universal Service Levy, which would be a percentage of the revenue earned by all operators under various licenses.
- 3.3 Making telephone available on demand implies that the operator will have to provide telephones on demand without any discrimination and as per waiting list even though providing connections to low calling subscribers may not be remunerative for the operator on strictly business considerations. This will require to be done in the rural and remote areas in the interest of increasing rural teledensity. In regard to low calling DELs in the urban areas, however, a separate view may have to be taken

considering the fact that the tariff rebalancing is still to be completed and urban SDCAs continue to generate surpluses on account of considerable STD/ILD traffic, tariff relating to which is above cost. Since revenue generated by high calling subscribers in such SDCAs already provides a good cushion for the other low calling DELs and also because it is extremely difficult to keep separate accounts of low calling subscribers, the Authority is of the view that for the present, USO support need be provided only in the rural/remote SDCAs. Support to urban SDCAs may be considered in the later phases of the USO programme once the problem of low rural teledensity has been addressed and some satisfactory results have been achieved on this front.

- 3.4 At present, providing affordable telecom facility in the rural areas is generally a loss-making proposition, which is a disincentive for the operators to roll out their networks in these areas. The position cannot be expected to change substantially unless some incentives are provided to the operators. One such incentive, as envisaged in NTP'99 can be in the form of financial support for rural telephones from the Universal Service Fund (USF) specifically to make a contribution to reduce the access deficit which the operator has to incur due to below cost rentals.
- 3.5 Unlike VPTs, where both the number and location of the unit is fixed, the number and location of DELs, of low calling individuals in rural/remote areas is not fixed. Further, identifying cost and revenue for each loss making DEL individually in a SDCA may prove problematic, as such accounts are not kept. It must also be kept in mind that there will be millions of such telephones and their exact categorization in terms of loss/profit making will be difficult as well as contentious. This categorization can change from period to period, even monthly, as the usage pattern of the same phone could vary quite often. Therefore, the methodology recommended for assessing subsidy requirement for individual VPTs/PTICs based on location cannot be employed for assessing the Universal Service support for DELs. In this context, another important factor is the fact that the subsidy required for USO will vary quite significantly from one circle to another due to wide variations in teledensity and topology of the SDCAs. For the same reason, it may vary even within the same Circle. Cost of giving a connection is generally inversely proportional to teledensity of the area under consideration. Notably, at present, the operating (license) area of most private BSOs is small i.e. individual telecom circles. Only BSNL is an all India Operator. These factors imply that the amount of subsidy required for rural/remote low calling subscribers cannot be worked out with a fair degree of objectivity and accuracy if an effort is made to calculate it on the individual DEL basis. In the opinion of the Authority, therefore, it would be far more practicable and equitable to calculate the net deficit of a given area taking into account the service revenue from all DELs in that area. This will be a fair approach, since it will take into account surpluses generated from long distance services as well as from high calling subscribers in the area and reflect the operator's actual net cost of providing loss making DELs in the area. Even in a rural area, there are high

calling subscribers, often generating sizeable STD revenue. These surpluses should be used to offset the deficits of loss making DELS in the area. Therefore, an area wise approach for calculating net cost and the subsidy required appears to be the most optimal.

- 3.6 In the light of what has been stated above, the Authority, recommends adoption of an area-wise approach for providing support to the operators in respect of all DELS in rural and remote SDCAs. Under the proposed approach, the Net Cost of providing universal service in an area, say a rural SDCA, can be calculated and partial or full reimbursement thereof can be provided from a fund created for this purpose. This fund will be created by realizing a levy from all telecom service providers, as envisaged in NTP'99 and will be used for supporting both public telephones/infocentres as well as provision of household phones in net high cost areas such as rural and remote SDCA. The quantum of support will be decided on the basis of a costing methodology developed by the USF Administrator in a transparent manner under the guidance of TRAI. Separate methodologies for calculation of reimbursable costs, one in respect of VPT/PTIC and the other in respect of the access network of a SDCA will be employed. Separate Proxy cost Models will need to be developed for the two situations. Whereas, ready made proxy cost models are available for assessing the cost of an optimally configured access network in a given area such as SDCAs in the country, the USO Administrator may have to quickly develop a proxy cost model for VPTs/ PTICs.
- 3.7 Since basic telecom service generally means POTS within a local area, each rural SDCA may be considered as a unit for the purpose of calculating the amount of support to be given from the USF, under the area approach recommended above.

Net cost of providing telecommunication service in a SDCA

- 3.8 The Area-wise approach for estimation and disbursement of USF recommended by the Authority in the foregoing paragraphs treats net cost at the SDCA level as the basis for determining the eligibility of a particular rural SDCA for receiving support from the USF. For each SDCA, the NC or access deficit per subscriber will be calculated as indicated below:

Net Cost

Net cost of access which is the same as access deficit can be calculated as under:

Per line Net Cost = Per line average cost of access – Per line average total service revenue^[3]

Based on this formula, the quantum of support required for a given number of telephones provided / to be provided in a year can be computed.

Methodology for determining Payments from USF:-

3.9 The Authority recommends immediate creation of the office of USF Administrator assisted by an independent and fully empowered board so that the work relating to Proxy Cost Model for VPTs/PTICs could be started at the earliest. Another task, which the USF Administrator should be undertaking urgently is development of comprehensive data bases for element based costing of the access networks for VPT/PTICs as well as DELs in rural SDCAs. Since hundreds of SDCAs may fall in the rural category and individual details in respect of each one of them will be required, it is going to be a time consuming exercise. Delays in the exercise can be minimized if the operators take urgent steps to maintain SDCA wise unbundled network element costs. Cost of various technology options in the access network will also have to be worked out .

Verification of the Net Cost figures submitted by BSOs, with the help of a Proxy Model for a SDCA

3.10 For verification of the claims submitted by various service providers (BSOs) for telephones installed in a SDCA, it is very desirable that the USF Administrator develops the computer based Proxy Cost Model mentioned in the foregoing paragraphs. As an alternative, one of the tools available in the country with the Telecommunications Engineering Centre (TEC), such as PLANITU, developed by ITU, may also be employed. PLANITU has been discussed further in paras 3.20 and 3.21 below. These Models would be able to engineer an optimal network for providing the required / projected number of connections in a SDCA. In Annexure B the proxy models used for estimation of Net costs in France, Australia and USA have been briefly discussed. PLAN ITU, is also based on similar algorithm for dimensioning of an optimal network.

3.11 The Proxy model adopted in USA aims at giving as its output, the least cost, assuming an efficiently structured and run network and a technology appropriate for the area. This model utilizes the wire centers (equivalent of exchanges) of the incumbent Local Exchange Carriers (LEC, equivalent of BSOs in India) as the reference points for engineering an optimal outside plant and cable network including access nodes. The proxy model is able to provide cost of each network element,

facilities and services. It is supported by an economic cost model which estimates the cost of providing services for both business and households lines taking into account, interalia, rate of return, economic life of assets and net salvage percentage.

3.12 The French Model for calculating the cost of universal service is based on the existing telecommunication network in France. It works out cost as well as income allocated for 35 categories of local distribution zones, or local areas .

3.13 The Australian Model is based on estimating Net Cost of Universal Service through a computer based model developed by Bellcore. It determines the avoidable costs, i.e. the cost the operator would avoid if he were not to offer services under the USO. Working out of the avoidable cost also requires determination of the most cost effective technology and production practices relevant to the area in respect of which avoidable cost is being worked out. In some other countries too similar models have been developed and are in use. In many cases these models have been developed through consultation with stake holders and experts in network engineering .

3.14 Whichever model we use it must provide a good basis for correct estimation of the Net Cost. Correctness of the calculation will be very crucial since teledensity is at present very low and the support required for USO would be substantial. The Fund Administration cannot afford to be wide off the mark in its' estimates as its adverse impact on the entire USO programme could turn out to be quite severe. Therefore, to ensure that USF is not made use of for covering up inefficiencies of the operators, utilization of the most cost effective equipment and optimal configuration to meet telecom service requirement has to be in-built in the proxy cost model.

3.15 From the study of the proxy models in developed countries (Annexure B), as well as PLANITU available with TEC, the following points of immediate relevance emerge:

- i) A detailed, element wise data base of costs will have to be built, such as, cost of trenching, labour costs, cost of installation materials like poles, cables, drop wires etc. These parameters will be required for use in software tools to engineer an optimally configured network and then to cost the same.
- ii) The proxy cost models developed and/or used in the initial stages of USF administration would need to be refined and modified based on the experience gained over a period of time, both in respect of the inbuilt algorithm as well as the cost of the relevant network elements i.e. those elements which are

associated directly with the user interface.

- 3.16 The cost of service in the SDCAs will have two components. One is the operating expenses, which will be arrived at by using the relevant norms developed by the Administrator based on current industry experience. The second is the capital recovery in respect of the access network developed for DELs installed after the date of implementation of USL. To better clarify the position in this regard, it may be stated that such costs should cover only the non-traffic-sensitive portion of the network. The capital costs from customer premises to the line card in the exchange or the cost of the access network in case of wireless technologies. These costs should not include other fixed costs, such as land and building, or the traffic sensitive portion of the core network. No capital recovery of any kind should be provided on DELs given before the implementation of USL.
- 3.17 By adopting the above methodology, the Administrator will be making through the USF an access deficit contribution (ADC) to help the operator in rolling out his network in the high cost areas of rural and remote SDCAs. Under the arrangement recommended herein, it has been envisaged that the cost of the switch, which is directly proportional to the traffic (erlangs) handled by it, will form part of traffic sensitive call charges. In its next tariff rebalancing exercise the Authority proposes to adopt this principle which will be in line with the global practices in this regard.
- 3.18 At the beginning of each financial year, the USF Fund Administrator will ask various service providers to indicate their SDCA-wise roll out plan including projected cost and revenue. These figures will help estimating of net-costs using the methodology explained in the following paragraphs. To ensure that NC figures are not over pitched, the Administrator would, besides using the proxy model also compare the projected cost and revenue figures with the corresponding recent or prevailing figures for that SDCA. Roll out Plan, cost and revenue data may be monitored at periodic intervals, say quarterly/ half yearly and immediate corrective action should be initiated to ensure due fulfillment of the programme for which support from the USF is being provided to the operator.
- 3.19 The final reimbursement from USF shall be based on the cost estimated by the proxy model for the network actually rolled out for the number of lines for which support is claimed. Adjustments, if any, in respect of excess/shortage in the reimbursement made shall be made in the first quarter of the next financial year. In case the service provider fails to meet the commitments of roll out or is found to have claimed and received excess amount from the USF, the excess amount shall be recovered along with interest and no further support from USF shall be given until he meets the

committed roll out plan for the previous periods. However, if the excess amount determined turns out to be within a reasonable tolerance limit, say 10% of the actual entitlement, it will not attract any penal action or interest.

- 3.20 While there is need to carry out an in-depth study for developing state of the art Proxy Cost models, some of which are described in detail in Annexure B, to start with, the USF Administrator may use a readily available software package developed by the International Telecom Union (ITU) called PLANITU for determining the quantum of support to high cost rural areas. It was procured by the Telecom Engineering Centre (TEC) in India from ITU in 1995 and since then has been used by them for dimensioning and costing of a proxy local and long distance network. If required, the Administrator may seek help of TEC to implement the system of costing of a network based on PLANITU till he builds his own team to do so.
- 3.21 Latest version of this software (PLANITU) is likely to be released by ITU shortly based on which, given the map of an area(SDCA) indicating locations of the exchanges and that of the subscribers, the package will be able to configure and cost the optimal local network. It is therefore, recommended that in the initial stages of USF administration, the readily available package i.e. PLANITU should be used by USF administrator to immediately start the work of costing access net-works in the various SDCAs in respect of which claims are made for USO support. This may be necessary till such time as the development of a more localised and accurate model. The engineering rules such as grade of service and transmission plans etc, which are already embedded in PLANITU are in conformance with our National Fundamental Plans and as such no major modification may be required in using PLANITU as a local Proxy cost model. The iterative procedure in using the PLANITU Software package is given in the Annexure C for ready reference.
- 3.22 Access for all being the priority of USO, while considering the support from the USF, the USF Administrator should give higher priority to meeting the requirements in respect of public phones (VPTs / RCPs as well as PTICs). DELs in the rural/ remote SDCAs will therefore rank for support from the USF after the requirement in respect of VPTs and PTICs have been met. Although unlikely, it is conceivable that initially the funds available to support DELs under USO may not be adequate to fully compensate the net costs of all rural SDCAs. To provide any such situation it is recommended that the portion of the fund available for supporting provision of DELs in the high cost areas, i.e., rural SDCAs should be distributed in proportion to the amount of Net Costs calculated for each of these rural/ remote SDCAs.

- 3.23 With the opening of unlimited competition in basic services, it is quite likely that in a SDCA, there could be more than one service provider and each may have different net costs depending upon its subscriber base in that area. For the purpose of compensation from USF, the cost per line of that SDCA shall be computed taking into account the figures of the Net Cost provided by all competing operators. The lowest Net Cost reported will be used to compute the USO support available to all operators in the SDCA. This principle is being recommended to ensure least economic cost to the USF and in effect to the country in supporting this programme.

Quantum of USL

- 3.24 While making its earlier recommendations on related issues, the Authority had estimated the required quantum of USL as 5% of the adjusted gross revenue for various service providers like Basic Service Operators (BSOs), Cellular Mobile Service Operators (CMSOs), National Long Distance Operators (NLDOs) etc. Since those recommendations were made, the facts and figures have not undergone any major change and therefore, the Authority would like to retain its recommendations that the USF be created initially with this percentage i.e. 5% of the adjusted gross revenue.
- 3.25 While the USL should be 5% of adjusted gross revenue of all telecom carriers or operators, pure value added service providers such as ISPs, E mail, voice mail service providers etc who do not own facilities and are thus not in the category of network operators and carriers shall be excluded from the purview of USL. Such service providers essentially provide only information services by putting intelligent servers at the edge of the Telecom Carrier and are not telecom carriers or operators in strict sense of the term.
- 3.26 This figure i.e. 5% of adjusted gross revenue of all telecom operators appears to be adequate to support the Universal Service programme in its first phase, VPTs/PTICs as well as DELs in rural and remote areas. In subsequent years, if there is any increase in the scope of USO, the USF Administrator may revise the estimate and raise it to meet the requirements. In any case it will continue to be a part of the license fee itself and as such even if increased, it is not likely to impact either the service providers or the consumers in any adverse manner.
- 3.27 The cost model required for assessing the VPT/PTIC costs are relatively easy to

develop. USF Administrator should endeavour to develop the VPT proxy cost model which could be started w.e.f. 1.1.2002. Since USF has to play an important role for penetration of telecom services in rural/remote areas, the office of USF Administrator should be set up latest by 1.1.2002, so that the implementation of the scheme could be taken in right earnest, w.e.f. 1.4. 2002.

Section 4

US FUND ADMINISTRATOR

- 4.1. Determining the quantum of USL as a percentage of the gross Revenue of the operators is only one part of the exercise relating to USF Administration. Determination of an equitable methodology for the disbursement of the collected funds among eligible operators for achieving physical targets in regard to VPTs, PTICs, Rural phones etc is the next, and no less an onerous task. The Authority has examined the various types of organizational structures that could be put in place for efficient discharge of these functions. Section 11 of the TRAI Act *inter-alia* makes the Authority responsible for “ensuring effective compliance of Universal Service Obligation”. Under this provision, the TRAI requires to take necessary steps for putting in place the necessary machinery and the systems for utilisation of the USF.
- 4.2. Fund Administration was one of the issues on which inputs from various stakeholders were invited. From the written comments received in response to TRAI’s Consultation Paper, and discussions with the Stakeholders in the Open House Sessions, the following options have emerged:
- i) USF should be administered through an Independent Agency, under the direction of TRAI.
 - ii) USF should be administered by TRAI itself, if necessary, by creating an in-house unit for this purpose.
 - iii) USF should be administered by the Licensor, either directly, or through an agency under its control.
- 4.3. The overwhelming view of the stakeholders was in favour of the first option. In line with the views expressed by the Stakeholders, the Authority feels that the administration of the Universal Service Fund i.e. its collection and distribution among operators based on the verification of their respective claims should be given to an

independent unit which may be established by TRAI in consultation with the Government. This unit will perform a specialized task, involving considerable interaction with the operators in developing and constantly improving/refining the proxy cost models and verifying their claims for support from the USF. The fund administration would need a fairly large set up with specialists from several disciplines such as Engineering, Cost accounting and Finance to discharge its functions adequately.

4.4. A number of countries have found it very expedient to keep the administrator distinct from the Regulator. TRAI too believes that this practice suits our conditions and can be adopted by us with success and considerable advantage. Some examples of such independent Fund Administration are given below :

i) France : The Universal Service Fund is managed and administered by an independent financial institution overseen by the Ministry of Economy. The institution receives a fee for meeting its administration expenses. Each operator pays a part of this fee calculated on a prorata system linked to its traffic volume. The amount collected each year is paid to France Telecom for meeting USO. Operators pay into the fund three times a year. These are provisionally estimated amounts. The definitive amounts to be paid by the operators are evaluated by ART and fixed by the Ministry on the basis of the audited costs of the year in question (for example, in 1999 based on the cost of 1998). Operators are reimbursed if the provisional amounts paid by them into the fund are more than the actual amounts due from them.

ii) USA: The National Exchange Carrier Association (NECA), an intra industry body established by the FCC, administers the US federal programme. NECA is run by a Board of Directors, which consists of representatives of more than 1000 US local telephone companies. By its 1997 order, FCC ordered NECA to get incorporated as an independent non-profit subsidiary, i.e. Universal Service Administrative Company (USAC). The USAC now administers the universal service support mechanism.

Constitution of some of the bodies set up for this purpose in other parts of the world are given in the table below by way of examples:

Country	Organization administering USO	Composition of Board
France	Control committee (comprising of Sr. Auditor, ART & CDC)	Chairperson, 2 Members of ART, Head of CDC (which administers USF)

Chile	Managed by Regulator, Fund approved by Council of ministers	Development department of Subtel manages day to day functions, Fund administered by 4 Ministers and one telecom expert adviser
Columbia		Ministry manages the fund
Peru	FITEL	8 employees
Australia	ACA	Chairman, Dy Chairman, 1 full time member, 1 part time Member, 2 Associate Members
South Africa	Universal Service Agency	Not available
USA	USAC	19 Member committee

4.5. Drawing upon the experiences of other countries as well as inputs from stakeholders and its' own deliberations and analysis, the Authority recommends creation of the office of the USF Administrator and an Independent US Fund Administration Board. TRAI shall have representation on this Board, at the member(s) level. The selection of other members of the USF Administration Board will be made by TRAI in consultation with the Government. The USF Administrator will also be the Chairperson of the Board and exercise administrative and such other powers as may be delegated to him by the Board. In effect the chairperson will perform the functions of the CEO in the Fund administration. The Fund Administration Board will be given the requisite autonomy & powers to create an organization equal to the task entrusted to it by the Authority.

4.6 **Constitution of the USF Administration Board**

The USF Administration Board will deliberate and decide upon the broad policies and guiding principles for the administration of USO. It may from time to time review the scope of USO as also the utilization of the universal service fund, and if necessary, may consider modifications therein. In such matters, however, the specific concurrence of the TRAI would be required. It may consist of seven members including the USF Administrator who will also be its chairperson. The other six members may come from the field of economics, finance, telecom engineering and administration, management, law, and consumer welfare. It should have one representative each from government, service providers, consumers and TRAI at the member level. For representing the consumers view, representative on the Board from consumer Welfare Organizations/Advocacy Groups may be considered.

Functions of the Universal Service Fund Administrator.

4.7 The Universal Service Fund Administrator shall perform the following functions with the assistance of the USF Administration Board.

- To estimate the aggregate USO support required for a period and to develop the measures and methodologies for arriving at such estimates.
- To Develop Proxy Cost Models i.e. a model to determine the optimal cost of providing a VPT/PTIC/HPTIC at a given location, and other model / models for estimating the cost of providing a given number of telephone connections by optimal engineering, in a SDCA.
- To determine the USL based on the above estimates in consultation with the TRAI.
- To settle the claims of eligible service operators after duly cross checking the same and to make disbursements from the USF.

- To specify the relevant formats and procedures for maintenance of technical and financial data/records by the various service providers; so that requisite data bases are built for subsequent use in the fund administration.

While discharging the above functions, the administrator may, if required, avail of the services of outside professionals/professional agencies for conducting audit, spot inspections, studies, surveys and research.

4.8 Fund Administration Expenses

The expenses of the US Fund administration will be met out of the USL and may be capped at a certain percentage of the contributions received into the fund annually. To start with the yearly expense of the USF Administrator's office and the Board may be restricted to 0.25% of contributions received into the fund during the same financial year.

Collection of USL by the Administrator

4.9 Universal Service Levy, collected as a percentage of the eligible gross revenues of all service providers, is not a voluntary payment or donation, but is a levy. This could be collected either by embedding it in the price for the services offered or by showing it separately in the bill, like a surcharge. Considering that USO levy is not intended to be an extra burden on the consumer, but is visualised as a contribution from service providers for meeting national objectives of Universal service, the Authority is of the opinion that it is not necessary to reflect the USL in the bills of customers, nor should it be separately collected from the customer over and above the other charges. It should be computed with reference to the revenue of the service providers and should be an outgoing from their earnings. USL is included in the licence fee and in the arrangement proposed herein is to be recovered with the license fee which will be

a certain percentage of the operator's adjusted gross revenue. To give effect to the fund, the fee realised may be bifurcated in two parts. The designated portion of USL may go to USF and the balance to the Consolidated Fund of the Government of India.

Section 5

Summary of Recommendations

5.1. As noted in Section One, Department of Telecom had sought TRAI's recommendations on the following specific issues.

- “a) Class of operators to fund the UAL.
- b) Various possible cost models/approaches to determine:
 - i) Percentage contribution from revenue of the operators and the mechanism for computing it;
 - ii) Per unit subsidy for VPTs and rural DELs separately to cover capital & recurring expenditure;
 - iii) Whether per unit subsidy will be the same or different in different geographical areas/tribal and non-tribal areas of the country; and
 - iv) Per unit subsidy for low calling urban DELs.”

The recommendations of the Authority address the above issues as well as some others considered relevant to the objectives of USO as contained in NTP'99. Our recommendations on the above specific issues along with reasons for the same have been discussed at length in preceding sections; however a summary is given below:

5.2. Recommendations on specific Issues referred by the DOT.

a) Class of Operators to fund Universal Access Levy:

Although the expression 'Universal Access Levy' (UAL) has been used by the DOT, the Authority has used the term Universal Service Levy (USL) to cover both access through public or Community phones and provision of household telephones. Universal Service Levy (USL) should be a specified percentage of the adjusted gross revenue of all Telecom carriers or operators such as BSOs, NLDs, ILDs, CMSPs etc. No levy should be charged from pure value added service providers such as ISPs, E-mail, Voice Mail service providers etc., who do not own facilities and thus are not in the category of network operators and carriers.

b Various possible cost models/approaches to determine**(i) Percentage contribution from revenue of the operators and the mechanism for computing it :**

In line with its earlier recommendations on related issues, the Authority has recommended a Universal Service Levy amounting to 5% of the Adjusted Gross Revenue of all the service providers, except pure value added service providers such as ISPs, E-Mail Service Providers etc. The Authority is of the view that this amount appears to be adequate to support the USO programme in the first phase, for VPTs/ PTICs as well as DELs in rural / remote areas. In subsequent years, if there is any increase in the scope of USO, the USF administrator may revise the estimate and raise it to meet the requirements. In any case it will continue to be a part of the license fee itself and as such even if increased, it is not likely to impact either the service providers or the consumers in any adverse manner.

(ii) Per unit subsidy for VPTs and rural DELs to cover capital & recurring expenditure

In line with the NTP'99 objectives, the Authority is of the view that the task of providing Access to voice and low speed data services in all villages be given the top most priority. The Authority, therefore, recommends that implementation of USO should be divided in two clearly separate streams.

Stream- I Provision of public Telecommunication & Information Services**Stream- II Provision of Household Telephones in Net high Cost Areas.**

While implementation of the two streams would be simultaneous, Stream-I, i.e., stream relating to provision of common access (VPTs and PTICs) should receive priority

VPT

The Authority has recommended that the Government, in its role as the Licensor of basic Services, direct both BSNL/ private BSOs to give the highest priority to the installation of all the 607,491 VPTs by the target date i.e, 31-3-2002.

All BSOs including BSNL, will be compensated for the net cost incurred by them on setting up village public phones. For this purpose, the Net Cost (NC) of providing VPT i.e. relevant cost of the access network upto the VPT, minus total revenue earned, would need to be assessed. To ensure that BSOs do not over estimate the cost figures of providing an optimal VPT connection, the USF Administrator (as detailed in Sections 3 and 4) should quickly develop proxy cost model(s) to assess the most optimal cost of providing VPTs based on their location, technology employed, and distance from the nearest exchange.

For estimation of costs, the Authority has recommended adoption of Fully Allocated Current Costs (FAC) as the basis of cost calculations. The capital cost items should include the terminal equipment, local loop and the line card in the exchange to which the VPT/PTIC is connected.

For the purpose of support from USF, public phones should be divided in two categories viz., those installed before the proposed introduction of the USF Scheme i.e., 1-4-2002 and those after. These two categories would differ in respect of capital recovery. No Capital recovery will be allowed on VPT/ PTICs installed before 1-4-2002, but capital recovery should be provided for the VPTs installed after 1-4-2002 i.e, the date of implementation of the third phase of the tariff rebalancing exercise initiated by the Authority vide TTO of March 99. The Authority accordingly recommends that NCs for these two categories of VPTs should be computed as follows:-

Category I :-

VPTs installed before 1-4-2002

$$\text{NC} = \text{Annual Operating Expenses} - \text{Annual Revenue}$$

Category II :-

VPTs installed after 1-4-2002

$$\text{NC} = (\text{Annual Capital Recovery} + \text{Annual Operating Expenses}) - \text{Annual Revenue}.$$

All replacement of VPTs, including replacement of VPTs installed before the proposed cut off date i.e., 1-4-2002, should be treated as new installations.

Rural DELs

In regard to rural DELs, the Authority is of the view that for the present, USO support need be provided only in the rural/remote SDCAs. Support to urban SDCAs may be considered in the later phases of the USO programme once the problem of low rural teledensity has been addressed and some satisfactory results have been achieved on this front.

The Authority has recommended an area wise approach for determining the quantum of support. The Area-wise approach for estimation and disbursement of USF treats net cost at the SDCA level as the basis for determining the eligibility of a particular rural SDCA for receiving support from the USF. For each SDCA, the NC or access deficit per subscriber will be calculated as indicated below:

Per line Net Cost = Per line average cost of access – Per line average total service revenue^[4]

Based on this formula, the quantum of support required for a given number of telephones provided / to be provided in a year can be computed. The claims submitted by the service providers will be verified using a cost proxy model developed for the purpose. The cost of service in the SDCAs will have two components. One is the operating expenses, which will be arrived at by using the relevant norms developed by the Administrator based on current industry experience. The second is the capital recovery in respect of the access network developed for DELs installed after the date of implementation of USL. Capital costs should cover only the non-traffic-sensitive portion of the network. No capital recovery of any kind should be provided on DELs given before the implementation of USL.

At the beginning of each financial year, the USO Fund Administrator will ask various service providers to indicate their SDCA-wise roll out plan including projected cost and revenue. These figures will help estimating of net-costs. To ensure that NC figures are not over pitched, the Administrator would, besides using the proxy model also compare the projected cost and revenue figures with the corresponding recent or prevailing figures for that SDCA. The final reimbursement from USF shall be based on the cost estimated by the proxy model for the network actually rolled out for the number of lines for which support is claimed. Adjustments, if any, in respect of excess/shortage in the reimbursement made shall be made in the first quarter of the next financial year. In case the service provider fails to meet the commitments of roll out or is found to have claimed and received excess amount from the USF, the excess amount shall be recovered along with interest and no further support from

USF shall be given until he meets the committed roll out plan for the previous periods. However, if the excess amount determined turns out to be within a reasonable tolerance limit, say 10% of the actual entitlement, it will not attract any penal action or interest.

In the event that the funds available to support DELs under USO may not be adequate to fully compensate the net costs of all rural SDCAs, it is recommended that the portion of the fund available for supporting provision of DELs in the high cost areas, i.e., rural SDCAs should be distributed in proportion to the amount of Net Costs calculated for each of these rural/ remote SDCAs. Also, it is quite likely that in a SDCA, there could be more than one service provider and each may have different net costs depending upon its subscriber base in that area. For the purpose of compensation from USF, the cost per line of that SDCA shall be computed taking into account the figures of the Net Cost provided by all competing operators. The lowest Net Cost reported will be used to compute the USO support available to all operators in the SDCA.

(iii) whether per unit subsidy will be the same or different in different geographical areas/tribal and non-tribal areas/tribal and non-tribal areas of the country

The subsidy required for USO will vary quite significantly from one circle to another due to wide variations in teledensity and topology of the SDCAs. For the same reason, it may vary even within the same Circle. Cost of giving a connection is generally inversely proportional to teledensity of the area under consideration. The Authority has recommended per unit subsidy approach for VPTs/ PTICs based on the net costs as verified through a proxy model and hence the subsidy would also vary depending on individual locations. In case of DELs in rural and remote SDCAs, the amount of subsidy will vary from one SDCA to other, depending on the net cost of the SDCA.

(iv) Per unit subsidy for low calling urban

In respect of low calling DELs in the urban areas, it needs to be considered that the tariff rebalancing is still to be completed and urban SDCAs continue to generate surpluses on account of considerable STD/ILD traffic, the tariff relating to which is above cost. Since revenue generated by high calling subscribers in such SDCAs

already provides a good cushion for the other low calling DELs and also because it is extremely difficult to keep separate accounts of low calling subscribers, the Authority is of the view that for the present, USO support needs to be provided only in the rural/ remote SDCAs. Support to urban SDCAs may be considered in the later phases of the USO programme once the problem of low rural teledensity has been addressed and some results have been achieved on this front.

5.3 Recommendations on other related issue:

a) Rural Community Phones

The Authority has recommended that after achieving the target of one VPT in every village, a second phase of Rural Community Phones (RCPs) programme may be initiated. This should include improvement of the existing VPTs by making them more reliable and serviceable, and also installing second public phone in villages where population exceeds 2000. There are about 75,000 such villages all over the country. The second public phone in villages may be provided in public places such as schools, primary health centres etc. The support from USF for RCPs will be on lines similar to VPTs.

b) Public Tele Info Centres

Taking note of the information revolution, one of the objectives laid down by NTP'99 is to provide voice and low speed data service to the balance uncovered villages in the country by the year 2002. The Authority has recommended that a phased programme should be implemented to upgrade about 35000 VPTs to function as PTICs by the year 2004. After 2004, a fresh programme for creation of PTICs/HPTICs can be embarked upon. It has to be our endeavour to provide data transmission facilities within 5 Kms of every village and atleast at all those villages where there are regular post offices. All the BSOs will be fully compensated for the amount of NC that would arise if the PTICs are engineered by upgrading an existing VPT, with the minimum configuration of a PC, a modem and an UPS. The BSOs could operate these PTICs/HPTICs themselves, or through the village Panchayat or a local entrepreneur who may function as a franchisee or through other intermediate agencies like NGOs, cooperatives, utility service providers etc..

The compensation on capital cost and operating expenses will be on lines similar to

category-II VPTs mentioned above, i.e. both capital and operational costs should be taken into account to determine the level of support available from USF. Having received support from the USF, the agencies operating the PTICs/HPTICs should be obliged to ensure reliability of this service.

c) High Speed PTICs

Some of the existing VPTs can also be upgraded to high speed PTICs providing wide band applications like tele-education and telemedicine based on two basic channels i.e., 128 Kbps. The Authority recommends that at least two HPTICs be set up in each SDCA in the first phase i.e., at about 5000 nodal points. This phase of the programme may be completed by 2004 along with the 1st phase of the larger programme of providing PTICs. In the second phase, more HPTICs at other locations in the SDCAs may be installed, based on techno-economic considerations. It may be possible to install an HPTICs in every block Headquarters by 2005 in a phased manner. Support to HPTIC should be on the same lines as for PTICs i.e., capital cost of required ISDN interfaces, a work station and UPS.

iv) USF Administrator

In line with the views expressed by the Stakeholders, the Authority feels that the administration of the Universal Service Fund should be given to an independent unit which may be established by TRAI in consultation with the Government. The USF Administration Board will deliberate and decide upon the broad policies and guiding principles for the administration of USO. It may consist of seven members including the USF Administrator who will also be its chairperson. It should have one representative each from government, service providers, consumers and TRAI at the member level. For representing the consumers view, representative on the Board from consumer Welfare Organizations/Advocacy Groups may be considered.

The main functions of USF Administrator will include estimation of aggregate USO support required for a period and to develop the measures and methodologies for arriving at such estimates, developing Proxy Cost Models, determine the USL based on the above estimates in consultation with the TRAI, settling the claims of eligible service operators after duly cross checking the same and to make disbursements from the USF, and to specify the relevant formats and procedures for maintenance of technical and financial data/records by the various service providers so that requisite data bases are built for subsequent use in the fund administration. The expenses of the US Fund administration will be met out of the USL and may be capped at a

certain percentage of the contributions received into the fund annually. To start with the yearly expense of the USF Administrator's office and the Board may be restricted to 0.25% of contributions received into the fund during the same financial year.

V) Collection of USL by the Administrator

Universal Service Levy, collected as a percentage of the adjusted gross revenues is not intended to be an extra burden on the consumer, but is visualised as a contribution from service providers for meeting national objectives of Universal service. The Authority is of the opinion that it is not necessary to reflect the USL in the bills of customers, nor should it be separately collected from the customer over and above the other charges. USL is included in the licence fee and in the arrangement proposed herein is to be recovered with the license fee, which will be a certain percentage of the operator's adjusted gross revenue.

(vi) Date of Implementation of USL.

The Authority recommends that the date of implementation of USL should be 1.4.2002. It recommends creation of the office of USF Administrator by 1.1.2002, so that activities to commence the scheme w.e.f. 1.4.2002 are completed, well in time.

(vii) Existing VPT obligations of private Basic Service Provider

Existing private basic service licensees in six circles had undertaken to provide a certain number of VPTs in their respective circles as part of the license agreement. These contractual obligations would need to be discharged. For USO support, these VPTs shall be treated in Category I i.e. only operating expense will be compensated from USF in these cases irrespective of the date of their installation

(viii) Development of Proxy Model

For verification of the claims submitted by various service providers (BSOs) for VPTs/PTICs and telephones installed in a SDCA, it is very desirable that the USF Administrator develops the computer based Proxy Cost Models. Two separate models will be required for VPTs/PTICs and DELs in rural/remote SDCAs. These Models would be able to engineer an optimal network for providing the required / projected VPTs / PTICs and number of connections in a SDCA. One of the tools available in the country with the Telecommunications Engineering Centre (TEC), such as PLANITU, developed by ITU, may also be employed for determining the quantum of support for Net High cost rural areas.

(ix) STD Facility in VPTs

The Authority has noted that most of the existing VPTs do not have STD facility due to which this service may not be very popular in villages and which becomes a major hindrance for commercial viability of VPTs. The Authority has recommended that all VPTs should have STD facility within the next three years.

Annexure-A**SUMMARY OF INPUTS RECEIVED IN THE CONSULTATION PROCESS****CHAPTER.2 UNIVERSAL SERVICE POLICY OBJECTIVES, DEFINITION AND SCOPE**

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- 1. What should be the scope of low speed data services? Should it be limited by the speed of a dial up Internet connection or ISDN connection or a leased line?**
 - i) Dial up access at a minimum rate of 9.6 Kbps
 - ii) Low speed data at a rate enough to meet PTIC requirement.
 - iii) No data at the moment, data to be included later based on the recommendation of advisory board.
 - iv) Speed should be limited by the technology available.
 - v) Speed of data should be 64 Kbps
 - vi) Speed of data at 25 ~ 30 Kbps with 56 Kbps Modem
 - vii) ISDN as the cost difference between 64 Kbps and ISDN is not much.
 - viii) First we should provide reliable media for exchanges
 - ix) Speed of data to be restricted to a minimum of 2.4 Kbps
 - x) The services to the villages should be defined and the bandwidth and technology be classified accordingly.
 - xi) Market driven

- 2. NTP 99 envisages provision of low speed data service to balance 2.9 lakh-uncovered villages in the country by the year 2002 under USO. Service is delivered through a terminal apparatus. Should it be interpreted to mean that**
 - (I) All new village phones would actually be Public Tele-info centres (PTIC) having Internet capability in accordance with the IT Policy?**
 - i) All villages to have PTICs.
 - ii) Phased approach; PTICs be initially provided in Gram Panchayats.

- iii) Left to FSPs
- iv) Multimedia education to be implemented.
- v) Conversion to PTIC should be demand based.
- vi) Villages of Population greater than 5000 would have demand of PTIC.
- vii) Connect the person to messages (pagers) first, followed by tel and then PTIC.
- viii) Does not necessarily mean that these village phones would be actually be PTICs with Internet capability. However, to achieve the objective of Internet connectivity in rural and remote areas as referred in Planning Commission no. IT-TF/S/98, the VPTs of the existing 3.41 lakh villages as well as the new VPTs to be provided in the remaining 2.66 lakh villages will have to be upgraded to convert them into a Public Tele-info Centre.

2.(II) The existing 3.17 lakh VPTs would be upgraded to PTICs by 2002? In such a case what should be the minimum terminal equipment configuration; and should the cost of this PTIC terminal equipment be also included in the USO cost.

Minimum Terminal Equipment

- i) PC, Modem, FAX and Telephone
- ii) PC, Modem, Solar Panel, Power packs
- iii) PC, Modem, Solar Panel, FAX, UPS, Printer
- iv) Terminal configuration should not be specified as it will vary with applications and development.
- v) Provision of additional terminal equipments like modems, PCs etc. for all the VPTs and access network of those working on MARR by alternate technologies which may support at least dial-up data

Should the cost of PTIC be covered under USO

- i) Yes
 - a) Capex and Opex
 - b) May be provided by state government (need to have more state government data on web)
 - c) Where demand is there people will take up.
 - d) Provide initial USO support and when it becomes viable, may be taken out of its purview.
 - d) Cost should be shared between USO provider and franchisee. Soft loan, rural credit, money for training should be given from USO.
 - e) This money should also be reimbursed from Universal Service Fund if this is a part of any policy of the Government. However, it is intended that upgradation of the terminal equipment to convert them into a Public Tele-Info Centres (PTIC) shall be done by franchisees and nothing is to be done by the Government / Department in this regard
- ii) No
 - a. Government should incentivise Rural tel by waving import duties, excise duties and sales tax on all equipment.

- b. USO is not intended to either define or cross subsidise terminal equipment
- c. Should be financed from rural development funds including resources of gram panchayat.

3. Telephone on Internet:

Envisaging a situation where voice over IP is permitted in India for ubiquitous telephony services by the ISPs. Whether ISPs be asked to discharge their USO? Whether ISPs should also contribute to the Universal Service Fund(USF)?

- i) NTP'99 envisages that Internet telephony shall not be permitted at this stage. Government will continue to monitor the technological innovations and their impact on national development and review this issue at an appropriate time. However, if at some stage the Government permits Voice on Internet, the ISPs should be required to obtain FSP license. All SPs should contribute to USO.
- ii) Should such a scenario emerge, the ISPs should also be liable to discharge USO. However, voice by ISPs will have adverse impact on the revenues of other service providers, fund will not be available for any development and fulfilment of teledensity targets. All licensed and registered service providers including ISPs should contribute to USF
- iii) To increase proliferation of Internet at this stage, ISPs be left out.
- iv) Countries like Australia, Canada, People Republic of China, Australia, USA cover essentially telephone services, with respect to Basic Telephony, Mobile Telephony and such other voice telephony related services. The objectives are clearly to increase teledensity and access to affordable telephony. Internet services are therefore not covered under the category of those telecom services, which are eligible to contribute towards the USO.
- iv) ISP should discharge their USO to the extent of providing Internet access. ISP too should contribute to USF.
- v) As and when voice over Internet is actually permitted in India, ISPs may be asked to contribute to the USF.

4. Internet to all DHQs :

Whether the current state of Internet Service meets the NTP 99 objective of Internet Access to all DHQs or will it be met only after the provisioning of an Internet node at each DHQ? The stipulated target for Internet access to all DHQs is 2000. Whether ISPs be asked to provide

such nodes in their service areas in addition to the incumbent?

- i) ISP licenses issued by DOT cover almost all the DHQs in the country, which also have the necessary telephone line infrastructure. Let this issue be governed by the ISP policy or Government Policy on provision of internet at DHQs.
- ii) Internet nodes at all SSA Headquarters are being provided as per policy of the Government irrespective of the fact whether their provision is commercially viable or not. However, at District Headquarters, it will be provided on demand.
There is no provision for discharge of USO in the existing licences of ISPs. In addition, no purpose is expected to be served at this stage by asking private ISPs to provide such nodes in their service areas.
- iii) The incumbent operator (DTS) has already committed to provide Internet nodes at all DHQs by the Year 2000 and the funding of the same will be available from the monopoly surplus of DTS. Thus, there should be no separate requirement for the ISPs to mandatorily provide such nodes.
- iv) Though this is already being achieved by the ISP's faster than any regulation can drive it, for the benefit of competition ISPs be asked to provide such nodes.
- v) At present DHQs have access to the nearest Internet node at local call rates, even if connection is made over long distance, implying a possible degree of cross subsidisation by the long distance service provider, currently DTS. Based on the avoidable cost approach, if there is excess capacity on the link to the node, then this degree of cross subsidisation may not be extensive. If traffic grows to the point where it requires a node, it is likely that the service would also become commercially viable.
- vi) Incumbent should provide the node and get reimbursed from USO.
- vii) Till the time the long distance operations are totally open up there is no need of providing any subsidy through USO Fund to DTS.
- viii) One can access Internet at local rates from any SDCA by dialing 172XXX, till node is not provided in that SDCA. To subsidise the STD call to local call, USO should bear the difference and if more number of nodes are provided at DHQs, same should also be covered through USO.

CHAPTER -3

PRESENT SCENARIO AND FUTURE PROJECTIONS

VPTs

Technology for VPT

1. Should a technology neutral approach be adopted for VPTs and the most cost effective technology model in a given situation be considered for disbursement from the Universal Service Fund i.e., a standard reference proxy model for a given situation.

i) Technology neutral approach has to be adopted for provisioning of VPTs. The operators should be given full flexibility in exploiting the available technology in the given situation to provide connectivity in the most cost-effective manner. The reimbursement of Universal Service Fund can be done in a standard proxy model in particular area.

ii) Since various technologies have been used or would be available for use in future having different costs per VPT, a technology neutral approach will not be appropriate as the most cost effective technology model to be used for reimbursement.

In fact, a model for each technology separately for various types of geographical terrains e.g. hilly, desert, island, remote and inaccessible areas etc., need to be worked out in consultation with the USO providers for the purpose of reimbursement.

iii) Technology neutral approach should be adopted so as to provide the operator serving a particular area with the necessary incentives to utilise the most cost effective technology in a particular area. As far as the standard reference proxy model is concerned, this may be utilised so as to determine the maximum reserve price for the subsidy bid in a particular area, though care must be taken to ensure that the proxy model reflects the geographical location, size, population etc. of a particular area. Separate proxy models may be developed for different groups of areas.

iv) The "standard proxy model for a given situation" should be the approach adopted for VPTs. The proxy model for each situation should be practicable to implement in India taking into consideration the availability of equipment locally, availability of frequency band, maintainability under Indian conditions etc. The Universal Services Advisory Group proposed should study and recommend the appropriate standard proxy model for each given situation. To ensure reasonable period for equipment demand forecast and manufacture, each model should be in force or acceptable for at least 5 years. If there is any technological breakthrough permitting more economical system, the latter can be permitted concurrently.

Existing FSPs

2. Number of uncovered villages in each area of operation of private FSPs were given in Annex of tender enquiry documents and accordingly reflected in Annex. III of license agreement. Evaluation

criteria included weightage for the number of VPTs to be installed in awarding the license for basic services. Now, in the period between tender enquiry and signing of license agreements some VPTs have been provided by DOT/DTS. The issue to be considered is whether DOT/DTS should be treated as a “ Carrier of last resort “ and compensated for providing these VPTs? Next stage comes after signing of license agreement. Number of VPTs is not provided as per agreement and subsequently DOT/DTS provide these VPTs.

- i) It was never stipulated that the incumbent shall stop covering the VPTs after the licences to private FSPs are issued. The private FSPs are prepared to provide VPTs in the uncovered village under USO as stipulated in NTP'99. The primary responsibility for providing universal service should remain with the incumbent, as is the practice in most of the countries. This is so as the incumbent has large infrastructure available to meet this obligation. Private FSPs shall be too happy to do this when their rollout infrastructure enables them to meet this requirement.
- ii) DTS should not be treated as the “carrier of last resort” as it will deprive the rural areas of the advantages of competition. NTP-99 also envisages that “ The implementation of the USO obligation for rural/ remote areas would be undertaken by all fixed service providers who shall be reimbursed from the funds from the universal access levy”. TRAI, therefore, should fix equitable targets of USO for all the FSPs. The Government and TRAI have enough powers to enforce upon the private service providers with respect to the provision of VPTs, rural DELs and other telephone lines in a non-discriminatory manner irrespective of subscribers’ paying capacity
Quite a number of VPTs have been provided by DTS which were, otherwise, supposed to have been provided by the licensed FSPs. DTS already has plans to replace large number of faulty VPTs working on MARR. The relevant number of VPTs under replacement by the DTS should, in fact, be provided by the FSPs as per the tender conditions. In any case, till these VPTs are replaced/ provided by FSPs as per the tender conditions based upon which weightage was given during evaluation, DTS should be compensated fully for the CAPEX and OPEX recoveries.
- iii) In view of DTS’s vast resources and also its extensive coverage throughout the country, it would be correct & proper to designate DTS as the carrier of last resort rather than burden the fledgling new entrants with the mandatory obligations of USO. However the various types of private operators should all be encouraged to provide USO services and be suitably compensated for the same.
- iv) DOT/DTS can be compensated as a "Carrier of last resort" only after the competitor fails to respond to his share of USO after he has been awarded license. As long as the competition has been absent, the incumbent has still enjoyed all the benefits of the long distance and ISD revenues, which have historically been utilised to cross subsidize USO. Hence the question

- of any additional compensation doesn't arise.
- v) DOT/DTS should be treated as a "Carrier of last resort" but compensated for only those VPTs which are provided after signing the license agreement by FSPs.
 - vi) It will not be possible to treat the DTS as a Carrier of last Resort and compensated for providing the VPTs on the following grounds:
 - a) There are heavy slippages between targets and actual provision of VPTs by the DTS in each year even in the Circles with private FSP licensees.
 - b) Individual villages have not been identified as to those to be provided VPTs by the DTS and by the private FSP. In the absence of such identification and slippages by DTS, it will not be possible to enforce "carrier of last resort" compensation or even claim liquidated damages.
 - vii) DTS should not be compensated for VPTs already provided as they had the monopoly. For the earlier obligation, there was a migration package and therefore VPTs would be provided by FSPs if reimbursed.
 - ix) Since DTS has vast reach, they could provide the VPT and should be compensated from the date when long distance is opened up. If any other SP is able to do it they should be permitted to do it and should be reimbursed.
 - ix) Irrespective of the operator, they should be reimbursed for the VPTs already provided and to be provided. As VPTs are loss making still, subsidy would be required still. A date should be fixed on when USO would be effective (say 1/12/2000). Let DTS state their un-amortised cost of VPT keeping in mind DOT has a depreciation rate of much lower than 10 (around 4). Fix the capex on the date USO comes into force. The un-amortised cost may be reimbursed and operating costs should also be given.
 - xi) Only future VPTs should be compensated. If USO is not prospective, it goes against the basic principle that margins were given in long distance for the purpose. If this issue is opened then there would be issues like
 - (a) what type of tech was used?
 - (b) How opex be assessed?
 - (c) How long we go back?
 - (d) Why VPT opened 10 years back has not become profitable?
 It would be practical to do it on a prospective basis only.
 - xii) To make it, technically economical feasible, both FSP & DTS to call for competitive bidding for VPTs & Rural DELs. We should allocate an area which is required to be provided with rural lines & VPTs. This concept is practically feasible instead of providing one phone. There should be package of business.
 - xiii) Even if the Private Operator has paid the liquidated damages, their obligation for providing VPTs should remain the same as committed in the license

obligation. This is necessary to meet the social obligation. If DTS provide the VPTs as a carrier of last resort, the same may be properly compensated through USO.

- xiv) FSP should be absolved from providing the VPTs since they have already paid the LDs and migration package was offered to them. The Service Provider who is having the network near to the villages can only provide the VPTs. DTS are having their exchanges in such areas. For FSPs, it will be difficult for them to provide VPTs since their network rollout is in limited areas. Compensation should be provided to DTS for providing such VPTs. FSPs are ready to provide VPTs and this should also be allowed that they could connect it through nearby DTS network for carrying the calls further.
- xv) Local initiative at village level should be involved with DTS for helping out in providing VPTs and DTS may help them by providing infrastructure.

3. Again should DOT/DTS be compensated as a carrier of last resort?

- i) DTS should not be compensated for VPTs it has installed. Installation of VPTs is a social obligation, which has been met by the incumbent. DTS enjoyed the status of a monopoly and has maintained almost total share of the market.
- ii) DTS should have claim to USO funding only after the private NLDO's become commercially operational, since till then, the incumbent will have access to the long distance monopoly surplus, which must be used to meet their "immense rural obligations."
- iii) It should also be added that DTS cannot be entitled to both a refund of its licence fee and financial support from the USO Fund as this would amount to a double reimbursement for the same activity. In the interests of objectivity and transparency and to ensure a level playing field, it is desirable that DTS's USO implementation should be funded directly through the USO and that there should be no reimbursement of licence fee.
- iv) DOT/DTS should be treated as a "Carrier of last resort" but compensated for only those VPTs which are provided after signing the license agreement by FSPs
- v) For those areas where no subsidy bids are received, DoT/DTS, keeping in view their extensive network, may be designated as the carrier of the last resort, and compensated to the extent of the maximum reserve price determined to subsidise that particular area. This status of carrier of last resort need not be indefinite, and may be subject to change in light of the possible structural and ownership changes in DoT/DTS.

- vi) It will not be possible to treat the DTS as a Carrier of last Resort and compensated for providing the VPTs on the following grounds:
 - (iii) there are heavy slippages between targets and actual provision of VPTs by the DTS in each year even in the Circles with private FSP licencees.
 - (iv) Individual villages have not been identified as to those to be provided VPTs by the DTS and by the private FSP. In the absence of such identification and slippages by DTS, it will not be possible to enforce "carrier of last resort" compensation or even claim liquidated damages.

4. Can private FSPs be absolved of their responsibility of providing VPTs in view of paid L.D. and /or offered migration package or setting up of UAL fund?

- i) FSPs should contribute to USF for VPTs in their areas of operation. FSPs should be absolved of their obligation towards VPTs in view of LDs already paid for the purpose and formation of USO policy going forward. The private basic operators have been facing lot of difficulties including rollout of their network and getting financial closures. Considering these difficulties, government has decided to migrate the existing licensees to NTP 99. With the migration to NTP 99 the basic service licensees get covered under NTP 99.
- ii) No it won't be fair on incumbent to absolve the private operators of their share of USO absolutely, because the operator is supposed to give service. But the question of LD may not arise as long as the license has not been signed.
- iii) The NTP '99 prescribes the transition of existing operators from a license fee regime, to one of revenue sharing. Further, it rightly replaces the earlier monopolistic regime with one of competition. Considering that the existing FSPs were given the obligation of providing VPTs as a result of their monopolistic status, these FSPs may absolved of their obligations, now that the competitive environment has been changed and the same provided for transparently through a process of bidding.
- iv) It is clear that private sector can be attracted to make investments to meet the socio economic objectives of the government, not by licence conditions but by offering incentives to compensate for any losses they may incur in such investments. Provision of VPT should not be a licence condition in future, but availability of compensation from the USO fund should be highlighted as an incentive. The present FSP licensees should also be absolved of their obligation without any penalty (difficult to impose as discussed in the para above) except that they should pay the full USO levy in respect of VPTs alone from the date of licensing to NTP-99.

- v) Pre determined liquidated damages absolve them of their liability.
- vi) It appears that both the parties have entered into contract, both parties fail to perform. The parties agree on liquidated damages. If there is no limit, the amounts reach an amount which is not possible to recover. The parties agree to cap the liquidated damages at a value. This has been the case vide which migration packages have been affected and therefore the issue of previous VPTs should not be considered
- vii) No. This was an essential and important licensing condition. Waiving off this condition amounts to undermining the basis on which evaluation of bids was done.

5. If DOT/DTS was providing VPTs and getting compensated through long distance revenue, then private FSP's either should pass on their compensation amount in the form of increased revenue share for a limited period or should pass on these benefits to consumer.

- i) Unlike DoT/DTS private operators are restricted to state wise circles and are not providing national long distance in the manner of DoT/DTS. As such there is no comparison between Private Fixed Service Providers and DoT/DTS. The FSP licensees are presently paying an interim 15% revenue share as license fee. The actual percentage to be paid as license fee will be determined by the government. UAL is to be assessed by TRAI as a part of consultation paper no.2000/3. ABTO recommends that provisioning of VPTs and coverage of rural areas should be governed by the US stipulations. Incidentally ABTO would like to point out that the rental and call charges for the FSPs are not cost based. The access charges have been determined taking into account these facts.
- ii) With competition in DLD and IDD, the concept would not apply.
- iii) In view of UAL fund, neither DOT/DTS nor FSP need getting any compensation from long distance revenue.
- iv) The current policy on long-distance tariffs contains an implicit subsidy from long-distance charges for uneconomic services, which have, until now, been provided by DTS. In a regime where private FSPs will carry long-distance calls but may not undertake USO obligations, it is legitimate to ask whether they should retain the cross-subsidy element in the long-distance tariff or pass it on to the DTS.
- v) This however, presumes that long-distance tariffs will continue to contain a cross-subsidy element and that the USO obligations would continue to be fulfilled solely by DTS. Neither of these assumptions may hold true in an environment where long-distance services are open to competition and USO

obligations are undertaken by a multiplicity of operators.

- vi) In such an open competitive environment, competition among service providers can be expected to weed out any cross-subsidy element from the long-distance tariffs. In effect, these benefits will pass on to the consumer. To the extent that such additional cross-subsidisation over and above the UAL remains a policy, a separate transparent levy such as a “*rural termination charge*” may need to be imposed. In addition the revenues from such charges would need to be transferred to the Universal Service Fund in order to ensure its usage by all operators undertaking USO obligations.
- vii) To the extent that competition for intra-circle long-distance remains restricted, such cross-subsidy elements may remain and a mechanism may have to be found to transfer revenues from such implicit cross-subsidies to the Universal Service Fund, to the extent that a specific long-distance operator does not undertake USO obligations.
- viii) For funding overall network growth, DoT/DTS supplemented its surplus through profits from long distance operations, through market borrowings. Thus, it cannot be said that long distance profits only funded the VPTs provisioning. Therefore, this statement is not valid.

Increased revenue share to DTS is, otherwise also justified because present revenue share arrangement is heavily loaded in favour of the private FSPs as it is not in proportion to the network costs involved in origination, carriage and termination of the calls. Therefore, a three way breakup of revenue share should be implemented for long distance calls to compensate the access providers at originating and terminating end and the long distance carriers. Revenue share arrangements need to be provided for local calls also to compensate all the service providers according to their costs.

6. The policy of giving extra weightage to commitments obtained for VPTs from prospective bidders while considering the grant of licence does not seem to have succeeded. Should this be continued in the present or any other modified form?

- i) This policy has failed and be discontinued.
- ii) This question is not fully relevant in the present context because VPTs would have already been provided in all the villages by the time the new FSPs are licensed. However, the new licences should make it an obligation on the part of the FSPs for rollout of network for providing rural DELs (minimum @ 30% of the total DELs) in a time bound manner to achieve the desired teledensity targets. Same criteria should be applied to the existing licensees also. Similarly, there should be a target for roll out of low revenue urban subscribers in the same proportion as is existing today in order to over come the tendency of cream-skimming which is anti-competitive and detrimental to the growth of telecom network in the country.

7. Can it be considered that all VPTs may be provided by DTS with suitable compensation from USF?

- i) It is evident that DTS by itself or along with the Private FSPs will not be able to meet the Government's universal service objectives. The DTS is too big, weighed down with many social responsibilities with insufficient resources to meet all such responsibilities and preoccupied with the need to compete with private operators for survival. The private FSPs are licensed for an entire circle which include many lucrative areas which take priority for private investment. Hence a third type of operator, small entrepreneurs, each preferably committed to the area of operation, are required to meet the objectives. He will be a Rural Service Provider (RSP), restricted to an area of operation not exceeding a SDCA (generally equivalent to a Tehsil) and total DELs not exceeding 25,000. In low density areas, he can have regular exchanges with connection to the network of DTS or the private FSP or the NLDO for long distance calls. In multi exchange local areas the third operator can provide the access network (between the customer and the service node as in fig-4-B of the consultation paper) including multiplexers and concentrators like RSUs, RLUs group PABXs etc. For the unlicensed circles there is no restriction in bringing in a third operator since the NTP 1999 permits entry of multiple operators on the recommendation of TRAI. In respect of the present 6 licensees, they should concede the entry of these small operators in exchange for absolving them of the VPT commitment and even for changeover to revenue sharing scheme. In this scenario, which I hope will be considered by TRAI for recommendation to the government, there will be three different operators for meeting the Universal Service Objectives of the government namely i) the DTS at the national level, ii) the private large FSPs at the circle level and iii) the RSPs at the SDCA level which is the level at which the preferred method of costing for USO funding is to be undertaken.

CHAPTER 4

GENERAL CONCEPT OF UNIVERSAL SERVICE AND ITS FUNDING

- 1. Should the USF be used to compensate the access deficit caused due to below cost rentals of rural DELs and low calling urban DELs as well as lower call revenues, or, the access deficit be compensated through interconnect charges and only the deficit in operating costs compensated by USF? In other words, whether interconnect charges be also an instrument of subsidy to provide rural DELs and low calling urban DELs as an alternative to the USF or complementary to it?**
- i) Some opinions do not favour using interconnection charges as instrument of subsidy to provide rural DELs as an alternative to the USF or complementary to it and supports the policy of creation of USF through Universal Access Levy (UAL) to achieve the objective of Universal Service.
- ii) Urban areas, if viewed in totality are high revenue earners and the service providers in these areas need not be separately compensated for some low

calling urban DELs. A large contributory factor in the low revenues for the rural DELs is the non-availability of STD / ISD facilities. COAI believes that rural DELs will become economically viable, maybe even profitable, if they are provided STD/ISD facilities and therefore would not need to be compensated from the USO Fund. In view of the above, there is no justification for any subsidy through interconnect charges for rural DELs or low calling urban DELs.

However, in the case of areas where there is no rural telephone exchange within a distance of 10 kms, the first / smallest rural exchange (128 port CDOT Exchange) and the transmission link should be funded from the USO Fund.

- iii) The worldwide trend by operators is to increase network usage rather than increase complacency and inefficiency by compensating for under utilized network sources.
- iv) USF be used to compensate the deficit in operating cost only and access deficit be compensated through interconnect charges.
- v) Interconnect charges may be used as an instrument of subsidy. This would be complementary to the USF and would reduce the estimated maximum reserve price for subsidy bids. The level of such interconnect charges would depend on the Authority's view on the appropriate level of long-distance charges. It would be possible to continue an implicit cross-subsidy from long-distance charges if the national long-distance market is opened to free competition, as it should be. The continuance of the cross-subsidy would then require the imposition of a transparent rural termination charge to be paid by all national long distance operators terminating a call in a designated rural area. USO Fund for urban services However, we do not support the use of such subsidies for low calling urban DELs,.
- vi) All operators who provide i) VPTs ii) Rural/Remote DELs and iii) Low calling Urban DELs are eligible for reimbursement of shortfall in revenue from the USO fund. With multiple providers of fixed local services, intra circle long distance services and national long distance services, it is essential to change over to an access charge regime where the long distance interconnection revenue compensates for the deficit in access only, which is the difference between access cost (normally for capex recovery) and the rental received (normally below cost on affordability criteria). With this access charge regime the compensation criteria for the above three types of service provision have to be different.
 - i) For the VPTs, where there is no rental, both the capital and operational expenses should be reimbursed as in VPT - Model 2 in the consultation paper.
 - ii) For the low calling urban DELs, only the operational cost need be compensated from the USO fund since the capital cost is recovered through the rental and interconnection charges. It is assumed that there is no difference in the capital cost for

likable to revenue share, such as Internet, Voice Mail, ASPs etc.

- Sale/lease of customer equipment
- Sale/lease of assets,
- Interest and other returns from investments,
- Database marketing, etc.

Further, only the "net" licensable revenue should be considered i.e after reducing -

- All interconnection/access charges payable by the operator to other operators (including the incumbent)
- Settlements to be paid (say international calling)
- Cost of telecom services taken for resale
- Discounts and bad debts
- Other levies such as service tax/sales tax etc.

- ii) In the interests of standardization and ease of application, the Regulator should adopt the same definition of revenues for the purpose of calculating the UAL as would be used for the determination of revenue share licence fee for all service providers. The USO levy, as when decided by the Telecom Commission should be charged from a prospective date and only once the NLDOs become commercially operational. Also for the purpose of Income Tax, USO levy should be treated as a revenue expenditure.
- iii) The definition of gross revenue will be the revenue after taking out all interconnection charges.
- iv) The definition of Eligible Revenue may be the same as that used to calculate revenue share, but should not include revenue accrued on account of providing supplementary/value added services, as these could have been provided by an operator even without obtaining a license.
- v) The total income billed by the operator shall be the eligible revenue for purposes of UAL.
- vi) Net licensable revenue may be taken as eligible revenue. Exclude the earnings from non-licence activities
- vii) Eligible revenue for the purpose of UAL should be taken as gross revenue including the revenue received from other service providers as the interconnect charge and revenue share but excluding the revenue share / interconnect charge paid to other service providers. In addition, revenue from VPTs, Rural DELs, Low Calling Urban DELs and PCOs should be subtracted from the gross revenue for the purpose of UAL.

3. What class of operators should fund the UAL?

- i) All Telecom Service Operators as stipulate in NTO'99 should contribute to Universal Service fund in the form of Universal Access Levy.
- ii) All FSP's, CMTS, and ISP's may contribute to UAL.
- iii) All licensed service providers carrying voice telephony may fund the UAL.
- iv) All operators who provide public voice service shall contribute to the USO fund. This will include operators of fixed services, cellular mobile services, national and international long distance services and GMPCS. ISPs and VSAT operators should be included when they are permitted voice services to the public. All those contributing to the USO fund should be eligible to receive compensation if they provide the eligible services especially the VPTs. As per NTP -1999, the cellular operators are free to provide PCOs and if they are VPTs they should be eligible for compensation from YUSO fund. A proxy model for this can also be developed. Since all those funding the UAL are also eligible to make use of the fund there should be no difference in the percentage contribution of UAL by the different service providers.
- v) All licensed, registered telecom service providers and operators / hirers of captive / leased line networks should fund the UAL. DTO being the only USO provider at the moment and is likely to be largest recipient of USF, therefore, should be allowed to bill and keep the UAL. The net receipts for DTO may be reimbursed from the USF

4. Whether the percentage contribution of UAL from different operators providing different services be the same or different? If it should be different, the criterion thereof?

- i) Universal Access Levy contribution should be linked with eligible revenue of the service provider
- ii) To ensure transparency and non-discrimination amongst service providers, it is advisable to levy a uniform USO levy on all service providers in the same service area. NTP 99 also postulates that the Universal Service Levy be a percentage of revenue earned by all operators under various licenses. However, keeping in mind the different levels of economic development and existing tele-density of the various service areas, it would be desirable to levy graded USO obligations for different service areas. It must be reiterated that all types of service providers within a particular service area should be liable to pay the same level of UAL.
- iii) It should be different. Contribution should be arrived as a percentage of ARPU.
- iv) Customer doing less calls may contribute less towards USO levy and customer doing more calls may contribute more towards USO levy.
- v) Cellular Mobile Telephone Service Providers, National Long Distance Service Providers, International Long Distance Service Providers, Internet Service

Providers and other Value Added Service Providers should contribute larger percentage of their revenues towards UAL compared to others. This higher percentage of revenue towards UAL shall be applicable to the revenues of FSPs accruing from Intra-circle Long distance as well.

5. Whether there should be a Proxy Model for evaluating the claims of USO submitted by the eligible carriers?

- i) Yes
- ii) Assessment of cost, based on a well defined network segment is the most appropriate and transparent method. The high cost area approach (para 10 of chapter 5) with each SDCA considered as a separate cost and revenue centre should be initially adopted, though this may require collection of more data (After gaining experience attempts can be made to group the SDCAs into different categories or to identify loss making areas and adopt other approaches) A proxy cost model for calculating the cost of serving a particular SDCA should be developed to evaluate the claims of eligible operators.
- iii) Population as well as income level may be determinants for deciding proxy model.
- iv) An average proxy model will not be sufficient to be described for all the area. It should be different for difficult areas particularly for area in North Eastern regions and J&K, etc. SDCA covers urban & rural areas. Hence it is difficult to decide a single proxy model for a SDCA. It is impossible. There may be more models for a single SDCA.
- v) Different percentages for different classes like CMTS, DLD, ISD and class like Paging etc.

6. Should adjustments be made for the reimbursement to DOT (DTS) of the licence fee while considering their claim for payment from US Fund?

- i) The license payment and UAL payment are two separate issues. For having a level playing field DOT/DTS should not be reimbursed license fee. However, in case it is decided, the license fee reimbursement should be adjusted out of Universal Service Fund reimbursement to DOT/DTS.
- ii) Reimbursing the licence fee to DTS as also providing it funding support from the USO fund to fulfil its rural obligations would tantamount to doubly advantaging the incumbent operator. In the interests of transparency and non-discrimination, it would be more appropriate if all funding to fulfil USO obligations is sourced directly from the USO Fund and there should be no

reimbursement of licence fee.

- iii) The license fee reimbursement to the DoT mentioned in the NTP 99 is to compensate for the social obligations imposed by the Government on the DOT as a Government Dept. These relate to over employment provision of services to government agencies and legislatures with high probability of writing off bills, long distance connection (not covered by USO) to remote and strategic areas without adequate return, disaster management telecom facilities with no return etc. Even these reimbursement may be affected when DOT is corporatized and later privatized without much change in obligations. Hence contribution to the USO fund and reimbursement from the fund should not be linked with any other contribution or reimbursement. Any such linkage will give rise to many claims and counterclaims by different operators.
- iv) No licence fee is payable by DTS. However, refund of licence fee by the Government in respect of Cellular Service provided by DTS is on account of other immense social obligations enforced by the Government which are not part of the proposed USO model.

5. ASSESSMENT OF COST – APPROACHES AND METHODOLOGIES

VPTs:

1. **Should the capex recovery for VPTs installed prior to NTP 99 be considered for support from USO Fund?**
 - (i) There should be no recovery of capex for VPTS already provided prior to NTP'99. The capex recovery may be permitted for the VPTs to be provided in the uncovered villages as stipulated in NTP'99.
 - ii) Most VPTs set up before NTP '99 were established by DoT. These were mostly financed through cross subsidies from long-distance calls. Further, most incoming calls to these VPTs generated revenue for DoT, as these were made from DoT's network elsewhere. Therefore the case for recovery of capex on these installations is weak. In addition, as the Consultation Paper recognizes, the performance of the analogue MARR technology, which comprises over half the existing VPTs has not been satisfactory and therefore compensation would also need to be reviewed on account of inadequate service standards.
 - iii) Significant borrowing of funds and leasing of MARR equipments had to be resorted to by DoT/DTS to provide these VPTs and in all fairness it justifies compensation to DTS for capex recovery of these VPTs from USO fund.
2. **Estimates for costs of providing VPTs vary over a wide range. For the purpose of support from USF, should standard costs for ordinary, hilly and tribal areas be adopted?**

- i) Standard costs should only be used as a benchmark, while determining the maximum reserve price for subsidy bids.
- ii) Yes

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Rural / Remote

3. Is it reasonable to assume that average cost of rural DEL is 40% higher than that of Urban DEL?

- i) Cost estimate as mentioned above appears to be reasonable.
- ii) The magnitude of the variation will have to be established through a proper & detailed costing exercise. The cost of rural DEL can be reduced further as mentioned in Point 2(2), by waiving the customs duties, excise duties, and sales tax on all equipment to facilitate delivery of affordable services to the rural consumer.
- iii) With competition in the DLD and IDD, the compensation from interconnect may be difficult. USF may finance only the capital investment in local loop. The concept of recurring deficit of providing rural tel lines wouldn't hold good in a competitive, market driven economy as once invested, the operator can actually exploit that local loop to his advantage by increased network usage.
- iv) The average cost of a rural DEL is 40% higher than that of urban DELs. Rather, we feel this will vary considerably based on geographical location, size, population etc. of a particular area. Even for purposes of the proxy model, such an assumption should not be made, since it would affect the maximum reserve prices in a perverse manner.
- v) The 40% higher cost for rural DELs as estimated by the DOT and the private operators should be accepted till the Advisory Board comes up with standard costs for the proxy models.
- vi) Much more

4. As revenue sharing on interconnect compensates for access deficit, should USF be used only to subsidize the shortfall caused by excess of operational expenditure over revenue? Whether USF should finance only the capital investment or recurring deficit of providing a rural telephone.

- i) USF should compensate both capital expenditure as well as the recurring deficit for providing a rural telephony.
- ii) The USO resources should be provided to meet the capital investments and operational expenditure for provision of VPTs and PTICs. Urban or rural

DEL's should not come under the ambit of USO funding.

- iii) With competition in the DLD and IDD, the compensation from interconnect may be difficult. USF may finance only the capital investment in local loop. The concept of recurring deficit of providing rural tel lines wouldn't hold good in a competitive, market driven economy as once invested, the operator can actually exploit that local loop to his advantage by increased network usage.
- iv) In respect of rural DELs the compensation should cover the operational costs and 40% of the capital costs in view of the 40% higher capital cost of providing a rural DEL. The consultation paper estimate of Rs. 4,724 and the DTS estimate of Rs.2,232 as the annual revenue per rural DEL need to be reconciled. As per DOPT annual report, among the circles, Karnataka Circle has the highest average annual income of Rs. 10,039 per DEL, the lowest being Himachal Pradesh with Rs. 4,855. The rural DEL revenue estimate of Rs. 4.724 is based on data from Karnataka circle and could be on the higher side. The all India average for rural DEL could be nearer Rs. 2,232.
- v) Capital cost and operational expenditure should be considered.
- vi) There should be one time funding of part of the capital cost of VPTs and rest should be based on revenues. To ensure that the installed equipments should be in use, the maintenance etc. should come through usage. Only apprehension is that if the person is getting compensation towards maintenance, there should not be any incentive to improve its packaging, efforts towards improving its revenue, etc. If it is not generating usage, the same may not be entitled for USO

Low calling Urban DEL:

- 5. Whether UAL should be raised to provide Universal Access in both urban as well as rural areas? This will involve subsidizing of loss making telephones irrespective of their geographical location in the service area.**
- i) UAL should be raised to provide Universal Access only in rural areas.
 - ii) UAL should be used to provide VPTs and PTICs in rural areas as well as the first rural exchange
 - iii) To limit the discussions to provision of local loop (i.e. the capital expenditure) rather than the usage of network resources.
 - iv) UAL should be raised to provide Universal Access in both urban as well as rural areas.
 - v) At least 70% of the DELs can be categorized as low calling subscribers (TTO-99) while the rental and access charges may compensate the capital

costs, the average call charges income from these low users are too low to compensate the operating costs. A private FSP has announced that he will focus on business and commercial clients, the so called high usage customers. The Hindu of 9, July 2000, while reporting the fall in FDI in telecom sector states "As much as half of the investment went to the cellular sector which made a mockery of the reason d'etre behind liberalizing the segment which was to make available phones on demand." To attract investment in fixed services to the low usage customers it is essential to provide incentive in terms of compensation from the USO fund.

- vi) Group telephones for low calling urban lines may be the answer which will reduce down the requirement of external components. We should connect more subscribers in a buildings by grouping. EPABxs can also be one of the solutions for providing communication in a building

6. Whether low calling urban subscriber should be defined as those upto 500 metered calls per month or upto 200 metered calls per month.

- i) Low Calling Urban subscribers should be defined as those who makes not more than 200 calls per month of a billing cycle.
- ii) The USO levy is sensitive to the average annual revenue and the assessment of this revenue has to be made with care. The total rental plus call charges for 200 calls and 500 calls as derived from Annexures 5-J-2 and 5-K-2 comes to Rs. 2,396 and Rs 4,716. The national average revenue per DEL of DTS, including MTNL, for the year 1998-99 (DTS annual report 1999-2000) was Rs. 8,43 per month or Rs. 10,116 for the year. The average low user revenue of Rs. 4716 with 500 call comes to 46.6% of the national average. This appears too high considering that the revenue distribution curve has longer and longer tail as the tele density (mainly due to addition of residential subscribers) increase. The average of Rs. 2,396 with 200 calls appears too low since it is lower than the rental revenue as per TTO-99, which DTS is bound to adopt considering their falling revenue. While the limit of 200 or 500 calls to identify low user subscriber may be applicable in tariff fixation, their application to USO fund reimbursement may not be realistic. The proxy model for costs and revenues are based on SDCA which can have wide variations in average revenue. On a circle basis, the average annual revenue varies from Rs 4,855 in Himachal Pradesh through 10,039 in Karnataka Circle to Rs 16,583 in Chennai district. Hence for calculating the USO reimbursement on a SDCA basis in respect of low urban callers another approach is necessary to assess the total income from low callers. One approach could be a below.

A survey carried out by DOT a few years ago indicated that about 70% of subscribers pay less than the average revenue per DEL. TTO -99 states that low user subscribers comprise more than 70% of the total subscribers. Hence it appears appropriate to define low user subscribers in a SDCA as those paying less than the average for that SDCA. The total annual revenue from

the low user subscribers can be calculated as the sum of the annual revenue from those subscribers whose annual payment is less than the average. This will not call for any more effort than aggregating the revenue from those making less than 500 calls per month in a billing cycle.

- iii) 500 calls may be taken as figure for passing USO subsidy
- iv) USO should not cover low urban calling subscribers. We have to push the operators to provide such services. Atleast it can provide enough incentives for applying innovative ideas to significantly reduce the cost such as providing shared phones. It is possible to generate profits by applying innovative models. Subsidy will provide disincentive in this respect. Incremental cost for providing urban lines is roughly in order of Rs. 8000-1000/-. This will meet the deficit of lines through rental only

CHAPTER 6

ORGANIZATIONAL ARRANGEMENT FOR ADMINISTRATION OF USO

1. How should the administration of USF be organised?

- i) USO should be administered by an independent agency to be decided By the Government.
- ii) TRAI should administer the USO Fund through a USO Board comprising of an independent and reputed firm of Chartered Accountants, representatives from the industry and Telecom Consultants who have the required professional expertise to undertake this task. Further, it would be preferable to have a real fund with actual inflows and outflows and not a settlement mechanism between service providers, as the latter could get easily derailed through disagreements / defaults / litigation.
- iii) By a strong Independent Regulator.
- iv) The administration of the USF would entail setting maximum reserve prices for subsidy bids, laying down conditions for achieving teledensity targets, and deciding on phased payments of subsidies etc.
- v) Setting up a separate body, reporting to TRAI, to administer the universal service fund will be the most appropriate. This body will operate under the guidance of TRAI. The routine functions of collection, assessment and disbursements should be with this body. The TRAI will issue guidelines and also monitor and review the functioning of this body.
- vi) Should be represented by all service providers who contribute to USF.
- vii) A separate independent board reporting to TRAI with competence in finance and accounting. It should be capable of interpreting the decisions of TRAI / GOVT. Purely professional body with a specific function of

- collection and disbursement.
- viii) Licensor should have a dedicated set up.

2. Who should monitor the achievement of teledensity target in rural areas and decide on the quantum of subsidy to be given from the USF?

- i) The licensor should monitor the achievement of tele-density target in rural areas and the USF administrator should decide the quantum of subsidy to be given from the USF.
- ii) TRAI should, with the assistance of the USO Board, have the responsibility to monitor the achievement of rural telephony and teledensity targets as laid down in NTP 99.
- iii) This monitoring should be done by the TRAI or if the Authority so decides, by another *independent* agency. It should not be made by the DOT/DTS. The quantum of subsidy would be determined by the minimum bid or reserve price as the case may be.
- iv) TRAI will continue to have the responsibility of ensuring effective compliance of the universal service objectives. TRAI will monitor the increase in VPTs and teledensities and advise Government on the progress along with changes required in the policy. The guidelines for implementing the USO and managing the USO fund will be issued by the TRAI, but TRAI should leave the routine functions of collection, assessment and disbursements to the separate body above.

3. Recognising that Universal Service is a dynamic concept and needs to be reviewed periodically for defining its scope, commensurate with development of communication technologies and information services, should a Universal Service Advisory Board, with experts from operators, financial institutions and consumer groups, be constituted, under the aegis of TRAI, for the purpose to undertake annual review of the services to be covered under Universal Service Obligation, proxy network model?

- i) A Universal Service Advisory Board with experts from operators, financial institutions and consumer groups be constituted under the aegis of the Administrator.
- ii) Universal Service Advisory Board with due representation from the industry / financial institutions, etc to oversee the working of the Fund, deployment of resources, monitoring of tele-density, etc. Rather than the services, it's the provision of the media in the local loop, the services will automatically evolve in a market driven economy because of will to exploit existing infrastructure
- iii) Such a Board can be constituted if the Authority is of the opinion that the Board would assist it in refining its estimates of universal service for

purposes of the benchmark model and calculation of the minimum reserve price and in responding to the evolving nature of universal service. However, in such a situation, an annual review is likely to become an audit exercise, rather than a constructive advisory engagement.

4. Should the UAL be shown and charged separately in a customer's bill like service tax or be embedded in the cost and reflected in tariff?

- i) UAL can be shown separately in a customer bill. However, the type of customer in whose bill the UAL can be charged should be determined by the Administrator.
- ii) It would be preferable to show USO levy as a separate charge in a customer's bill issued by any service provider, including ISPs, as is being currently done for service tax. This would ensure clarity and transparency to the customer as otherwise, it will be passed on to the customers as a hidden cost in the form of higher tariffs. This transparent approach will also ensure the direct remittance of the UAL into the USO Fund without undergoing multiple transfers through the service provider, licensor, etc.
- iii) There is a merit in showing it in bill but there is a genuine fear that it would become an additional cost for the consumer. Incumbent has lost 2000 crore. If this becomes an additional levy, the subscriber would react initially. Therefore, carefully it has to be handled and the rates will have to be reduced along with the levy.
- iv) USO to be met from his own fund and not to be charged separately from consumer
- v) Less than 200 calls should not have the USO shown in the bill.
- vii) It should be part of total bill

5. For USO funding, separation of accounts of various service products is essential. For clarity and transparency, should the accounting formats and procedures for unbundled services be standardised?

- i) Yes. The requirements of accounting separation should immediately be rolled out for the incumbent operator and then to the other players also. TRAI should standardise clear and transparent accounting formats for the unbundled service.
- ii) TRAI have already issued a Consultation Paper regarding accounting separation and finalisation of accounting formats for which DTS have sought certain clarifications. These formats and procedures for unbundled services may be standardized after careful consideration of the various issues involved.

Annexure-B

Proxy Models

Proxy Model in France:-^[5]

B.1 The Telecommunications Act of 26th July 1996 establishes the principles of USO in France. Universal Service means the provision of quality telephone service to everyone at an affordable price and ensures provision of payphones throughout the country, free routing of emergency calls, provision of a directory enquiry service and a subscriber directory. France Telecom is the public operator responsible for providing Universal Service.

Cost of Universal Service

B.2 The cost of universal service is net balance of avoidable costs and revenue foregone. The avoidable costs are determined on the basis of operator's financial account and is the additional cost borne by the operator in meeting the Universal Service Obligation i.e., the difference in cost between a purely market driven situation and a situation where it also had to meet the Universal Service Obligations. The components of cost included

- a) those related to imbalance in the current France Telecom Pricing structure: rebalancing of tariffs;
- b) cost of accessing the telephone service for the same price irrespective of location;
- c) cost of offering social tariffs (physical handicaps and low income level user);
- d) cost of installing and maintaining public payphones nationwide;
- e) cost of providing universal directory and directory enquiry service.

Out of these costs, the costs due to tariff rebalancing indicated in (a) above is temporary in nature and has been removed from January 1, 2000. ART, the French regulator evaluates the net costs as well as the corresponding amount due from each of the operator based on traffic volumes and submits it to the minister.

Calculation of Costs :

B.3 ART uses an economic model for calculating the provisional cost of unprofitable zones. It uses a representation of the economy of France Telecom's network, with 35

categories of local distribution zones identified on the basis of population density. Each zone has been allocated corresponding costs and revenues based on France Telecom's data and ART's accounting rules for the purpose. The cost of providing a uniform service nationwide is now calculated on the basis of real observation of the physical characteristics of the France Telecom network and not statistical data. This results in lower costs. For each category of local zone, a net cost emerges where the additional cost incurred is more than the direct and indirect income in serving these zones. The model mirrors the behaviour of an operator that develops the network on the basis of most profitable zones i.e., the zones where the population density is the highest.

AUSTRALIAN MODEL ^[6]

B.4 Australia has adopted Avoidable cost and Revenue foregone mechanism for estimating the Net Universal Service Cost (NUSC). NUSC is the amount by which avoidable costs exceed revenue foregone in serving Net Cost Areas (NCAs). The formula used for NUSC is:

$$\text{NUSC} = \text{Avoidable cost} - \text{Revenue foregone}$$

The incumbent service provider, Telstra has the responsibility of meeting USO requirements. Telstra is required to meet its USO targets in accordance with a Universal Service Plan approved by the minister. Within 90 days of the end of the financial year, Telstra may lodge its claim for fulfilling its universal service obligation with Australian Communications Authority (ACA). Telstra's claim is evaluated with a computer based Proxy Model. The brief details of this proxy models are discussed below.

B.5 To build a model for calculating NUSC, Telstra, C&W Optus, Vodafone and the ACA together worked over a period of approximately two years to develop the NUSC costing model based on inputs related to avoidable costs and revenue foregone. The US based company Bellcore International Inc was contracted to build the costing model. The process involved recommending methodology for handling components of avoidable costs and revenue foregone.

The major deliverables of the above mentioned model developed by Bellcore were the following:

- Net loss area specifications providing rules for identifying NCAs so that

universal service funding is directed only to those areas for which it is intended.

- Written report on costs replacement costs which discusses the methodology for estimating the replacement costs for customer access network (CAN), switches, junctions, etc.
- Specifications on CAN costs and Excel spreadsheet Model for estimating CAN costs by Area and sub-CAN area and capacity costing, sampling and the stratification process to be used to derive average CAN costs.
- Report on local switching costs and specification for associating local switching costs with the NLAs which describe the capacity costing and sampling process to calculate avoidable switching costs.
- Rural Depots Operating Expense Analysis and Deliverable Report on Non depot overhead costs identifying potentially avoidable operating costs, cost drivers and methodologies for calculating these costs.
- Payphone asset costs, and deliverable net loss payphone methodology identifying potentially avoidable payphone costs and the methodology for calculating these costs.

B.6 The avoidable cost determination requires use of the most cost-effective technology and production practices that are available and suitable. These costs are based on the forward-looking technologies of service delivery with respect to engineering rules, regardless of the existing means of delivery. Avoidable costs determination stipulates that the NUSC represents the cost of that part of the network that would be needed specifically to service the USO requirements as at the relevant date. The basis for deriving the costs are those that would be borne by the most efficient operator in delivering the stipulated services and represent the true opportunity cost of meeting the USO.”

B.7 The Net Cost Area includes the following types of areas:

- a) Small exchange service areas(ESAs)
- b) Built-up areas(BUAs)
- c) Non-built up areas(NBUAs)
- d) Premises to which radio services were supplied; and

e) Payphones.

An ESA is Telstra's exchange service area, where an exchange is a point of convergence of telephone cables that has a specified set of number ranges. ESAs with less than 150 services in operation (SIOs) are considered as a single geographical area.

B.8 The BUA can be described as a rural township. It includes contiguous, readily recognisable town blocks, recreation areas and places land normally associated with township activities. The NBUA is that part of an ESA which is outside the boundary of the BUA. NUSC is calculated separately for BUAs and NBUAs. Further, as the cost characteristics of radio service and payphones are different from ESAs, they are costed separately. The number of SIOs, BUAs and NBUAs is determined statistically. Categorisation of ESAs, BUA and NBUA is done based on working line density and number of services.

B.9 Sampling is used to calculate the average number of SIOs in BUAs and NBUAs, costing of CAN at sub ESA level, stratifying potential net loss area into those with similar CAN costs, estimation of revenue per SIO, installation costs for junction, switches & payphones and operating cost per SIO.

B.10 Telstra has used sampling processes to estimate most installation costs for junctions, switches and payphones. For example, the average installation cost per kilometer for optical fiber cable was based on estimates from 19 recent projects in country Victoria, South Australia and Queensland, covering a total of 634 kilometers of cable

B.11 Revenue per SIO is categorised into

- Net International Direct Dial (IDD) revenues as determined by billing records and netted against settlement,
- calls originating on the PSTN and terminating on mobile network,
- local revenue originating in the Potential Net Loss Area (PNLA) and terminating in other PNLAs,
- total information service provider revenue for calls originating in the PNLA,
- revenue associated with rental of equipment

- installation connection and other non recurring charges,
- operator assessed revenue, and
- average discount per SIO.

B.12 While calculating the avoidable cost technology cost and technology selection were also considered. While selecting a particular technology the relevant date for selection of technologies, the principles used for selecting technologies were also considered along with the factor whether a data capability should be a requirement for technology selection. The criteria used for selection of appropriate technologies was that the person supplies carriage services using the most cost effective technology and production practices that:

- a) are available; and
- b) are suitable for Australian conditions; and
- c) are reasonably suitable for integration with the person's existing telecommunications network; and
- d) comply with Australian regulations, codes and standards applying to the supply of carriage services.

USA MODEL ^[7]

B.13 The FCC, in the USA, adopted a universal service order in May 1997 based on forward economic looking cost methodology to calculate support for non-rural carriers. The Universal Service support mechanism for Non rural carriers (effective from Jan 1, 2001); recognizes forward looking costs estimated by the cost model, which are then averaged at statewide level. National benchmark was set at 135% of national average forward looking cost per line of providing support through universal service fund. This forward looking higher cost support mechanism provides support for interstate carrier for whom the forward looking cost per line that exceeds the national benchmark.

Proxy model

B.14 For estimation of costs in high cost areas, it was decided to have a proxy model for the network. The reason for adopting a computer based cost model was to enable regulatory authorities to estimate the cost of network facilities and services without having to rely on detailed cost studies especially prepared by incumbent local exchange carriers and to provide an independent check on the accuracy of

incumbent LEC cost studies. A public consultation was carried out for the finalisation of the model. The final adoption of a synthesis model took place in October 1998. In October 1999 the commission adopted a final inputs order, which defines a set of inputs for the model. This model provides separate treatment for Rural and Non Rural local exchange carriers.

B.15 The principles adopted for framing the proxy model are as under:

- The model must be the least-cost, most-efficient and should use reasonable technology for providing the supported services that are currently being deployed.
- This model must include the incumbent LECs' (ILEC) wire centers as the center of the loop network and the outside plant should terminate at ILECs' current wire centers.
- The loop design incorporated into a forward-looking economic cost study or model should not impede the provision of advanced services. Wire center line counts should equal actual ILEC wire center line counts, and the study's or model's average loop length should reflect the incumbent carrier's actual average loop length
- Any network function or element, such as loop, switching, transport, or signaling necessary to produce supported services must have an associated cost.
- Only long-run forward-looking economic cost may be included. The long run period used must be a period long enough that all costs may be treated as variable and avoidable.
- The costs must not be the embedded cost of the facilities, functions, or elements. The study or model, however, must be based upon an examination of the current cost of purchasing facilities and equipment, such as switches and digital loop carriers (rather than list prices).
- The rate of return should be the authorized federal rate of return on interstate services, currently 11.25 percent, or the states prescribed rate of return for intrastate services.
- Economic lives and future net salvage percentages used in calculating

depreciation expense should be within the FCC-authorized range and use currently authorized depreciation lives.

- The cost study or model must estimate the cost of providing service for all business and households within a geographic region. This includes the provision of multi-line business services, special access, private lines, and multiple residential lines.
- A reasonable allocation of joint and common costs should be assigned to the cost of supported services in order to ensure that the forward-looking economic cost does not include an unreasonable share of the joint and common costs for non-supported services.
- The cost study or model and all underlying data, formulae, computations, and software associated with the model should be available to all interested parties for review and comment. All underlying data should be verifiable, engineering assumptions reasonable, and outputs plausible.
- The cost study or model should include the capability to examine and modify the critical assumptions and engineering principles. The assumptions and principles include, but are not limited to, the cost of capital, depreciation rates, fill factors, input costs, overhead adjustments, retail costs, structure sharing percentages, fiber-copper cross-over points, and terrain factors.
- The cost study or model must be average support calculations to the wire center serving area level at least, and, if feasible, to even smaller areas such as a Census Block Group, Census Block, or grid cell in order to target efficiently universal service support. Carriers must provide verification of customer location when they request support funds from the administrator.

B.16 The inputs required in the proxy model are price of various network components, installation and placement costs, capital cost parameters etc. They are values that can be altered by the users. There are two parts of a proxy model:

- **Platform**

It is a set of algorithms that determine the cost of an exchange network and includes a component for 0.5. each portion of the network. It includes all parts of the model that are not user supplied

- **Inputs**

They are values that can be altered by the user,

Example: price of various network components, installation and placement costs, capital cost parameters.

B.17 A proxy model comprises of a clustering and loop design module (local loop), switching module, transmission module and expense module. During the course of the model development process, several industry sponsored models were submitted to FCC for evaluation. These include

1. Benchmark Cost Proxy Model (BCPM) sponsored by US-West, SPRINT and Bell – South
2. HAI Model sponsored by AT&T and MCI
3. Hybrid Cost Proxy Model (HCPM) sponsored by FCC

In Oct 1998, FCC adopted HCPM for Clustering and Loop design and HAI for switching, transport and expense module.

Elements of a Proxy Model

Clustering and Loop Design (HCPM Model)

B.18 The clustering and loop design module essentially determines the cost involved in building up an efficient local loop i.e., from customer premises to the wire center. This comprises of Customer location module, clustering algorithm, grid overlay design, loop design, feeder design and costing.

1. Customer location Module: Inputs

B.19 The most important input to the model is the geocoded location of the customer. In absence of exact data the customers can be assumed to be located on the road. Alternatively, census block level data can also be used for the purpose.

2. Clustering Algorithm

B.20 The HCPM identifies the customer clusters or serving area and then connects it to the feeder system using serving area interface (SAI). A serving area is limited by the constraints of capacity and geographical dimensioning. The model creates a proper number of feasible serving areas keeping in mind the fixed and variable costs involved in serving each additional service area. Each location in the service area belongs to a single parent cluster. The parent cluster is subdivided into a child and a parent till all the clusters are

feasible from engineering point of view. Another approach could be of agglomeration of small clusters to form larger clusters. Optimisations are carried out to arrive at the most effective distribution.

3. Defining a grid overlay

B.21 Output of Cluster Algorithm is a set of clusters for each wire center. The information required for each cluster include

- Coordinates of each customer location
- Number of business and residential lines
- Terrain data (bed rock depth, rock hardness, soil type, depth of water table, minimum and maximum slope.

A grid is defined over each clusters and microgrids are created to cover the customer locations in order to have a reasonable approximation of the customer location. The recommended default size of a microgrid is 360 feet X 360 feet, although it can be user defined. There are likely to be lot of micro grids, which do not have any population and can be excluded. Loop plants can be constructed for only populated microgrids. The model then calculates the feeder distribution for the mocregrids.

4. Loop Design Algorithm

B.22 Each populated microgrid is divided into a number of equal sized lots and distribution cable is is placed to connect every lot. The customers are assumed to be uniformly distributed within the microgrid. These microgrids are connected to nearest concentration point i.e., serving area interface (SAI) by distribution plant. The SAIs are connected to central Office switch by feeder cable. The choice of feeder i.e., copper or fibre is made by the model based on distance of customer, prices etc. The distribution plant within a microgrid is built to touch every lot in the cell. Two alternate algorithms (not detailed here) are used for connecting the microgrids to the SAI.

5. Feeder Plant Design Algorithm: HCPM (Modified Prim algorithm)

B.23 The model then computes the cost of each possible configuration of primary and secondary SAIs within a cluster and selects the least cost option. In event of a secondary SAI being used, it is connected to the primary SAI using least cost option by T1 lines. The cost of copper based T1 and Fibre DLCs are determined using capacity algorithms. A brief of the algorithm is as follows:

- Begin with a network consisting of CO office alone
- From a set of unattached nodes, find the nodes for which average cost per line is lowest
- Choose From the set of unattached nodes, the node for which the average cost is the lowest.

The model runs this algorithm and terminates when all the nodes are connected. In construction of the feeder network, the model allows the user to use airline and rectilinear distance and also has a provision to apply the road factor (determined imperically for each region).

6. Feeder plant costing

B.24 The model requires the cost element inputs in respect of the following and then utilizes the algorithm described above for determining the costs.

- Cable sizing and costing including copper distribution cable cost, drop terminal cost, drop wire cost, fiber feeder cost, fill factors etc.
- Terminal cost including fiber DLCs or T1 terminals
- Structure cost including cable laying, manholes et depending upon type of terrain, type of lay out, soil type, rock hardness, density, water depth, size of cable.

The input to this model utilizes the data that are available in the public domain to provide independent estimate of the cost of placing outside plant facilities and digital switching equipment. The data base of National Regulatory Research Institute[NRRI]., which contains 12679 records of unit cost of labour and material associated, was utilized.

Switching and transport module

B.25 This module is based on Total Service Long Run Incremental Cost. It provides the network investment estimates in the following categories:

1. Switching and wire center investment
2. Signaling network investment
3. Transport investment
4. Operator Systems investment

The inputs required include total line count for each wire center, distances between switches, traffic peakedness assumptions, distribution of traffic among local intraoffice, local interoffice, intra LATA toll, interexchange access and operator services etc.

1. Switching investment

B.26 The module places one end office switch at one wire center. The capacity of the switch is calculated by adding up all switched lines in the area served by the wire and then comparing the resulting total to the maximum permissible size center (default max switch line 80000, user adjustable). If the number of lines are more than maximum say 1 lakhs, the model will put two switches of 50000 line each to account for maximum expandability. A double check is performed to see whether the switch is line limited or processor limited. Then the module compares the traffic with the user defined per line traffic, which can be set differently for residential and business customers (allowance for Internet traffic with larger holding time). The model has an option now to either have user defined host, remote and standalone switch or to use the model algorithm for the purpose. The model then places hosts and remotes on SONET rings separate from interoffice rings. It then computes investments in ADMs and Digital cross connects and calculates average Add Drop MUXs (ADM) / Digital Cross Connects (DCS) investment per line. Cost of an entire switching system consisting of its host and remote is allocated evenly over all lines served by the configuration. Switching investment curve are used for estimating the switch cost. From the switching investment the investment on trunk port is removed, which is accounted for in transmission module. The wire center cost is calculated for each wire center.

2. Transport investment

B.27 This module is used to estimate the costs of the transmission systems. In order to determine the costs, the module first determines the overall breakdown of traffic per subscriber according to the traffic assumptions i.e., the break up of the total traffic in different categories and then determines the number of trunks. These break up percentages are applied to the total traffic in each wire center based on business / residential assumptions and appropriate per line load. It then computes the total load offered per Wire Centre for various trunk classes i.e., local, direct route and then compares the load of a trunk class to an engineering threshold driven by the grade of service required. If the load exceeds threshold the number of trunks is the quotient of total offered load divided by the user specified maximum trunk occupancy and if it is less than the threshold, the model determines the trunks using Erlang B formulae with 1% blocking.

B.28 For interoffice communication SONET rings are established. There are user defined inputs for maximum and minimum requirements of wire centers on a ring. The model begins with a case where all wire centers are connected directly to their serving tandems. Each wire center is then examined to determine whether it is investment wise more advantageous to leave it directly connected to the tandem or to put in on the ring. While considering addition of a wire center on the ring the investment is compared with the cost involved in direct interconnections and Multiplexers before making the decision. While computing the rings, additional savings are realized through having standalone rings and connecting this ring with the tandem or a ring that has the tandem in it. The model also takes account of additional capacity required in the rings to handle transit traffic.

B.29 At the highest level of the ring network, the model provides a path for tandem to tandem connectivity through inter-ring-system connectors. This creates a fully meshed ring system within a LATA. Once the configuration is in place the model determines the elements of the ring networks i.e., the set of wire centers comprising the ring, the distances between them and the node to which it connects, list of centers serve by spurs and their distance, list of wire centers that serve as inert ring system connector nodes and their distances, the total number of ring connectors required, the total connector distance, the total number of inter-ring-system connector and its distances and the total number of rings that have the tandem. Based on these information, the model calculates the cost of installed cable, structure costs, mix of structure types, amount of structure sharing between interoffice and feeder plant. User specified sharing percentage is used to calculate the shared investment.

3. Tandem switch investments

B.29 Here, the module performs the investment calculations and assigns the price for switch, switching matrix and control structure and investment in trunk interfaces. The number of trunk interfaces are derived from transport investments. The tandem wire center calculations assume the maximum switch room size and also assumes that tandem will reside with a wire center that contains at least one end office switch.

4. Signalling investment

B.30 The module computes the cost involved with the signalling links. The model always equips two signaling link per switch. User defined variables for message length of ISUP and

TCAP are used to determine the signaling link cost. The model also determines the STP and SCP costs involved.

5. Operator Systems investment

B.31 The model also takes into account the investment in the operator tandem and trunk requirement and operator position investment.

Expense Module

B.32 The expense module receives from other modules the network investments, by type of the network, component necessary to provide UNEs, basic universal service, network interconnection and carrier access in the area. It estimates the capital carrying costs and the cost of operating this network. Capital carrying costs include depreciation, return on debt and equity investment required to build the network and the Income taxes imposed on the returns. The operating expenses comprised of network related expenses like maintenance and operations and non network related expenses like customer operations, general support, other taxes, uncollectibles and variable overhead expenses.

ANNEXURE C

PLAN ITU as a Proxy Model tool

C.1 In the interim period till a more detailed Proxy Model is developed for India, the PLANITU Computer tool may be used as a Proxy Model.

The ITU at present provides one licence free of charge to Member Administrations, and since TRAI is such a Sector Member, the Authority could obtain this model for use in the USO programme. This Software has been provided to a number of countries including India, Thailand, Indonesia, Vietnam in Asia. The present model is an updated version, and could be obtained by TRAI.

C.2 PLANITU is a computer tool for optimisation and dimensioning of telecom networks, designed to facilitate the task of planning a network over a medium term period, eg. a 3-5 year period. It presents an integrated interactive approach for finding minimum cost solutions for

- location and boundaries of exchanges;
- selection of switching and transmission equipment;
- circuit quantities, traffic routing, switching hierarchy;
- choice of transmission paths.

Once the basic data are available, various network scenarios can be investigated quickly and accurately. The sensitivity of the network to changing demands, to the choice of switching and transmission equipment, or change in technology can be easily seen. Results are available in detailed as well as in summarised form.

C.3 Applications

Applications are as below:

C.3.1 Local Networks

- Exchange locations, Exchange boundaries, RSU locations & boundaries
- Inter-exchange network, Exchange hierarchy
- Transmission systems

C.3.2 Rural Networks

- Exchange locations & boundaries
- Exchange hierarchy, Inter-exchange network
- Transmission systems

C.3.3 National & International Networks

- Traffic routing
- Exchange hierarchy, Inter-exchange network
- Transmission systems

C.4 Data required for Network Planning

The data required for planning of telecommunication networks depends on the type of network, and the planning objectives. For most networks, the following data are required:

C.4.1 Present Network Configuration

Exchange locations and boundaries
Exchange and transmission equipment
Geographical lay-out of subscriber and inter-exchange network

C.4.2 Demand Forecasts

Subscribers: location and category
Traffic: quantities and dispersion

C.4.3 Switching Equipment

Capacity: subscriber lines, junction lines, call attempts, etc.

Costs: subscriber, junction line, exchange units
Traffic handling specification
Floor space requirements

C.4.4 **Transmission Equipment**

Capacity
Cost: system, terminal equipment, repeaters; interface to other systems
Attenuation and loop resistance

C.4.5 **Buildings & Ducts**

Present situation, and extension possibilities

C.4.6 **Quality considerations**

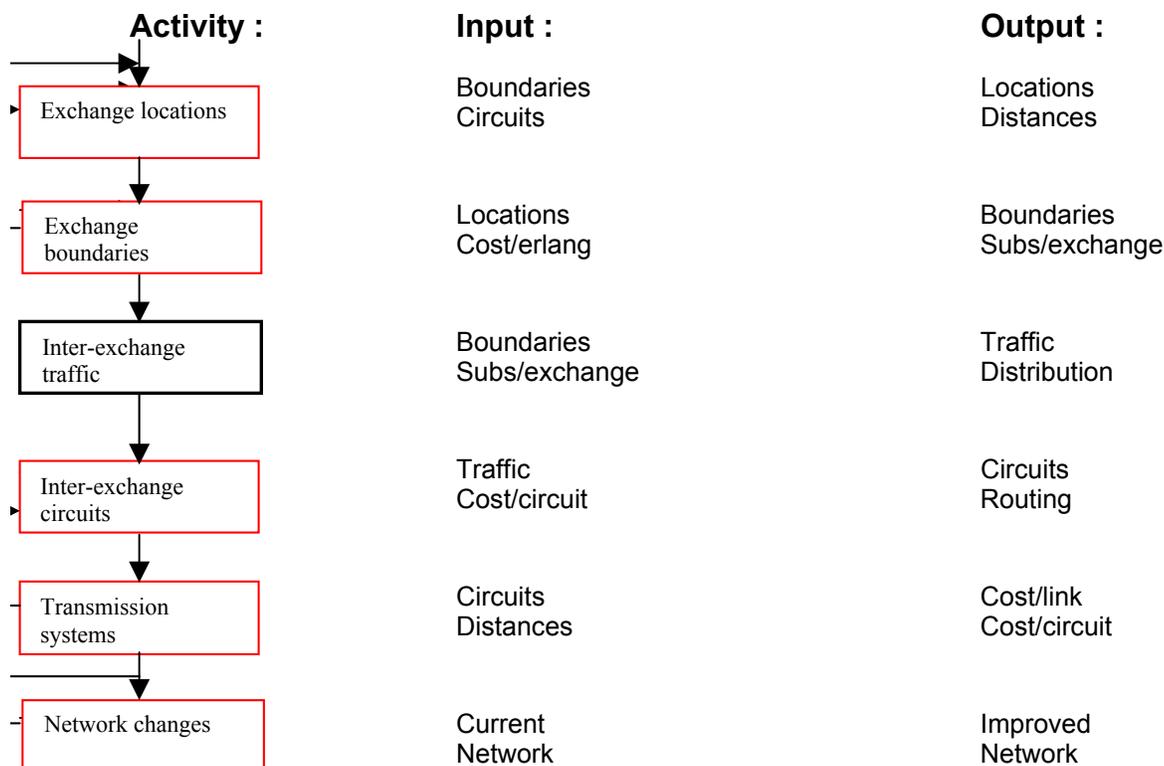
Grade of Service
Transmission Plan

C.5 The diagram attached to this annexure provides the iterative process in PLANITU usage.

Diagram

Iterative Procedure

Due to the complexity and size of a typical telecom network, it is not possible to optimise all network aspects simultaneously; sub-optimisation becomes necessary. The final network solution is found in the iterative process outlined below:



Changes in **total network cost** are there as a function of the number of exchanges:

¹ This is based on the Census figures of 1991. These figures as per the Census of 2001 are not yet available.

² It is clarified in this context that the actual physical location of the HPTIC need not necessarily be at the block Headquarters building/complex. The idea would be to place these at the best possible commercial location at the centre.

³ Average in this context denotes the SDCA average

¹ Average in this context denotes the SDCA average

[5] ART Annual report 1999

[6] ACA ASSESSMENT OF NUSC FOR 1997-98 downloaded from www.aca.gov.au

[7] COMPUTER MODELLING OF THE LOCAL TELEPHONE NETWORK BY BUSH, KENETT, PRIBERY, SHARKEY OF FCC & VAIKUNTH GUPTA, PANUM TECHNOLOGY, LLC, OCTOBER 1999

