TRAI'S DETERMINATION OF COST BASED RENTAL FOR WLL WITH LIMITED MOBILITY

1. This note explains the principles adopted to derive cost based rental for WLL with limited mobility (hereinafter "WLL (M)"). For WLL (M), the Authority's recommendations provide for mobility within a short distance charging area (SDCA). In this regard, however, the extent of mobility provided will be the choice of the service provider subject to the condition that the maximum mobility will not extend beyond the SDCA.

2. To determine cost based rentals for WLL (M), the Authority sought capital cost estimates from the basic service operators for providing WLL (M) service in three different types of SDCAs with subscriber bases of 5000, 20000 and 50000. Selection of these three types was based on an assessment of the likely WLL (M) capacity that would be installed by the service providers in typical SDCAs to meet demand while focusing on reasonable returns from their capital investment. Sustainable economic viability of the investment required to be made, was an important reason behind the decision to seek their cost data, from basic service operators, for the WLL(M) systems likely to be deployed by them.

3. As the Authority was approaching the end of its exercise to fix rentals, the Group on Telecom and Information Technology Convergence (hereinafter "GOT-IT"), submitted its recommendations on WLL(M) which inter-alia specify certain conditions with respect to the roll-out of WLL (M). The Report stipulates that the operator providing WLL (M) will have to offer the service in SDCAs belonging to three categories, i.e., urban, semi-urban and rural areas in equal numbers in each phase of the stipulated roll out obligation. This changes in a major way the costing model on the basis of which cost based rental will have to be fixed. The GOT-IT report states as follows:

"The Group would therefore advise that Short Distance Charging Areas (SDCA) should be divided into three sub categories: viz (1) Rural, (2) Semi-urban, and (3) Urban (a categorization familiar in census operations). For the purposes of coverage of Short Distance Charging Areas (SDCA), it was felt that each of these categories should be equally covered for each phase of the rollout prescribed – that is to say in the first

phase, where 15% of the short distance charging areas are to be covered in a circle, each of the three categories should be covered by the operator in equal proportions, and achievement must be ensured: subject only to this that if there is better performance than prescribed in the rural, and semi-rural sub categories this should not be considered a violation of the prescribed roll out."

4. The GOT-IT's requirement of equal roll-out in urban, semi-urban and rural SDCAs in equal proportion is likely to result in lesser economy of scale for the operator. As a consequence, the operator may have to incur a higher cost because investment in WLL (M) network/services in even a single urban SDCA will imply that the investment will have to be made in one semi-urban and one rural SDCAs where the system sizes are likely to be smaller because of much lower subscriber base, and thus incurring higher costs per line. As a consequence, the estimates of cost-based rentals would also increase, as is shown later in this note.

5. The requirement for roll-out in groups formed by equal number of urban, semi-urban and rural SDCAs also implies that the operators would be deprived of the advantages of economy of scale inherent in telecom networks of higher capacities. Cost efficiencies which accrue by engineering a higher capacity WLL(M) network infrastructure for areas with a greater demand, such as an urban area, will also be less pronounced in a scenario where the roll-out is subject to certain constraints. Such loss of flexibility will increase per line cost and thus the rental.

6. The requirement to roll out WLL(M) services in sets of three SDCAs composed of urban, semi-urban and rural in equal proportion, also implies that it is necessary to consider costs involved in serving subscriber bases other than those for which cost data were obtained from the service providers, before GOT-IT recommendations were accepted by the Government. Accordingly, in addition to the earlier envisaged subscriber base categories of 5000, 20000 and 50000, the Authority has taken into account system sizes to meet demands of 2,500 and 10,000 subscribers also. Further, to obtain a weighted average cost, instead of relying on the weighing pattern that had been indicated by service providers, the Authority has given weightage to capacities likely to be employed in semi-ubran and rural area.

7. Service operators fall in three categories. BSNL and MTNL by themselves are separate categories, with distinct business conditions and cost patterns. Private operators form the third category. Based on their overall shares of the WLL(M) market, and their respective costs for rolling a WLL (M) system of appropriate capacity to meet demand in the three SDCA categories, monthly rentals for the various subscriber base categories have been computed and presented in Table 3 (The names of service providers have not been made indicated in the Table for reasons of commercial confidentiality). These estimates show considerable variation. To a significant extent, the differences in costs and rentals for different service providers are due to the requirement that urban, semi-urban and rural SDCAs be covered in equal proportion of the total SDCAs where the basic operator is required to establish a Point of Presence (POP). Considering the wide variation in costs incurred in rolling out a network of sufficient capacity to meet the anticipated demand in the three categories of SDCAs, the Authority has decided to specify a range for the monthly rental of WLL(M), rather than a spot rental. Adoption of such an approach is recommended not only because the cost varies substantially in different SDCA categories, but also because the estimates received from almost all operators are only tentative, and their plans are yet to be finalized, particularly in the light of the GOT-IT Report. Further, in such a situation, it would be difficult with a single estimate of rental (spot rental) to achieve the objectives of consumer benefit as well as giving adequate economic incentive to operators to offer the WLL(M) service, particularly in the initial stages of its introduction.

8. The Authority has determined the range for WLL (M) rentals i.e., floor and ceiling, by considering two types of scenarios, i.e., one in which the maximum economy of scale advantage is derived by the operator and the second, in which this advantage is least because of his scale of operation. These are mainly on account of constraints imposed on the operator by the stipulations of the GOT-IT. These estimates are indicated in Table 2. The figures in this Table provide a basis for deriving the ceiling and floor for the cost based rental for WLL (M), shown in Table 1.

9. Based on the computations shown in Table 1, the Authority would like to specify a floor rental of Rs.450/- and a ceiling of Rs. 550/- per month. Ideally, it would have liked to specify a spot rental, but

a floor and ceiling is being specified both due to the highly tentative nature of estimates of various sizes of WLL(M) systems, and also the difficulty in correctly estimating demand in the three SDCA categories, so that appropriate cost models are used against each category. The Authority feels that without the constraint of covering all the three categories in equal proportion, the rental for WLL(M) would have worked out to about Rs. 400/- per month.

10. In the light of the uncertainties and difficulties brought out in previous section in specifying a spot rental as well as the trend of declining cost of telecom network infrastructure, the Authority will review the cost basis for rentals every year, for each of the next three years. Over time, the Authority expects the costs to decrease and rentals to fall lower, as has been the case with cellular mobile services.

11. The basis for the derivation of monthly rentals is provided below.

Data sought by TRAI

12. Cost data was sought from service providers for a system engineered to cover a typical SDCA for 2RF channels and 4RF channels for three different network capacities corresponding to 5,000, 20,000 and 50,000 subscribers. In addition, information on the number of SDCAs falling in these three categories was also sought. Separate cost estimates were sought for WLL systems using 800/900 MHz (macro-cellular configuration) and 1800/1900 MHz (micro-cellular configuration) frequency bands.

13. To bring the cost estimates given by different service providers, for various network sizes on same footing, the Authority had specified a originating and terminating traffic of 0.08 Erlangs per WLL(M) subscriber for dimensioning the WLL(M) system. In addition, for dimensioning network on the same basis all service providers were asked to assume an occupancy of 80% of BTSs (Base Transmitter and Receiver). In conformity with the Authority's Recommendations, service providers were also asked to engineer their Wireless Access Network around a BSC, which should be directly connected to a Local Exchange by a V 5.2 Interface, specified by ITU to connect an access node to a local exchange of a PSTN. The cost estimates were the current costs involved in installing the network. The network elements included in cost calculations were those up to (but not including) TAX, i.e. similar to

the network elements used to derive the cost based rental for basic service.

Data made available to TRAI

14. The rentals have been calculated taking into account the cost data submitted by the service providers.

15. Table 'A' gives the details of information submitted by the service providers. All service providers have submitted details for 2RF channels and macro cellular configuration. All except one service provider have submitted data based on 4 RF channels also. For the micro cellular configuration, most service providers have indicated that such systems are not likely to be deployed by them in the near future and thus no estimates are available with them. Prior to the GOT-IT recommendations, some service providers had indicated that they would be operating in only certain types of SDCAs, e.g. only in those with 50,000 subscribers, or mainly those with 20,000 subscribers. This is presumably to get advantages of economy of scale and scope, which is offered by higher capacity systems.

16. Five service providers have submitted data based on V5.2 configuration; BSNL has provided, in addition, information based on R2MF. Two service providers have submitted costs based on centralised MSC architecture, stating that mobility within the SDCA will be controlled by a software function. Since the Authority is firmly of the view, and has already recommended to the Government (licensor), that WLL (M) has to be based on a system without MSC, (copy of the recommendation is placed at Annexure 1) the figures provided by these two service providers have not been reckoned while estimating the cost based rentals for WLL (M). Moreover, these two service providers have themselves indicated that they have yet to consider the plans for providing WLL (M) or that they would find it difficult to provide WLL (M) services without having a MSC based network structure. The Authority would like to reiterate its earlier recommendation that a WLL(M) system which is a part of a PSTN, should not include a MSC, otherwise there will be no difference between a Mobile Network i.e., PLMN operated by CMTS, and a PSTN operated by BSOs.

Table A. Data Provided By Service Providers In Relation To The Type of Data Requested From Them

Service Provider	Data Provided				Interface between BSC and Digital Switch
	2 RF		4 RF		
	Macro	Micro	Macro	Micro	
BSNL	Y	N	Y	N	Separately for both V5.2 and R2MF
MTNL (Delhi/Mumbai)	Y	N	N	N	V5.2 (Please see Note below)
Reliance	Y	Y	Y	N	V5.2
HFCL	Y	N	Y	N	MSC architecture with mobility controlled by software
HIL	Y	Y	Y	Y	As above
Tata	Y	Y	Y	Y	V 5.2
BTL	Y	N	Y	N	V 5.2
STL	Y	N	Y	N	R2MF or CCS7

Y = Yes; N = No

Note: After submission of its data, MTNL retracted it and asked the Authority to consider the data which is based on its actual investment in the system to provide WLL(M) in Delhi and Mumbai. The data for Mumbai has been used in this regard because that data is based on 2 RF and is thus closer to the estimate of costs provided by others. The erlang use by MTNL, at 0.06 Erlang, is different from the specified 0.08 Erlang. In our consideration, the MTNL costs are relevant only in one case, namely as part of service category of "A" circle, and the change in the data does not substantively affect the results.

17. For BSNL, we have taken into account only the cost estimates for a WLL(M) system engineered based on V5.2 access interface to a local exchange. On examination of these costs, it appears that they are an over-estimate, due to the high number of BTS that have been shown necessary for proper dimensioning of the network for the traffic and coverage requirements. Discussions with equipment suppliers were held to examine this issue in greater detail. The number of BTS required was also checked with the help of a software dimensioning tool provided by one of the equipment suppliers, and by comparing the reasonableness of the number of BTSs in the proposed network of the operator, taking into account the traffic characteristics of BTS. This exercise indicated that while the number of BTSs projected for 50,000 subscribers was reasonable, the projected requirement of BTSs for 20,000 and 5,000 WLL(M) customers in a SDCA were overestimated. The BTS required for the three sizes have been estimated as 7, 24, and 54 based on traffic engineering and coverage considerations. The OFC costs have also been correspondingly reworked. The costs for BSNL, therefore, have been normated on the basis of the modified estimates of BTS and OFC for the

respective SDCA categories based on WLL(M) system capacities. It may also be borne in mind that coverage has to be based on practical considerations because in any SDCA 100% coverage is unlikely and there would always be pockets, where coverage may not be provided in the initial years because of techno-economic reasons.

Results from the data

18. Available information shows that the capital cost per line varies inversely with the size of the subscriber base, reflecting economies of scale. In areas where the market size is low i.e. in rural or semi urban areas, the capital cost per line will be higher than the cost per line in relatively dense or urban areas, where higher capacity networks will be deployed to meet the demand.

19. The costs of setting up the WLL network differ across service providers. For example, without handsets, these costs vary from about Rs. 37,000 per subscriber for a subscriber base of 5000 to about Rs 14,000 per subscriber for a subscriber base of 50,000.

20. The cost based monthly rentals have been derived from the capital cost estimate for each service provider, as follows. To the capital cost, annual recurring expenditure (ARE) of 24% has been applied. This converts the capital cost into flow amounts. To this stream of flows emanating from capital expenditure, two more cost items that are provided as flows, namely, rentals for building for BSC and towers, have been added.

21. The cost based estimate of monthly rental is then augmented to incorporate a spectrum charge equal to 2 per cent of gross revenue, and three different license fee revenue shares. This gives the estimates for monthly rental, without taking the handset into account. These estimates of monthly rentals are given in Table 3.

22. Cost based rental estimates have been determined for each service provider (Table 3). Initially, the weights used for this purpose were based on the submissions of service providers which are shown in the Table below. However, with the requirement of the GOT-IT that roll-out has to be equally in urban, semi-urban and rural SDCAs, these weights have been modified.

Table B. The Likely proportion of Different Subscriber Categories in the operator's WLL(M) By business and the Expected aggregate Subscriber Base at the end of the first year of WLL(M) operations.

Service Provider	Share in total WLL (M) subscriber base of subscribers in category of 5,000 subscribers	Share in total WLL (M) subscriber base of subscribers in category of 20,000 subscribers	Share in total WLL (M) subscriber base of subscribers in category of 50,000 subscribers	Total expected subscriber base for WLL (M) in the first year
BSNL	0	75%	25%	Please see note below
MTNL	0	0	100%	60,000
Bharati	28%	72%	0	30,000
Tatas	17%	50%	33%	1,00,000
Reliance	82%	2%	16%	2,00,000
HFCL	36.66%	40%	23.33%	1,15,200
HIL	30.7%	30.7%	38.5%	1,30,000
Shyam	14%	36%	50%	50,000

Notes:

1. Information based on submissions made by the Basic Service Operators.
2. In one communication BSNL has stated that the proportion of its WLL business will be 70 to 75% from SDCAs having subscriber base of 20,000 and balance 25 to 28% per cent will come from the areas having a higher base, i.e. from the SDCAs in the 50,000 category. Another communication from BSNL, however, shows that they do plan to provide WLL(M) in a number of places where the WLL(M) subscriber base will be up to 5,000. It appears that it is still too early for them to have developed any long term or even a medium term business plan in respect of this business. The figures provided by them are, therefore, highly tentative. This has been confirmed by a subsequent letter of BSNL which states "BSNL, as yet, has not finalized its plans for provision of WLL-M telephone connections. … In view of the above, the SDCA wise information … can also not be furnished as on date."

23. The figures shown in the above Table are based on the data submitted by each service provider. Similar to BSNL, in the case of other operators too, there is not much evidence of detailed planning and the figures submitted appear to be highly tentative. This is more so after the GOT-IT Report which has imposed certain constraints on the operators relating to their roll-out plans.

24. If the operators had the freedom to choose the SDCAs based on purely market considerations, at least in the initial stages they would have aimed to cover those SDCAs, where higher capacity WLL (M) systems could be installed to meet higher demands and where the cost of providing the service is thus lower, due to economies of scale. SDCAs

with higher subscriber base, such as 50,000 and 20,000 would naturally be more lucrative from the angle of service providers. On purely business considerations, areas with lower subscriber bases would not be covered in the initial phases of roll out.

25. The GOT-IT's requirement for equal roll-out in urban, semi-urban and rural SDCAs, however, alters that situation because roll-out of WLL (M) in each SDCA with a subscriber base of 50,000 or 20,000 in the urban area will require that the operator also covers one semi-urban SDCA and one rural SDCA. This implies that the weighing pattern given by the above Table for WLL (M), would need to be modified.

Mix of SDCA categories (urban, semi-urban and rural)

26. With the requirement for equal roll-out in urban, semi-urban and rural SDCAs, investment decisions regarding WLL (M) will be based on treating the three SDCAs categories, i.e., urban, semi-urban and rural, as an integrated package by the operators. The total number of SDCAs covered by the operators will thus be limited by the lowest number of viable rural SDCAs that they may profitably cover (because the rural SDCAs are likely to be less viable than the other two categories of SDCAs). Once all viable rural SDCAs are covered, the service providers are unlikely to invest further in rural SDCAs. Since the roll out is required at the same time in the three SDCA categories, they will also not be able to cover any other SDCA. In this scenario, the number of rural SDCAs will have to be at least one-third of the total SDCAs covered in the WLL(M) roll out. The proportion of the two other categories of SDCAs, i.e., semi-urban/urban, in the total roll out can not be accurately estimated because the GOT-IT condition allows substitution of urban SDCAs by semi-urban or rural SDCAs.

27. The thrust of the service provider will be to cover as many of the viable SDCA combinations as possible subject to the constraint imposed by GOT-IT report. Since viability of operations is likely to be linked to the available subscriber base in SDCAs, the investment in WLL (M) networks by the operators will be spread in such a way that they cover as many urban SDCAs as possible, up to a maximum of one-third of the total SDCAs. The rest of the SDCAs covered will be of semi urban and rural SDCAs categories. In addition, besides increasing the cost of providing WLL (M) lines this requirement implies that in the initial years, the overall subscriber base for WLL (M) will be lower than what

was projected by the operators initially, i.e. before the GOT-IT report. In many rural and semi urban SDCAs the demand for WLL(M) connections is likely to remain much below 5000 considering the total demand, i.e., working lines and waiting list as on date. The Authority has, therefore, taken into reckoning two more sizes of WLL (M) systems, in order to have a more realistic assessment of per line costs in the three categories of SDCAs.

28. The following method has been employed to arrive at appropriate weights, for determining average rentals.

(i) In addition to subscriber bases of 5000, 20000 and 50000, costs have also been calculated for installing WLL (M) systems which can provide service to 2500 and 10000 subscribers. The costs relating to these WLL (M) system sizes have been derived by allowing for the proportionate changes in cost estimates for the sizes for which figures have been provided by the service provider.

(ii) To correctly estimate the demand in the three categories of SDCAs, SDCA level data of BSNL subscribers for three circles were examined, namely for Gujarat ('A' Category Circle)* Madhya Pradesh ('B' Category Circle)*, and Bihar ('C' category Circle)*. The data is for the current year. For each SDCA, the number of actual working connections was added to the number of subscribers on the waiting list in each SDCA, and the resultant figure is taken as the total base to project the demand for WLL (M) lines. Of this base, 5 % is reckoned as the likely demand for WLL (M) in the first

---

This reference is to the categorization of service areas in 'A', 'B' and 'C' category areas by the DOT.

year of introduction of this service in each SDCA. This is likely to provide us with an upper limit of the likely WLL (M) demand in the first year of introduction of this new service.

(iii) For Gujarat, the top fifteen SDCAs have been considered as proxy models for five different sets of urban, semi-urban and rural SDCAs in which WLL(M) services can be introduced.

It is noteworthy that the SDCA which is fifteenth in this order, has a projected WLL (M) subscriber base of only

1,600 subscribers. The weights for different SDCA categories are assigned as explained below.

(iv) Based on the estimate of demand for WLL(M) services, in the fifteen SDCAs mentioned above, these have been placed under the different categories of system sizes ranging from 2,500 to 50,000, i.e., if the projected demand is up to but not exceeding 2,500 subscribers, it is placed in the category of SDCAs, where a WLL (M) system of 2,500 lines will be enough to meet the demand. If the projected demand is between 2,500 and 5,000 lines then the costing figures of a WLL (M) system of 5000 lines has been considered appropriate. A projected demand of the size falling between 5,000 and 10,000 subscribers is allocated to the system size of 10,000, and so on. This method gives us the following weights, which have been used for SDCA falling in 'A' category circles.

Subscriber Base	**2,500**	**5,000**	**10,000**	**20,000**	**50,000**
Weights	24.4%	4.4%	8.9%	17.8%	44.4%

Note: The above table also indicates the distribution of total subscriber population of WLL(M) in the five subscriber bases for which separate cost calculations have been done.

(i) (v) A similar exercise was conducted for Madhya Pradesh. However, for this circle, only the top 12 SDCAs have been taken into account because as we go below these top SDCAs, i.e., those with maximum demand, the demand projection for WLL(M) services seems to taper off to unsustainably low levels. This implies that given the demand profile of MP circle, there can possibly be only four urban/semi-urban/rural groups of SDCAs which can economically sustain WLL(M) service roll out. This exercise throws up weights as shown in the table below. These figures have been employed for sizing and categorizing the SDCAs in the 'B' category circles such as Madhya Pradesh.

Subscriber base	**2,500**	**5,000**	**10,000**	**20,000**	**50,000**
Weights	40%	20%	40%	0%	0%

(ii) (vi) For Bihar, we have considered the top 9 SDCAs, i.e. a set of three groups of urban, semi-urban and rural SDCAs, to derive the weights for category "C" Circle. Even with these SDCAs, the expected WLL (M) demand for the lowest SDCA is only 614 subscribers. We have nonetheless used these groups for the weights applicable to "C" category circle in order to reflect the high cost/low subscriber base situation in these service areas. The weights used for "C" Circle are given in the Table below.

Subscriber base	**2,500**	**5,000**	**10,000**	**20,000**	**50,000**
Weights	66.67%	0%	33.33%	0%	0%

29. Cost based rentals have been computed with the above weights, and are tabulated in Table 3. Table 3 includes a category called "most efficient private operator". It shows the lowest estimate of cost based rental among the private sector operators discounting cost data provided by operators for a cellular system based on a Mobile Exchange (MSC). TRAI is of the view that in order to maintain clear distinction between WLL(M) and cellular mobile service with full mobility, the former i.e. WLL (M) service, should not be engineered based on a Mobile exchange and a PLMN configuration. Accordingly cost data for systems based on MSC, i.e. Mobile Exchange and PLMN configuration, have not been taken into account, while computing the cost based rental for the Most Efficient Private Operator (MEPO). Rather it should be interfaced with a local exchange of a PSTN based on a ITU specified interface V5.2.

Principle of Pricing, e.g. Average, Most Efficient Private Operator, Ceiling/Floor, etc.

30. Table 3 shows that the rentals calculated for various service providers for different subscriber bases and system configurations vary widely. With such a variance in the estimates for rentals, it would be difficult to arrive at a representative figure without some normation.

31. In view of wide variance in the estimates of cost based rentals and the highly tentative nature of the available cost data and roll-out plans, the Authority is of the view that fixing one single representative rental or a "spot rental" is neither feasible nor desirable at this stage. It has, therefore, been decided to specify a range for cost based rentals, or a

ceiling and a floor. The fact that a range defined by the ceiling and floor rather than a single figure is being recommended also addresses the uncertainties of the present roll-out plans of the operators, difficulties of correctly dimensioning the network and costing it based on accurate estimates of the cost of network elements etc. for a service which is being introduced for the first time.

(b.i) The estimate of the lower limit or floor

32. The lower limit or floor is derived assuming the best scenario in WLL(M) roll out, i.e., giving maximum advantage of system sizes and other factors. The following factors (from Table 3) have been taken into account in arriving at this estimate:

- The estimates are for "A" category service area, i.e. the service area with license fee revenue share of 12%,
- The SDCAs considered are those which are expected to sustain the highest projected customer bases, i.e. 50,000, 20,000 and 10,000,
- For these subscriber categories in Circle "A" service area, the rentals for the most efficient private operator shown in Table 3 have been considered for deriving the relevant average rentals.
- The weights for the three cost categories are based on the number of subscribers in each category as a proportion of the total number of subscribers expected in the three cost categories i.e. SDCAs with likely demand for 50,000, 20,000 and 10,000 subscribers. Thus, in this scenario the total number of subscribers in the three cost categories has been taken as 80,000 (i.e., 50,000+20,000+10,000), and the weights of used for arriving at the rental are 5/8 (or 0.625), 2/8 (or 0.25), and 1/8 (or 0.125).

33. Calculations based on the above assumptions are shown in Table 2. The estimate given in this Table corresponds to the best case scenario, because costs decline as the WLL (M) system capacity increases. The least per line cost is for an urban, semi-urban and rural combination with the highest total capacity. As shown in Tables 1 and 2, this estimate of monthly rental with these assumptions works out to Rs. 475/-. It is noteworthy that if the requirement of equal roll out in urban, semi-urban, and rural SDCAs were not applicable, the average rental would be substantially lower, as only urban SDCAs with much higher demand than rural/semi-urban will be chosen by the operator, thus deriving maximum advantage of higher capacities.

34. There are two main reasons why the Authority has decided to benchmark the Most Efficient Private Operator (MEPO) for fixing the rental. One, the costs of the incumbents (BSNL/MTNL) are likely to be lower than those of the new entrants because of the fact that they have the benefit of economies of scale and market dominance over practically the entire country. Since they can place orders in bulk, they are likely to be offered discounts. Further, since they will be launching both CMTS and WLL (M) systems simultaneously, they can share a lot of infrastructure such as towers, buildings, power plant, optical fibre etc. Another reason for choosing the cost models of the private operator and particularly those of an economically efficient operator is to provide incentive to other private operators for achieving greater efficiency and cost reduction.

(b.ii) The estimate of the upper limit or ceiling

35. The efficiency based upper limit has been derived by a two-step process. First, a cost based rental has been derived for a likely worst case scenario, i.e. by choosing a set of urban, semi-urban and rural SDCAs, whose cumulative system capacities are the lowest. Second, a weighted average of this rental and the lower limit of rental has been calculated to arrive at the upper limit of the cost based rental.

36. For estimating the monthly rental in the worst case scenario, the following factors (from Table 3) have been taken into account.

- The estimates for "C" category service area, i.e. the service area with license fee revenue share of 8 %,
- The SDCAs considered are those which are expected to sustain only the three lowest projected subscriber bases, i.e. 2500, 5000 and 10000 and correspondingly the lowest cumulative system capacity,
- In these cost categories i.e. SDCAs with subscriber base for 10,000, 5,000, and 2,500 the rentals for the "most efficient private operator", have been considered.
- The weights for the three cost categories are based on the number of subscribers in each category as a proportion of the total number of subscribers in all the three cost categories put together. Thus, in this scenario the total number of subscribers has been taken as 17,500 (i.e., 10000+5000+2500) and the respective weights for the three categories used for arriving at the rental are 2500/17500 (or 0.143), 5000/17500 (or 0.286), and 10000/17500 (or 0.571).

37. A focus on the three highest cost categories i.e. SDCAs with the lowest subscriber bases, results in relatively high estimates of rentals. Though the weight for the SDCA with system capacity of 10,000 is substantial, the lowest two cost categories i.e. with capacities of 5000 and 2500 also have large weights in the average. As shown in Table 2, the worst scenario for roll out and cost calculation provides us with an average monthly rental of Rs. 608/-. It is noteworthy that the estimate of monthly rental remains unchanged at Rs. 608/- even if the subscriber base corresponding to system capacities in the SDCAs, changes from 10000, 5000, and 2500 to 10000, 2500 and 2500. In other words a change in the subscriber base in one of the SDCAs from 5000 to 2500 does not alter the cost calculation of rentals.

38. To arrive at one figure for the upper limit, the two estimates, i.e. Rs.475/- and Rs.608/-, are mixed in a ratio of 70:30 on the consideration that overall, there will be a mix of high capacity and low capacity sets of SDCAs in this ratio. This provides us with a weighted average monthly rental of Rs. 568/-.

39. These two estimates, i.e. Rs. 475/- for lower limit and Rs. 568/- for upper limit, provide us with a basis for determining the upper and lower limits, i.e. ceiling and floor of cost based rentals for WLL (M), which are given in Table 1. The Authority decided to fix the lower and upper limits of WLL (M) monthly rentals as Rs.450/- and Rs.550/-, respectively, taking into account the above cost based estimates, the need to encourage consumer choice, and the likelihood of fall in input costs when the roll-out decisions are actually implemented for WLL (M).

40. The Authority is aware of the fact that certain service providers are already offering WLL (M) service at a monthly rental of Rs. 400/-, i.e. below the present lower limit specified here by the Authority. In the Authority's opinion, these low rentals would be difficult to sustain if we take into account the constraint imposed by GOT-IT report that WLL (M) roll out has to be spread in equal proportion in urban, semi-urban and rural SDCAs. In the absence of this constraint on the operators, the monthly rentals might have worked out to about Rs.400/-.

4. **Other aspects**

41. Monthly rentals for WLL (M) have been specified as floor and ceiling. This implies that the service provider is obliged to charge rental within the range determined in this Determination.

42. All telecom systems including WLL (M) system have large capital costs, but much lower marginal/incremental costs. WLL (M) systems are no exception. Once base stations and the links to the telephone exchange have been installed, new subscribers can be added quickly and at a relatively low marginal costs, thus enjoying economies of scale. The Authority will review the estimates of cost based rentals once a year for the next three years.

43. WLL (M) systems are being introduced in the country for the first time. Naturally, there is considerable uncertainty about its market and demand in various Telecom Circles. With time, the rentals are expected to come down, as has been the case with cellular mobile. In about two years time, it is likely to be substantially lower than the levels that are now being stipulated. The Authority will therefore conduct an exercise at the end of each year to fix yearly rentals for the next three years

44. For the 1800 MHz Band, i.e. micro cellular configuration, only three service providers have reported data for 2 RF channels and two for 4 RF channels. The reasons cited by most service providers for not providing this information is that such cost estimates are not available at present, or that they will not be using this spectrum frequency for providing WLL(M) services. Further, spectrum in 1800 MHz band will be made available only after utilisation of the Spectrum in 800 MHz band has been completed according to DoT's Spectrum Allotment guidelines. Therefore, utilisation of the 1800 MHz band is not likely before the Authority's proposed review after one year. Due to these reasons the estimates of rental presented in this paper are only for the 800 MHz frequency spectrum.

45. WLL (M) system dimensioning and costing are based on CDMA frequency band, i.e. 800 MHz with the assumption that the systems will be engineered based on 2RF initially. It is expected that in the first year 2RF will suffice. Any further allocation of spectrum will be only at a later date. With availability of 4RF at a subsequent date per line costs will come down further. The Authority's plan to review the rental on

yearly basis will take into account any augmentation of RF channels, beyond two.

46. The Authority has taken note of the GOT-IT's view on revenue sharing arrangements, which is as under:

> "the Group is of the view that the present revenue sharing arrangement between FSPs and long distance carriers on the one hand and CMSPs and long distance carriers on the other hand, should not be continued with those aspects of FSP services which have the advantage of limited mobility. … This means that the present ratio of 60:40 for WLL subscribers should be reduced to 5:95 in respect of, but only in respect of, those subscribers who use the facility of WLL with limited mobility through hand-held sets."

47. In the above context, the Authority would like to state that revenue sharing arrangement between WLL (M) based basic operators and National Long Distance Operators including BSNL can be implemented only after suitable interconnect charging and billing mechanisms have been installed at the Network to Network Interfaces of the two operators, particularly to distinguish between the traffic streams originating from WLL(M) lines and those from fixed lines, and to charge them differently. At present no such arrangement exists, as the exchange numbering scheme does not distinguish between a fixed line or a WLL (M) line. The Service providers should, therefore, by mutual agreement put in place the required technical systems in their exchanges as well as at the Points of Interconnection (POIs) so as to distinguish clearly the traffic flows originating from WLL (M) lines and POTs lines, so that revenues are shared differently for the two traffic streams. It may be recalled in this connection that since WLL(M) service has been considered as a part of the basic services, it has been clearly mentioned in the TRAI's recommendations on the subject that the numbering plan for WLL(M) will be the same as that of the basic services fixed connections.

5. **Decisions of the Authority**

48. The monthly rentals for WLL (M) are specified as ceiling and floor, namely a ceiling of Rs. 550/- and floor of Rs. 450/-. Ideally, the Authority would have specified a spot rental for the WLL (M) service.

However, with the range of cost estimates for various WLL (M) system capacities to be deployed in urban, semi-urban and rural SDCAs, the Authority considers it more desirable to specify a range for monthly rentals, bound by two figures, i.e. Rs. 550/- and Rs. 450/-.

49. The handset for the WLL(M) connection may be supplied by the service provider or alternatively procured by the subscriber himself. In case it is supplied by the service provider, he may ask for a deposit for the handset up to an amount of Rs.10,000/-. This amount will be refundable in full to the subscriber, if he ceases to subscribe to the service.

50. A maximum of Rs.80 per month may be charged as rental for the handset if it is supplied by the service provider. This rental would cover all expenses/charges incurred by the service provider including depreciation on the handset and any other administrative charges he may have to incur in the procurement and supply of the handset. The service provider's cost of funds for providing the handset will, normally, be covered by the amount of deposit received from the subscriber.

51. In cases where the existing monthly rentals are above the ceiling of monthly rentals specified herein, the amount in excess of the ceiling should be refunded to the subscribers. However, for monthly rentals charged below the lower limit specified by the Authority, the subscriber will not be charged the additional amount, except that the lower limit specified by the Authority will become effective from the date of notification of the monthly rentals by the Authority.

52. TRAI's Recommendation on WLL (M) has already specified that the call charge will be Rs.1.20 per metered call unit applicable to basic service. Thus, for local calls, the charge will be Rs.1.20 per 180 seconds, and for STD/ISD calls each metered call unit will be charged at Rs.1.20. There will not be any free calls provided with WLL (M).

53. The Authority will conduct yearly reviews of the cost based rental for the next three years.

Table 1. Ceiling and Floor for WLL (M) Rentals

(a) Average Monthly Rentals Calculated With Share of Best Circumstances 30% and Share of Worst Circumstances 70%

(1)	(2) Amounts	(3) Share of the Category to Calculate Basis for Upper Limit	(4) Column (2) multiplied by Column (3)
Average Rental for Best Circumstances as Calculated in Table 2	Rs. 475/-	0.30	Rs. 142/-
Average Rental for Worst Circumstances as Calculated in Table 2	Rs. 608/-	0.70	Rs. 426/-
Weighted Average of above (sum of items in column (4))			Rs. 568/-

Note: Amounts have been rounded up.

(b) Floor Monthly Rental is based on the average for Best Circumstances, and is specified as Rs. 450/-

(c) Ceiling Monthly Rental is based on a combination of the averages for Best and Worst Circumstances (weighted average in Table above). This monthly rentals is specified as Rs. 550/-

Table 2. Estimation of the Average Rentals for Notional Best and Worst Types of Circumstances

A. Best Circumstances

(1)	(2) Most Efficient Private Operator's cost based rental for Circle "A", i.e. License Fee Share 12%, in Table 3	(3) Share of the Subscriber Category	(4) Column (2) multiplied by Column (3)
SDCA with 50,000 subscribers	Rs. 451/-	0.625	Rs. 282/-
SDCA with 20,000 subscribers	Rs. 457/-	0.25	Rs. 114/-
SDCA with 10,000 subscribers	Rs. 629/-	0.125	Rs. 79/-
Weighted Average of above (sum of items in column (4))			Rs. 475/-

Note: Amounts have been rounded up.

B. Worst Circumstances

Step 1: Calculation of the weighted average for worst circumstance

(1)	(2) Most Efficient Private Operator's cost based rental for Circle "C", i.e. License Fee Share 8%, in Table 3	(3) Share of the Subscriber Category	(4) Column (2) multiplied by Column (3)
SDCA with 10,000 subscribers	Rs. 601/-	0.571	Rs. 343/-
SDCA with 5,000 subscribers	Rs. 616/-	0.286	Rs. 176/-
SDCA with 2,500 subscribers	Rs. 623/-	0.143	Rs. 89/-
Weighted Average of above (sum of items in column (4))			Rs. 608/-

Note: Amounts have been rounded up.

Step 2. Weighted average of Rs. 608/- and Rs. 475/- to be calculated in the ratio of 70:30 for the rental estimate that will provide a basis for upper limit

Table 3: Monthly Rentals for different Service Providers, according to their costs for different subscriber bases and the share of their subscriber bases

(a) Monthly Rentals with 8% Revenue share

Operator	SDCA subscriber base of 2,500	SDCA subscriber base of 5,000	SDCA subscriber base of 10,000	SDCA subscriber base of 20,000	SDCA subscriber base of 50,000	Wghtd. Average
Public Sector Operator 1	662	626	552	405	365	626
Public Sector Operator 2	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Private Sector Operator 1	772	745	690	581	574	745
Private Sector Operator 2	623	616	601	572	543	616
Private Sector Operator 3	855	795	676	437	431	795
Private Sector Operator 4	719	704	674	613	555	704
MEPO	623	616	601	437	431	616
Weights used	66.67%	0.00%	33.33%	0.00%	0.00%	

(b) Monthly Rentals with 10% Revenue share

Operator	SDCA subscriber base of 2,500	SDCA subscriber base of 5,000	SDCA subscriber base of 10,000	SDCA subscriber base of 20,000	SDCA subscriber base of 50,000	Wghtd. Average
Public Sector Operator 1	678	640	565	414	373	625
Public Sector Operator 2	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Private Sector Operator 1	789	762	706	595	587	751
Private Sector Operator 2	637	630	615	585	556	627
Private Sector Operator 3	874	813	691	447	440	789
Private Sector Operator 4	736	720	689	627	567	714
MEPO	637	630	615	447	440	627

Weights used	40.00%	20.00%	40.00%	0.00%	0.00%	

(c) Monthly Rentals with 12% Revenue share

Operator	SDCA subscriber base of 2,500	SDCA subscriber base of 5,000	SDCA subscriber base of 10,000	SDCA subscriber base of 20,000	SDCA subscriber base of 50,000	Wghtd. Average
Public Sector Operator 1	693	655	578	424	382	495
Public Sector Operator 2	N.A.	N.A.	N.A.	N.A.	454	454
Private Sector Operator 1	808	779	722	608	601	672
Private Sector Operator 2	652	644	629	599	569	603
Private Sector Operator 3	895	832	707	457	451	600
Private Sector Operator 4	753	737	705	641	580	651
MEPO	652	644	629	457	451	525

Weights used	24.44%	4.44%	8.89%	17.78%	44.44%	

N.A. : Not Applicable

MEPO: Most Efficient Private Operator

-

ANNEXURE 1

LETTER FROM TRAI REFERRING TO THE STIPULATION IN THE TRAI RECOMMENDATION THAT MSC SHOULD NOT BE USED FOR WLL (M)

D.O.No.4-48/CP-408-2/2001 (FN)
March 20,2001.

Dear Shri Ghosh,

This refers to the 17th Report of the Standing Committee on Information Technology on Limited Mobility through WLL for fixed service providers. A copy of the report was sent to us by DOT vide their letter No. 842-331/2000-VAS(Vol.II).

2. In the introduction to the Report the Chairman of the Committee has stated that the Committee came to the conclusion "that introduction of 'limited mobility' through technological innovation would immensely help faster roll out of the network, increase tele-density and greatly benefit the consumers as long as there is marked difference in the scope of the two services i.e. GSM based cellular mobile and CDMA WLL based limited mobility services". We would in this regard also invite your attention to the Authority's view on significant difference between the WLL systems recommended for introduction and mobile systems based on GSM network. A relevant extract from the Authority's recommendation dated the 8th January, 2001 is reproduced below for ready reference.

> "Although both WLL systems and Mobile systems employ similar Air Interface and network infrastructure such as cells, there are significant difference between the two. While in cellular mobile systems, such as GSM based networks which are operational in a large number of telecom circles in the country, there is a mobile exchange called Mobile Switching Centre (MSC) capable of extensive mobility management/roaming function, the WLL systems are engineered essentially to provide the so called 'last mile linkage' with the existing exchange, and these do not have an exchange viz. mobile switching centres as parts of the WLL system. Considering this essential difference and also the intrinsic characteristics of WLL as indicated by the nomenclature itself i.e. 'local loop', the TRAI is of the view that extension of WLL mobility only up to the local area i.e. SDCA will be the most optimal solution and serve interest of telecom growth in the country best. Accordingly, the Authority recommends that the Basic Service Operators (BSO) be allowed to offer WLL with mobility within the local area i.e. Short Distance Charging Area (SDCA)."

3. In this context, a reference is also invited to para 18 of the guidelines issued by the DOT for Basic Service. The same is reproduced below for ready reference:

> "Basic Service Operator shall be allowed to provide mobility to its subscribers with Wireless Access Systems limited within the local area i.e. Short Distance Charging Area (SDCA) in which the subscriber is registered. While deploying such systems, the operator has to follow the numbering plan of that Short Distance Charging Area (SDCA) and it should not be possible to authenticate and work with the subscriber terminal equipment in SDCAs other than in which it is registered. The system shall also be engineered so as to ensure that hand over of subscriber does not take place from one SDCA to another SDCA while communicating."

4. In the light of what has been stated in preparas (2/3), you may like to request the Telecom Engineering Centre to draw up a system engineering specification, so that WLL systems do not have a Mobile Switching Centre (MSC) and are also engineered to ensure that hand over of subscriber does not take place from one SDCA to another. The system specification should also specify numbering, routing and charging as applicable to WLL systems. Suitable clause may be incorporated in the license agreement of BSOs, to provide for system testing to check its conformance to TEC specification, before permission to commence service is given by the licensor.

With regards,

Yours sincerely,

(M.S.Verma)

Shri Shyamal Ghosh,
Secretary,
Department of Telecommunications,
Sanchar Bhavan,
New Delhi.