

Consultation Paper on Rationalization of Annual Radio Frequency Spectrum Fee

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PTA

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Summary

This consultation document relates to PTA's new approach towards setting the annual spectrum fee for radio based services. A drastic change in spectrum demand has been observed in Pakistan which needs associated price change like any other commodity in the world.

The proposed changes are based on a thorough analysis of various frequency bands. Moreover, all internationally accepted methods for derivation of spectrum charges have been explored. The summary of spectrum fee proposals for commercial users is as follows:

- a. For Land Mobile Wireless license (commonly known as VHF Wireless), the proposed rates are based on weighted linear formula keeping in view the present spectrum demand.
- b. Proposals related to fixed links in any frequency band have been discussed in fixed point to point (P2P) charging regime. A common formula for fixed P2P links in all the frequency bands has been proposed.
- c. Proposed fee for broadcasting services consist of two components to avoid existing disparities.
- d. In case of ground to air communication in Aeronautical Navigation Service, the fee proposals are based on new VHF wireless station fee.
- e. New charging regime for Maritime Communication Service has been formulated in light of the fact that PTA has planned to introduce the licensing for this service in near future.
- f. A uniform initial license application processing fee has been proposed to keep it simple for PTA and operators.

The present spectrum charging methodology was worked out in 2000 keeping in view the availability of abundant spectrum. Now the situation has changed altogether. This is the first spectrum pricing review which has been done to avoid undue economic pressure on the licensees. A periodic review of spectrum prices would be carried out to introduce utilization efficiency, bring technological innovation and tackle any distortions observed after implementation of proposed charges. This is in the interest of PTA as well as the industry.

1. Introduction

1.1 Background

1.1.1 In order to grow and flourish, any industry would require availability of adequate raw material at appropriate cost. With a slight difference, same is true in telecom which needs availability of spectrum for provision of various services. The difference originates from the fact that spectrum is a scarce resource and therefore its pricing needs to bring utilization efficiency to promote technological innovation. The variables involved in setting the price of this rare commodity in telecom are complex and large in number. Accordingly the techniques which have evolved to define the level of charges are numerous in number and vary in terms of relative complexity and benefits.

1.1.2 The consultation is aimed at promoting innovation and competition in wireless industry of Pakistan. The present frequency spectrum charging regime was developed in year 2000 based on which PTA receives annual radio spectrum charges from its users. This is primarily a flat charging mechanism which was defined keeping in view very few variables involved. Since the time Pakistan telecom sector was deregulated, the spectrum demand has increased and therefore its management in terms of quality and quantity is a challenge for the regulator.

1.2 Legislative Framework for spectrum pricing

1.2.1 The section 5-2(a) of Pakistan telecommunication (re-organization) Act 1996 empowers the Authority to review the fee structure associated with any telecommunication service. It states one of the powers of Authority as:

“Grant and renew licenses for any telecommunication system and any telecommunication service on payment of such fees as it may, from time to time specify”

1.2.2 The section 5-2(c) of the above Act empowers the Authority as:

“Receive applications for the use of radio frequency spectrum and subject, where applicable, to grant of licenses under clause (a), refer such applications to the Board for assignment of spectrum within a period of thirty days”

1.2.3 Based on above references of the Act, PTA has been empowered to modify the fee associated with use of radio spectrum to promote its efficient use as the same is a scarce resource. This is in line with international trend set by various regulators and standardization bodies around the world.

2. Frequency Spectrum Charging Methods

There are various methods available for deriving the spectrum charges. Some of these have been discussed as follows:

2.1 Administrative Cost Recovery

This is the simplest method for spectrum charging which aims to recover the costs incurred by the government agency for managing the spectrum resource. This includes the cost of skilled labor, equipment used to manage the spectrum and other related costs. Fees designed to recover administrative costs are not tied to the value of the spectrum used. This is a major disadvantage of this approach because of which it does not bring efficiency in spectrum usage.

2.2 Fee based on Linear Weighted Formula

In this case the fee is based on few technical parameters which are combined with certain weights to form a linear weighted formula for price. The technical parameters include, but not limited to, bandwidth, power and number of channels. Carefully selected weights can bring efficiency in spectrum usage.

2.3 Fee based on spectrum Refarming

In this case the existing users are shifted to an alternative frequency band to promote innovative technologies. Such re-allocation should be financed by parties interested in deploying new technologies. This approach improves spectrum efficiency because the new technology will use the band more efficiently and bring more benefit to society. This approach is very relevant in development of IMT-2000 because in some cases this is the only way to free spectrum from incumbents.

2.4 Differential Rent Pricing

If there is a difference between equipment costs for provision of same service using different spectrum ranges, this difference can be made the basis for spectrum fee to be charged from the operator using low cost equipment. The operator using the lower frequencies with lower equipment costs has higher profits than its competitor. This profit has got nothing to do with any other innovation except the fact that it is using low cost equipment.

2.5 Administrative Incentive Price (AIP)

AIP is charged from the operators to reflect the opportunity cost of spectrum and provide incentives for efficient use. For a given frequency band, the current and other possible uses are identified. The marginal values of spectrum for the current use and other possible uses are calculated until a use is found which has a higher marginal value than the current use. If this case exists, AIP is set between the two

values. If the case does not exist, then set the AIP at the marginal value for the current use.

This scheme is designed to promote efficient spectrum usage. It does not simply recover the cost involved to manage spectrum. The base line is to define the charges in a way that if the user has unused spectrum, it should return it back instead of paying a nominal charge. The incentives can be given to efficient users.

2.6 Spectrum Royalties

In this case the percentage of annual revenue is charged from operator for the duration of license. This is done according to terms of license.

2.7 Main Principles

While applying any of the above methods to determine the level of charges, it is important to recognize two main principles involved:

2.7.1 First is the 'Economically Efficient Pricing'. According to this, the pricing of spectrum access rights should be designed to maximize the benefits from its use and therefore the value of total output of goods and services across the national economy. In other words, the pricing of spectrum determines its effective use and therefore helps the economy to grow. However it is important to note that if there is no scarcity (that is, demand can be met by available supply) then price should be limited to the recovery of the regulator's costs.

2.7.2. Secondly, if there is an excess demand, then price based mechanisms like 'Auctions' should be used to determine the level of charges.

3. Annual Fee Proposals

The following sections describe the annual fee proposals for Radio Based Services (RBS). These proposals relate to commercial users. For the non-commercial users, the Authority may decide about the discount level on case to case basis.

3.1 Land Mobile Wireless Station

3.1.1 This type of license is given to the users in closed communication group. It is also known as 'VHF Wireless License'. In some of the other countries, this type of license is termed as Business Radio (including PBR, PAMR). This communication system uses base station and mobiles for dedicated use by specific organizations. Typical examples are the radio systems used by law enforcement agencies, fire brigades, Airlines, Oil exploration companies, industrial setups and radio cabs service.

3.1.2 Presently there are about 739 licensees in this category including 495 private licensees, 251 Government licensees and 23 NGOs/foreign missions. Existing charges are based on Bandwidth (BW) and Power (in Watts). Rates are different for commercial and Non-commercial (NC) use and are given in Table-2 Annex-B.

3.2 Proposed Rates for Land Mobile Wireless Station

3.2.1 The frequency band used for this category of RBS license is the most congested one and its demand is very high. Keeping in view this aspect, the rates for this license are being revised to promote the efficient utilization of spectrum. The new rates for VHF stations (Base and Mobile) and trunking service stations (Base and Mobile) are based on a linear weighted formula which is as follows:

$$AF = Wf * (\sum_i NE_i * pf_i + NFC)$$

Where,

AF: Annual Fee

Wf: 'Weighting Factor' applied to convert the technical parameters to fee.

NE: #of Equipments with specific Power.

Pf: Power factor

NFC: #of Frequency Channels each of 12.5 KHz

3.2.2 For selection of weights, an alternative solution for provision of closed communication group has been analyzed and a comparison has been made in Annex-A. The purpose is to justify the level of weights.

3.2.3 Keeping in view the above comparison coupled with the fact that PTA does not intend to put undue economic pressure on its licensees, 'Wf' value is 3000 for Base Stations, 1200 for VHF Mobile Station and 250 for trunking services mobile station.

3.2.4 Based on the above explanation, the proposed rates are given in Table 3-6 Annex-B. A phased implementation plan has been prepared to implement the proposed charges gradually in three years (Table 6 Annex-B). This will give reasonable time to both PTA and operators to fine tune the fee level and usage (amount of spectrum) respectively.

3.2.5 In case of trunking services, the proposed rates are based on the same formula as given above.

3.2.6 For HF and VHF fixed links, the following weighted linear formula is proposed for annual fee(AF) calculation in contrast to present rates given in Table 7 Annex-B.

$$AF = Wf(Pf + Ff + BWf)$$

Pf: Power factor;

Ff: Frequency factor;

BWf: Bandwidth Factor;

The Value of 'Ff' is 5 for HF band and 4 for the VHF band.

The 'BWf' is equal to number of discrete chunks of 12.5KHz bandwidth. e.g it is 1 for 12.5KHz, 2 for 25KHz and so on.

The value of 'Pf' is as follows:

1 for signals with power level upto 10Watts(W).

2 for signals with power level upto 10W-25W.

3 for signals with power level upto 25-50W.

4 for signals with power level > 50W.

The 'Wf' is 1000 for VHF and 5000 for HF band.

Questions related to Land Mobile Wireless License fee

Question No.1: In order to simplify the proposed charging regime, the segregation for simplex and duplex frequency channels has not been done. Do you agree with this simplification? If not, please give a detailed answer with technical reason(s) to support your point.

Question No.2: All the equipment used in the 'Private Mobile Radio System' is proposed to be included in annual fee calculation. This is because each device is a source of interference for the rest of the systems used by other licensees. Do you support our view point? If not, give a detailed technical reason.

Question No.3: Do you agree with proposed linear weighted formula for calculation of annual fee for 'Private Mobile Radio System'? If not, suggest an alternative with reasons to disagree with the proposed approach.

Question No.4: Do you agree with proposed linear weighted formula for calculation of annual fee for fixed links in the HF/VHF frequency bands? If not, suggest an alternative with reasons to disagree with the proposed approach.

Question No.5: In light of given justification of weighting factor for 'Private Mobile Radio System', do you agree with its proposed level? If not, suggest the level of this factor.

Question No.6: Do you agree with flat values used as weighting factors for fixed links in HF/VHF frequency bands? If not, suggest an alternative approach.

Question No.7: Do you agree with phased implementation of proposed annual fee for various categories of Land Mobile Wireless License. If not, please give detailed reasons with alternative proposal.

4. Fixed Point to Point (P2P) links:

4.1 Introduction:

4.1.1 A communication service which uses the frequency between fixed stations is referred to as fixed point to point (P2P) service irrespective of the frequency band under consideration. These links are being used under different licenses such as HF/VHF Wireless license and Site Registration (Microwave links) license. All such links, in HF/VHF and microwave frequencies, are covered under 'fixed P2P' charging regime.

4.1.2 This consultation only covers the microwave links. The main users of such links are WLL, FLL and CMO licensees. Presently the charges of such links are based on frequency band and bandwidth. CMOs are not paying microwave charges separately for reason mentioned above. The new annual microwave charges would be applicable on all operators/users including CMOs.

4.2 Present Charges:

4.2.1 A list of present microwave charges is given in Annex-B (Table 8):

4.2.2 There are numerous points which need regulatory attention as far as the present charges are concerned. Some of these are:

a. These charges are not value based and therefore it is not possible to introduce spectrum utilization efficiency. This is against the objectives of spectrum management which is one the most important area for the regulator particularly in post de-regulation scenario.

b. The charges above 10 GHz are not frequency dependent and sensitive to bandwidth (BW) only. With more innovative technologies coming up in the lower frequency bands, it is hard for the regulator to make these frequencies available for backhaul links which should ideally fall in higher frequency bands(above 10GHz). In such a scenario, charges should not only be dependent on BW.

4.3 Approach for defining new charges:

4.3.1 PTA has considered various options to define new microwave charges for operators. After carrying out a thorough analysis, we have decided to use a linear weighted formula to determine these charges. The new annual charges are 'Link Specific', i.e the charges would be payable for each microwave link separately. The technical parameters include bandwidth factor, frequency factor and weighting factor.

$$AF = Wf [Ff + BWf]$$

Where;

AF= Annual fee; Wf= Weighting factor,

Ff=Frequency factor,

BWf=Bandwidth factor,

4.3.2 Selection of Wf is critical as it determines the price. In order to determine Wf, we have gone through following steps:

a. For a given microwave frequency band, data rate, modulation and antenna size we have found the microwave link lengths under typical conditions. Although the radio-relay path is governed by many factors such as climate, terrain, equipment configuration, frequency band, wanted capacity etc, some assumptions and generalizations have been made. In order to eliminate any error in calculation and avoiding any undue disadvantage to the operators, we have considered the **WORST CASE SCENARIOS** for path lengths. e.g upto 6GHz frequency, we have considered the worst case scenario of 27km by taking all the path lengths for different frequencies/data rates/Modulations and Antenna sizes. The worst case path lengths for different frequency ranges are given in table-9 (Annex-B).

b. For a given frequency bandwidth (BW), we have mapped it to an appropriate data rate. Through higher level modulation usage, we know that it is technically possible to accommodate higher data rates in a given BW. e.g using 28MHz channel in 11GHz it is possible to accommodate STM-I (155Mbps). While doing these mappings, we have considered the **WORST CASE SCENARIOS** to avoid any undue disadvantage to operators. Following mappings have been done:

- 2MHz to 2 Mbps
- 7MHz to 8 Mbps
- 14MHz to 24 Mbps
- 21MHz to 34 Mbps
- 28MHz to 45Mbps

c. DPLC rates offered by PTCL have been calculated against the data rate and link lengths (km) found in above two steps (a&b).

d. In order to further safeguard the operators by avoiding any undue economic pressure on them, level of 'Wf' has been selected to keep considerable difference between the DPLC rate and microwave frequency annual charges. Value for 'Wf' starts from '5000' for microwave frequencies upto 3GHz and its value reduces by

'200' for each 1GHz rise in frequency block. The minimum value for 'Wf' is 1000 at 23GHz after which it remains constant.

4.3.3 The values of 'Ff' are given in table 10 (Annex B).

4.3.4 The 'BWf' is equal to total BW in MHz. e.g the 'BWf' for 7MHz BW will be '7'.

4.3.5 Keeping the above given factors under consideration, the new microwave frequency annual charges are given in the table 11 (Annex B).

4.3.6 The difference between DPLC rates (for given data rate and length) and new microwave frequency annual charges are given in the table 12 (Annex B).

4.3.7 Per kilometer (km) rates for 24Mbps and 90 Mbps DPLC are given in the table 13 (Annex B).

4.3.8 The issue of difference between DPLC rates given in PTCL's RIO and existing DPLC market rates has been dealt with through consideration of the **WORST CASE SCENARIOS** discussed above.

Questions related to Fixed P2P(Including Microwave links) Annual License fee:

Question No.1: Do you agree that existing annual microwave rates do not promote innovation and efficient utilization because (i) They are being priced/charged well below the alternative technology solution which would be used in case an applicant is denied of spectrum use (ii) Above 10GHz the rates are bandwidth dependent only.

Question No.2: The new formula for annual microwave charges consists of three factors. Do you agree with applicability of these factors? If not, suggest some other/alternative factor(s) with specific reason(s) to disagree.

Question No.3: Do you agree with worst case path length calculations? If not, please specify the technical reasons supported with any actual product specifications.

Question No.4: Do you agree with worst case data rate mapping calculations? If not, please specify the technical reasons supported with any actual product specifications.

Question No.5: Do you agree with the scheme to calculate the Weighting Factor 'Wf' which is critical parameter to calculate new charges.

Question No.6: By considering 'Worst Case Scenarios' for calculation of microwave link length and mapping of BW to data rate, PTA has tried to deal with the issue of difference between DPLC rates given in PTCL's RIO and existing DPLC market rates. Do you agree with this approach? If not, please let us know the %age difference between actual DPLC rate and proposed annual microwave rates for major cities/regions in Pakistan.

Question No.7: If you have any other proposal/scheme for rationalizing the present annual microwave charges, please explain in detail along with the justifications.

5. Broadcasting Services

5.1 A broadcasting service is a point to multipoint service which is provided using various frequency bands like low frequency (LF), Medium frequency (MF), High frequency (HF), Very high frequency (VHF) and Ultra high frequency (UHF) as per the ITU allocations.

5.2 These services, when offered in low frequency bands like HF, sometimes require international coordination due to nature of short waves which can propagate long distances. These waves are subject to interference from HF stations around the world, as a result, the HF frequency bands are extremely congested (particularly the lower frequency ranges). This requires the regulators to regularly participate in international frequency coordination meetings in an effort to maximize broadcasters' access to clear channels and minimize any potential harmful interference to and/or from foreign HF broadcasters.

5.3 Presently FAB has assigned the frequency to broadcast operators in various bands as per the ITU recommendations. The charges are band and power specific. These charges, for each type of transmitter, are given in Annex-B Table 14:

5.4 Few disparities in the existing rates can easily be observed. Some of these are:

a. Rate for Radio Broadcasting (R.B) in MF/HF band above 200KW is equal to TV Broadcasting upto 10KW. This is not justified as TV broadcasting is high revenue generating service.

b. Rate for R.B MF/HF above 500KW is higher than TV broadcasting upto 10KW.

5.5 Proposed Rates for Broadcasting Services:

5.5.1 The frequency range from 87MHz to 108MHz is congested and FAB needs more frequency to be allocated to FM operators. The proposed fee structure consists of two components, first is the basic broadcasting (BC) fee and 2nd is based on factors like nature of service, frequency and power. The basic fee is given in Table 15 Annex-B.

Annual fee for TV BC service

$$\blacksquare \text{ Basic Fee(TV)} + 200 * (\text{Service Factor} + \text{Power Factor} + \text{Freq Factor})$$

Annual fee for Audio BC service

$$\blacksquare \text{ Basic Fee(Audio)} + 100 * (\text{Service Factor} + \text{Power Factor} + \text{Freq Factor})$$

5.5.2 Power factor is equal to Effective Radiated Power (ERP) in dBW and the service factor is given in Table 16 Annex-B.

5.5.3 FM Audio broadcasting is a popular service in the country and spectrum demand is high. There are about 84 licensees of this service. Audio broadcasting in other frequency bands is not a high demand service. Given this, FM Audio broadcasting has been assigned a slightly higher service factor to avoid undue pressure on the operators.

5.5.4 The reason of assigning lower service factor (and hence a discount in fee) to digital TV broadcasting is to encourage the operators to migrate from analog to digital broadcasting solutions. Digital TV broadcasting service utilizes less bandwidth. After this switchover, the leftover spectrum could be returned back to FAB for new services such as wireless broadband. This service has not been introduced in Pakistan.

5.5.5 The frequency factor is equal to number of Unit Frequencies, where the unit frequency size is given in Table 17 Annex-B.

5.5.6 This means that for TV broadcasters using 7MHz of channel, the frequency factor would be '14'.

5.5.7 For Audio broadcasters using 200 kHz of channel, the frequency factor would be '4'.

5.5.8 Based on above information, the proposed rates given in Table 18 Annex-B.

Questions related to Broadcasting License Annual Fee:

Question No.1: Do you agree with basic fee levels in light of disparities in existing broadcasting (BC) rates?

Question No.2: Do you agree with technical factors proposed for fee calculation? If not, please suggest alternatives with technical reasons to support your point.

Question No.3: Do you agree with proposed changes in various categories of broadcasting services? If you have any other proposal for rationalizing these charges, please explain in detail with justification.

6. Radio Navigation Services:

6.1 One of the types of Radio determination service is Radio Navigation. This is a service in which radio waves are used to determine the position on earth or obstruction warning. Radio navigation service provides a safety of life function as delineated in RR 4.10 of ITU Radio Regulations.

6.2 Maritime Radio navigation and Aeronautical Radio Navigation can be termed as two broad classes of radio navigation. The former is intended for the benefit and for the safe operation of ships while the latter one is intended for the benefit and for the safe operation of aircraft. Both have two sub-categories of equipments used. This gives us four categories of radio navigation services.

- a. Aircraft equipment
- b. Ground to air communication equipment
- c. Ship equipment
- d. Shore to ship communication equipment

6.3 The main users of this category of radio service are Armed forces, Civil Aviation, and Pakistan coast guards. The frequency assignments are mainly in VHF (108-137MHz, 230-380MHz) and MF bands.

6.4 The existing rates for Aeronautical services are:

- a. Rs. 5000/- for aircraft,
- b. For ground to air communication, the rates are same as for VHF wireless stations (Power based).

6.5 Fee Proposal for Radio Navigation Services

6.5.1 The revenues of airline industry are generally quite high and the existing charges per aircraft are quite low. The proposed charge per aircraft is Rs.15,000/-

6.5.2 In case of ground to air communication for aeronautical service, the proposed rates are based on same formula as proposed for VHF wireless stations. These rates are given in Table 19 Annex-B.

6.5.3 Presently there is no licensing regime for Maritime radio communication in Pakistan. PTA intends to introduce this license and Licensing Division has almost completed its framework. The proposed annual charges for this category of service

are included in this consultation paper and are intended to be applied on future licensees.

6.5.4 Before these charges are recommended, it is important to have an overview of frequency channels available for this category of communication. There are 89 channels (0-88) available for Maritime communication universally. These channels range from 156 MHz to 162.025 MHz and the communication rule set is well defined for these channels.

6.5.5 In addition to above frequency, 162.025MHz-174 MHz is also recommended for maritime communication by ITU. The assignments in this range would require considerable administrative activity at our end. In light of the above information, the proposed charges are given in Table 20 Annex-B.

6.5.6 Based on Gross Tonnage (GT), ships are proposed to be divided into two categories for charging. A very low annual charge is proposed for small ships used by the fishermen. While for large volume ships, a high charge has been proposed. These charges are given in Table 21 Annex-B.

Questions related to Radio Navigation License Annual Fee:

Question No.1: Proposed aircraft charges have been defined keeping in view high revenues of airline industry and administrative effort (for clearance) at our end. Do you agree with these rates?

Question No.2: Ground to air communication equipment is proposed to be charged using the same linear weighted formula as for VHF wireless station. Do you agree with this arrangement and the rate proposed?

Question No.3: Do you agree with two proposed categories of ships and their charges?

Question No.4: For shore to ship communication, do you agree with the rates according to two frequency ranges?

7. Earth Station Registration:

7.1 For various reasons, it is vital for the regulator to maintain record of all types of earth stations. This is a common practice all over the world. For better management of this record, the earth stations are proposed to be divided into three (3) worldwide recognized categories. These categories along with the proposed annual registration fee are given below.

7.2 'Transportable Earth Stations' are vehicle mounted earth stations capable of moving from one place to other. Present license for 'Inmarsat Terminal' falls under this category because it is also semi-fixed/portable terminal and its weight & size allows portability. It is charged @ 25000/- per terminal. No changes are proposed for this category.

7.3 For the operators using the 'Permanent Earth Station', a registration with the regulator is proposed for them. The proposed annual registration fee is Rs.5,000/- per earth station using frequencies other than C/Extended-C bands.

7.4 For permanent earth stations using C/ Extended-C bands, annual registration of Rs. 10,000/- is proposed because of interference management with other terrestrial services.

7.5 'Earth station networks' also known as VSAT networks generally consist of a hub terminal through which a number of smaller terminals (the VSATs) communicate. It is also possible to implement mesh networks in which the VSAT terminals communicate with each other without the support of a hub terminal. In Pakistan, VSAT communication is allowed to existing CVAS-Data/LDI licensees. In the past VSATs were charged but later on the charges were abolished. Keeping in view the significance of this type of communication, new charges are being proposed. It is a flat charging structure. Initially an operator having small number of terminals is charged more with gradual decrease in charges as the network grows. But still an undue pressure on the operators has been avoided. The proposed rates are given in Table 22 Annex-B.

Questions related to Earth Station Registration Annual Fee:

Question No.1: Do you agree with three types of Satellite earth stations registration in Pakistan?

Question No.2: Do you agree with registration rates for permanent earth stations which are frequency dependent?

Question No.3: For an operator using more VSAT terminals, an incentive through decreased rates has been proposed. Do you agree with suggested rates? If not, give detailed reason.

8. Initial Application processing Fee:

8.1 Present application processing fee is license category dependant which should not be the case as the application processing fee is charged one time. The proposed initial application fee is given in Table 23 Annex-B.

9. Common Questions:

The following consultation questions are to be answered by all the Radio Based Service Licensees.

Question No.1: Do you agree that market based spectrum pricing reforms are mandatory for the regulator to meet the spectrum demand and promote innovation. If not, please give your reasons.

Question No.2: Do you agree that existing annual microwave rates do not promote innovation and efficient utilization because (i) They are being priced/charged well below the alternative technology solution which would be used in case an applicant is denied of spectrum use (ii) Above 10GHz the rates are bandwidth dependent only.

10. Next Step in this consultation process

All the stakeholders are requested to respond electronically with your comments on the consultation paper as well as to the specific questions raised before we end our consultation process by March 15, 2010. The response may be sent to wtauqir@pta.gov.pk, Mr. Wasim Tauqir, DG (S&D), PTA with a 'cc' to lkram@pta.gov.pk Mr. Ikram ul Haq kayani, DD(S&C), PTA. Moreover, all the operators are required, for reconciliation purpose at our end, to send electronically (Excel file) the complete information of all the frequency assignments under use. All the following relevant parameters may please be made part of this information.

- a. Site ID.
- b. Address of Site
- c. Longitude & Latitude
- d. City
- e. District
- f. Province
- g. Tower Height
- h. Transmit/Receive Frequency

- i. Bandwidth of link
- j. Power level(dbm)
- k. Link length
- l. Redundant backhaul(if any)
- m. Number of Mobile & Base Station units (In case of Wireless Station license)
- n. Radius of service (In case of Wireless Station license)

The above parameters are to be given for each site. e.g for a given microwave link, these parameters will be separately given for both the sites (Same format in which the operators already submit the data).

Weighting Factor through Technology Comparison

For selection of weight, an alternative solution for provision of closed communication group has been analyzed. The cheapest alternative is the WLL service offered by incumbent operator in Pakistan. In this case, there is a package with free local on-net calls as well as a package with Rs. 0.49/30 sec (Excluding Tax) local on-net calls. In order to optimally justify the level of weights, we have compared the package with zero on-net charges (unlimited free calls) with annual fee of land mobile wireless licensee using VHF equipment. The details are as follows:

Table 1: Comparison of annual VHF wireless license fee with alternative technology

Fee component	Amount (Rs.)
WLL Line rent	17.925/day
Line rent for 1 Month	537.75
Line rent for 12 Months	6,453
Line rent for 12 months for 10 connections	64,530
Annual Fee for 10 VHF Mobiles upto 5 Watts	10*3600=36,000
Annual Fee for 1 VHF Base Station upto 10 Watts	9000
Total fee from land mobile wireless licensee using VHF equipment	45,000

It is clear that comparison is in favor of wireless license as far as the charges are concerned. Furthermore, it is important to note that WLL involves switching which is never desired in closed communication groups which mostly need instant connection.

List of Tables:

Table 2: Existing Annual Fee for Land Mobile Wireless Licensees

Equipment specification	Rate (PRs.)
VHF Base St. for 12.5 KHz N.C up to 10 Watt	1000
VHF Base St. for 12.5 KHz St. N.C above 10 Watt	2000
VHF Base St. for 12.5 KHz N.C above 25 Watt	4000
VHF Base St. for 12.5 KHz N.C above 50 Watt	8000
VHF Mobile St. for 12.5 KHz N.C less than 5 Watt	1000
VHF Mobile St. for 12.5 KHz N.C 5 Watt and above	1500
VHF Mobile St. for 12.5 KHz N.C above 25 Watt	2000
VHF Mobile St. for 12.5 KHz N.C above 50 Watt	4000
VHF Walkie Talkie for 12.5 KHz N.C	400
VHF Base St. for 12.5 KHz commercial up to 10 Watt	2500
VHF Base St. for 12.5 KHz commercial above 10 Watt	5000
VHF Base St. for 12.5 KHz commercial above 25 Watt	7500
VHF Base St. for 12.5 KHz commercial above 50Watt	10000
VHF Mobile St. for 12.5 KHz commercial less than 5 Watt	1250
VHF Mobile St. for 12.5 KHz commercial 5 Watt and above	2500
VHF Mobile St. for 12.5 KHz commercial above 25 Watt	3750
VHF Walkie Talkie for 12.5 KHz commercial up to 10 Watt	1000

Table 3: Proposed Annual Rates for Land Mobile Wireless License

Type of Equipment	Power level(W)	Present Fee(PRs.)	Proposed Fee (PRs.)
VHF Base Station	Upto 10	2500	9000
	10-25	5000	12000
	25-50	7500	15000
	>50	10000	18000

Table 4: Power Factors for PMR services

VHF/Trunking Base Station		VHF/Trunking Mobile Station	
Power(Watts)	P.f	Power(Watt)	P.f
Upto 10	2	Upto 5	2
10-25	3	5-25	3
25-50	4	>25	4
>50	5		

Table 5: Proposed Rates for VHF Mobile Station

Type of Equipment	Power level(W)	Present Fee (PRs.)	Proposed Fee(PRs.)
VHF Mobile St.	Upto 5	1250	3600
	5-25	2500	4800
	>25	3750	6000

Table 6: Proposed Rates along with a phased implementation plan

Category	Power brackets(W)	Wf	P.f	Frequency Factor	Equipment Factor	Difference from present fee	Proposed Charges (PRs.) (Round off to nearest 100)	Phased imp-I (PRs.)	Phased imp-II (PRs.)	phased imp-III (PRs.)
VHF Base St. for 12.5 KHz Comm	upto 10	3000	2	3000	6000	6500	9,000	5750	7700	9000
	10-25	3000	3	3000	9000	7000	12,000	8500	10600	12000
	25-50	3000	4	3000	12000	7500	15,000	11250	13500	15000
	>50	3000	5	3000	15000	8000	18,000	14000	16400	18000
VHF Mobile St. for 12.5	upto 5	1200	2	1200	2400	2350	3,600	2425	3130	3600
	5-25	1200	3	1200	3600	2300	4,800	3650	4340	4800

KHz Comm	>25	1200	4	1200	4800	2250	6,000	4875	5550	6000
VHF Walkie Talkie for 12.5 KHz Comm	upto 10	500	2	500	1000	500	1,500	1250	1400	1500
Paging transmitter for 12.5KHz		3000	2	3000	6000	4000	9,000	7000	8200	9000
Trunking service Base Station for 12.5KHz	upto 10	3000	2	3000	6000	4000	9,000	7000	8200	9000
	10-25	3000	3	3000	9000	7000	12,000	8500	10600	12000
	25-50	3000	4	3000	12000	10000	15,000	10000	13000	15000
	>50	3000	5	3000	15000	13000	18,000	11500	15400	18000
Trunking service Mobile Station for 12.5KHz	upto 5	250	2	250	500	650	800	425	620	800
	5-25	250	3	250	750	900	1,000	550	820	1000
	>25	250	4	250	1000	1150	1,300	675	1020	1300

Table 7: Existing Annual rates for P2P HF/VHF fixed links

Equipment specification	Rate (PRs.)
HF Wireless Stations N.C up to 20 Watt (DSB)	2500
HF Wireless Stations N.C above 20 Watt (DSB)	4000
HF Wireless Stations N.C above 50 Watt (DSB)	6000
HF Wireless Stations N.C above 100 Watt (DSB)	7500
HF Wireless Stations Commercial up to 20 Watt (DSB)	5000
HF Wireless Stations Commercial above 20 Watt (DSB)	8000
HF Wireless Stations Commercial above 50 Watt (DSB)	12000
HF Wireless Stations Commercial above 100 Watt (DSB)	15000
VHF fixed point to point for 12.5 KHz N.C up to 10Watt	1000
VHF fixed point to point for 12.5 KHz N.C above 10Watt	2000
VHF fixed point to point for 12.5 KHz N.C above 25Watt	4000
VHF fixed point to point for 12.5 KHz N.C above 50Watt	6000
VHF fixed point to point for 12.5 KHz commercial up to 10Watt	600
VHF fixed point to point for 12.5 KHz commercial above 25Watt	1000
VHF fixed point to point for 12.5 KHz commercial above 50Watt	3000
HF Wireless Stations N.C up to 20 Watt (SSB)	1250
HF Wireless Stations N.C Above 20 Watt (SSB)	2000

HF Wireless Stations N.C Above 50 Watt (SSB)	3000
HF Wireless Stations N.C Above 100 Watt (SSB)	3750
HF Wireless Stations Commercial Upto 20 Watt (SSB)	2500
HF Wireless Stations Commercial Above 20 Watt (SSB)	4000
HF Wireless Stations Commercial Above 50 Watt (SSB)	6000
HF Wireless Stations Commercial Above 100 Watt (SSB)	7500

Table 8: Present Annual Microwave Rates

Frequency Band	Bandwidth (MHz)	Annual Fee(PRs.)
Upto 1 GHz	0.5	6000
	2.0	24000
	3.5	42000
	7.0	84000
1.01-2 GHz	0.5	4500
	2.0	18000
	3.5	31500
	7.0	67500
2.01-3 GHz	0.5	3750
	2.0	15000
	3.5	26250
	7.0	52500
	14	105000
3.01-4 GHz	0.5	3000
	2.0	12000
	3.5	42000
4.01-5 GHz	0.5	2250
	2.0	9000
	3.5	15750
	7.0	31500
	14	63000
5.01-6 GHz	0.5	1500
	2.0	6000
	3.5	10500
	7.0	21000
	14	42000
6.01-7 GHz	2.0	3600
	3.5	6300
	7.0	12600
	14	25200
	28	50400
	50	90000
	55	99000
7.01-8 GHz	2.0	2400
	3.5	4200
	7.0	8400
	14	16800

	28	33600
	50	60000
	55	66000
8.01- 9 GHz	2.0	1800
	3.5	3510
	7.0	6300
	14	12600
	28	25200
	50	45000
	55	49500
9.01- 10 GHz	2.0	1200
	3.5	2100
	7.0	4200
	14	8400
	28	16800
	50	30000
	55	33000
	64	38400
	100	60000
	200	120000
Above 10 GHz	2.0	600
	3.5	1050
	7.0	2100
	14	4200
	28	8400
	50	15000
	55	16000
	64	19200
	100	30000
	200	60000

Table 9: Calculating worst case path lengths

Frequency	Data Rate	Modulation	Antenna Size(m)	Average Path (km)	Worst Case Path length(km)	Frequency Range (GHz) (for which worst case length applies)
4GHz		64 QAM	1.8	42	27	upto 5.999
		64 QAM	2.4	55	27	upto 5.999
		64 QAM	3	62	27	upto 5.999

6GHz	8Mbps		1.2	44	27	upto 5.999
	8Mbps		1.8	57	27	upto 5.999
	8Mbps		3	67	27	upto 5.999
	40Mbps		1.2	30	27	upto 5.999
	40Mbps		1.8	40	27	upto 5.999
	40Mbps		3	47	27	upto 5.999
	100Mbps		1.2	27	27	upto 5.999
	100Mbps		1.8	33	27	upto 5.999
	100Mbps		3	37	27	upto 5.999
6.8GHz		64 QAM	1.2	25	20	6 - 8.99
		64 QAM	1.8	30	20	6 - 8.99
		64 QAM	3	32	20	6-8.99
7.5GHz		128QAM	1.8	31	20	6-8.99
		128QAM	2.4	39	20	6-8.99
		128QAM	3	47	20	6-8.99
7.5GHz	8Mbps		1.2	44	20	6-8.99
	8Mbps		1.8	54	20	6-8.99
	8Mbps		3	65	20	6-8.99
	40Mbps		1.2	30	20	6-8.99
	40Mbps		1.8	37	20	6-8.99
	40Mbps		3	47	20	6-8.99
	100Mbps		1.2	25	20	6-8.99
	100Mbps		1.8	32	20	6-8.99

	100Mbps		3	36	20	6-8.99
7.5GHz	27Mbps		1.2	24	20	6-8.99
	27Mbps		1.8	30	20	6-8.99
	27Mbps		3	40	20	6-8.99
	54Mbps		1.2	21	20	6-8.99
	54Mbps		1.8	27	20	6-8.99
	54Mbps		3	34	20	6-8.99
	111Mbps		1.2	20	20	6-8.99
	111Mbps		1.8	25	20	6-8.99
	111Mbps		3	30	20	6-8.99
8GHz		128QAM	1.2	22	20	6-8.99
		128QAM	1.8	27	20	6-8.99
		128QAM	3	31	20	6-8.99
11GHz		64 QAM	1.2	19	19	9-11.999
		64 QAM	1.8	27	19	9-11.999
		64 QAM	2.4	32	19	9-11.999
11GHz		65 QAM	1.2	23	19	9-11.999
		66 QAM	1.8	27	19	9-11.999
		67 QAM	2.4	30	19	9-11.999
13GHz	8Mbps		0.6	24	12	12-14.999
	8Mbps		1.2	34	12	12-14.999
	8Mbps		1.8	42	12	12-14.999
	40Mbps		0.6	16	12	12-14.999

	40Mbps		1.2	23	12	12-14.999
	40Mbps		1.8	29	12	12-14.999
	100Mbps		0.6	13	12	12-14.999
	100Mbps		1.2	20	12	12-14.999
	100Mbps		1.8	25	12	12-14.999
13GHz	27Mbps		0.6	15	12	12-14.999
	27Mbps		1.2	21	12	12-14.999
	27Mbps		1.8	27	12	12-14.999
	54Mbps		0.6	13	12	12-14.999
	54Mbps		1.2	20	12	12-14.999
	54Mbps		1.8	25	12	12-14.999
	111Mbps		0.6	12	12	12-14.999
	111Mbps		1.2	18	12	12-14.999
	111Mbps		1.8	23	12	12-14.999
18GHz		32QAM	0.6	7	7	15-17.999
		32QAM	1.2	10	7	15-17.999
		32QAM	1.8	13	7	15-17.999
18GHz	8Mbps		0.6	13	7	15-17.999
	8Mbps		1.2	15	7	15-17.999
	8Mbps		1.8	17	7	15-17.999
	40Mbps		0.6	8	7	15-17.999
	40Mbps		1.2	12	7	15-17.999
	40Mbps		1.8	13	7	15-17.999

	100Mbps		0.6	7	7	15-17.999
	100Mbps		1.2	10	7	15-17.999
	100Mbps		1.8	13	7	15-17.999
23GHz		32QAM	0.6	6	5	18-22.999
		32QAM	1.2	7	5	18-22.999
		32QAM	1.8	8	5	18-22.999
					5	18-22.999
23GHz	8Mbps		0.6	8	5	18-22.999
	8Mbps		1.2	11	5	18-22.999
	8Mbps		1.8	12	5	18-22.999
	40Mbps		0.6	7	5	18-22.999
	40Mbps		1.2	8	5	18-22.999
	40Mbps		1.8	10	5	18-22.999
	100Mbps		0.6	6	5	18-22.999
	100Mbps		1.2	7	5	18-22.999
	100Mbps		1.8	8	5	18-22.999
23GHz	27Mbps		0.6	6	5	18-22.999
	27Mbps		1.2	8	5	18-22.999
	27Mbps		1.8	9	5	18-22.999
	54Mbps		0.6	6	5	18-22.999
	54Mbps		1.2	8	5	18-22.999
	54Mbps		1.8	9	5	18-22.999
	111Mbps		0.6	5	5	18-22.999

	111Mbps		1.2	6.5	5	18-22.999
	111Mbps		1.8	8	5	18-22.999
38GHz		32QAM	0.3	3	4	>23
		32QAM	0.45	5	4	>23
		32QAM	0.6	5	4	>23
38GHz	8Mbps		0.3	3	4	>23
	8Mbps		0.45	3.5	4	>23
	8Mbps		0.6	4	4	>23
	40Mbps		0.3	2.5	4	>23
	40Mbps		0.45	3	4	>23
	40Mbps		0.6	3.1	4	>23
	100Mbps		0.3	2.1	4	>23
	100Mbps		0.45	2.7	4	>23
	100Mbps		0.6	3	4	>23

Table 10: Ff values for different frequency bands

Frequency Range	Frequency Factor(Ff)
Upto 3GHz	6
3GHz-6 GHz	5
6GHz-9 GHz	4
9GHz-12GHz	3
12GHz-20GHz	2
>20GHz	1.5

Table 11: Proposed Annual Microwave Rates

		BWf											
Frequency (GHz)	Ff	2	7	14	21	28	35	2	7	14	21	28	35
1		Wf						Proposed Annual Rates					
2	6	5,000	5,000	5,000	5,000	5,000	5,000	40,000	65,000	100,000	135,000	170,000	205,000
3	6	5,000	5,000	5,000	5,000	5,000	5,000	40,000	65,000	100,000	135,000	170,000	205,000
4	5	4,800	4,800	4,800	4,800	4,800	4,800	33,600	57,600	91,200	124,800	158,400	192,000
5	5	4,600	4,600	4,600	4,600	4,600	4,600	32,200	55,200	87,400	119,600	151,800	184,000
6	5	4,400	4,400	4,400	4,400	4,400	4,400	30,800	52,800	83,600	114,400	145,200	176,000
7	4	4,200	4,200	4,200	4,200	4,200	4,200	25,200	46,200	75,600	105,000	134,400	163,800
8	4	4,000	4,000	4,000	4,000	4,000	4,000	24,000	44,000	72,000	100,000	128,000	156,000
9	4	3,800	3,800	3,800	3,800	3,800	3,800	22,800	41,800	68,400	95,000	121,600	148,200
10	3	3,600	3,600	3,600	3,600	3,600	3,600	18,000	36,000	61,200	86,400	111,600	136,800
11	3	3,400	3,400	3,400	3,400	3,400	3,400	17,000	34,000	57,800	81,600	105,400	129,200
12	3	3,200	3,200	3,200	3,200	3,200	3,200	16,000	32,000	54,400	76,800	99,200	121,600
13	2	3,000	3,000	3,000	3,000	3,000	3,000	12,000	27,000	48,000	69,000	90,000	111,000
14	2	2,800	2,800	2,800	2,800	2,800	2,800	11,200	25,200	44,800	64,400	84,000	103,600
15	2	2,600	2,600	2,600	2,600	2,600	2,600	10,400	23,400	41,600	59,800	78,000	96,200
16	2	2,400	2,400	2,400	2,400	2,400	2,400	9,600	21,600	38,400	55,200	72,000	88,800
17	2	2,200	2,200	2,200	2,200	2,200	2,200	8,800	19,800	35,200	50,600	66,000	81,400
18	2	2,000	2,000	2,000	2,000	2,000	2,000	8,000	18,000	32,000	46,000	60,000	74,000
19	2	1,800	1,800	1,800	1,800	1,800	1,800	7,200	16,200	28,800	41,400	54,000	66,600

20	2	1,600	1,600	1,600	1,600	1,600	1,600	6,400	14,400	25,600	36,800	48,000	59,200
21	1.5	1,400	1,400	1,400	1,400	1,400	1,400	4,900	11,900	21,700	31,500	41,300	51,100
22	1.5	1,200	1,200	1,200	1,200	1,200	1,200	4,200	10,200	18,600	27,000	35,400	43,800
23	1.5	1,000	1,000	1,000	1,000	1,000	1,000	3,500	8,500	15,500	22,500	29,500	36,500
24	1.5	1,000	1,000	1,000	1,000	1,000	1,000	3,500	8,500	15,500	22,500	29,500	36,500
25	1.5	1,000	1,000	1,000	1,000	1,000	1,000	3,500	8,500	15,500	22,500	29,500	36,500
26	1.5	1,000	1,000	1,000	1,000	1,000	1,000	3,500	8,500	15,500	22,500	29,500	36,500
27	1.5	1,000	1,000	1,000	1,000	1,000	1,000	3,500	8,500	15,500	22,500	29,500	36,500
28	1.5	1,000	1,000	1,000	1,000	1,000	1,000	3,500	8,500	15,500	22,500	29,500	36,500
29	1.5	1,000	1,000	1,000	1,000	1,000	1,000	3,500	8,500	15,500	22,500	29,500	36,500
30	1.5	1,000	1,000	1,000	1,000	1,000	1,000	3,500	8,500	15,500	22,500	29,500	36,500
31	1.5	1,000	1,000	1,000	1,000	1,000	1,000	3,500	8,500	15,500	22,500	29,500	36,500
32	1.5	1,000	1,000	1,000	1,000	1,000	1,000	3,500	8,500	15,500	22,500	29,500	36,500
33	1.5	1,000	1,000	1,000	1,000	1,000	1,000	3,500	8,500	15,500	22,500	29,500	36,500
34	1.5	1,000	1,000	1,000	1,000	1,000	1,000	3,500	8,500	15,500	22,500	29,500	36,500
35	1.5	1,000	1,000	1,000	1,000	1,000	1,000	3,500	8,500	15,500	22,500	29,500	36,500
36	1.5	1,000	1,000	1,000	1,000	1,000	1,000	3,500	8,500	15,500	22,500	29,500	36,500
37	1.5	1,000	1,000	1,000	1,000	1,000	1,000	3,500	8,500	15,500	22,500	29,500	36,500
38	1.5	1,000	1,000	1,000	1,000	1,000	1,000	3,500	8,500	15,500	22,500	29,500	36,500
39	1.5	1,000	1,000	1,000	1,000	1,000	1,000	3,500	8,500	15,500	22,500	29,500	36,500
40	1.5	1,000	1,000	1,000	1,000	1,000	1,000	3,500	8,500	15,500	22,500	29,500	36,500

Table 12: Difference between DPLC rate and New Annual Microwave Rate

	DPLC Rates for given link length and data rate						DPLC Rate - New Annual Rate					
Link Length	2(2) ¹	7(8)	14(24)	21(34)	28(45)	35(90)						
27	62,991	226,773	606,933	755,892	1,196,829	1,964,898	22,991 ²	161,773	506,933	620,892	1,026,829	1,759,898
27	62,991	226,773	606,933	755,892	1,196,829	1,964,898	22,991	161,773	506,933	620,892	1,026,829	1,759,898
27	62,991	226,773	606,933	755,892	1,196,829	1,964,898	29,391	169,173	515,733	631,092	1,038,429	1,772,898
27	62,991	226,773	606,933	755,892	1,196,829	1,964,898	30,791	171,573	519,533	636,292	1,045,029	1,780,898
27	62,991	226,773	606,933	755,892	1,196,829	1,964,898	32,191	173,973	523,333	641,492	1,051,629	1,788,898
20	46,660	167,980	449,580	559,920	886,540	1,455,480	21,460	121,780	373,980	454,920	752,140	1,291,680
20	46,660	167,980	449,580	559,920	886,540	1,455,480	22,660	123,980	377,580	459,920	758,540	1,299,480
20	46,660	167,980	449,580	559,920	886,540	1,455,480	23,860	126,180	381,180	464,920	764,940	1,307,280
19	44,327	159,581	427,101	531,924	842,213	1,382,706	26,327	123,581	365,901	445,524	730,613	1,245,906
19	44,327	159,581	427,101	531,924	842,213	1,382,706	27,327	125,581	369,301	450,324	736,813	1,253,506
19	44,327	159,581	427,101	531,924	842,213	1,382,706	28,327	127,581	372,701	455,124	743,013	1,261,106
12	27,996	100,788	269,748	335,952	531,924	873,288	15,996	73,788	221,748	266,952	441,924	762,288

¹ 2(2) this indicates the given BW mapped to data rate, i.e 2MHz mapped to 2Mbps. Similarly 21(34) indicates 21MHz mapped to 34Mbps

² This is indicating difference between DPLC rate of 2Mbps (for 27Km) and new microwave rate for 2MHz (2GHz) frequency.

Table 13: Per Km Rate for 24Mbps & 90 Mbps DPLC

Finding 24Mbps, 90Mbps Rates from Averaging		
Data Rate(Mbps)	DPLC Rate(PRs.)/Km	Approx. Per Kbps DPLC Rate(PRs.)/km
2	2333	1.1665 ³
8	8399	1.049875
34	27996	0.823411765
45	44327	0.985044444
155	97986	0.632167742
Data Rate(Mbps)	Approx. Per Kbps DPLC Rate	DPLC Rate(PRs.)
8	1.049875	
34	0.823412	
24	0.9366435 ⁴	
24		22479.444 ⁵
Data Rate(Mbps)	Per Kbps DPLC Rate	DPLC Rate(PRs.)
45	0.985044	
155	0.632168	
90	0.808606	
90		72774.54

³ Approx. applied 2Mbps = 2000 Kbps.

⁴ Taking average of per kbps rate of 8Mbps and 34 Mbps

⁵ Rate for 24Mbps.

Table 14: Existing Annual Rates for Broadcasting Stations

Specification of Service	Rate(Rs.)
Radio Broadcast (R.B) MF/HF Bands (0.5-30 MHz) up to 10KW	2000
R.B MF/HF Bands (0.5-30 MHz) above 10KW	4000
R.B MF/HF Bands (0.5-30 MHz) above 50KW	6000
R.B MF/HF Bands (0.5-30 MHz) above 100KW	8000
R.B MF/HF Bands (0.5-30 MHz) above 200KW	10000
R.B MF/HF Bands (0.5-30 MHz) above 500KW	15000
R.B FM/VHF/UHF Bands up to 10 W	1000
R.B FM/VHF/UHF Bands above 10 W	3000
R.B FM/VHF/UHF Bands above 100W	4000
R.B FM/VHF/UHF Bands above 1KW	6000
TV Broadcasting 7MHz/channel/St. upto 10KW	10000
TV Broadcasting 7MHz/channel/St. above 10KW	20000
TV Broadcasting 7MHz/channel/St. above 20KW	30000

Table 15: Basic fee for broadcasting services

Basic BC Fee	Rate(Rs.)
TV	150,000
Audio FM	75,000
Audio MF/HF	50,000

Table 16: Broadcast service factors

BC Service	Service Factor
Analogue Audio (LF)	1
Analogue Audio (MF)	1
Analogue Audio (FM)	2
Analogue TV	10
Digital TV	5

Table 17: Unit frequency size for Broadcast services

BC service	Unit frequency size
Audio	50 KHz
TV	0.5 MHz

Table 6: Proposed Rates for broadcasting services

Specification of Service	Present Rate(Rs.)	Proposed(Rs.)
Radio Broadcast (R.B) MF/HF Bands (0.5-30 MHz) up to 10KW	2000	54500
R.B MF/HF Bands (0.5-30 MHz) above 10KW	4000	55000
R.B MF/HF Bands (0.5-30 MHz) above 50KW	6000	55200
R.B MF/HF Bands (0.5-30 MHz) above 100KW	8000	55500
R.B MF/HF Bands (0.5-30 MHz) above 200KW	10000	55900
R.B FM/VHF/UHF Bands up to 10 W	1000	79600
R.B FM/VHF/UHF Bands above 10 W	3000	80300
R.B FM/VHF/UHF Bands above 100W	4000	80600
TV Broadcasting 7MHz/channel/St. upto 10KW	10000	162800
TV Broadcasting 7MHz/channel/St. above 10KW	20000	163200
TV Broadcasting 7MHz/channel/St. above 20KW	30000	163600

Table 7: Proposed rates for ground to air communication

Type of Equipment	Power level(W)	Present Fee(Rs.)	Proposed (Rs.)	% Difference
Base Station for ground to air communication	Upto 10	2500	9000	260
	10-25	5000	12000	140
	25-50	7500	15000	100
	>50	10000	18000	80

Table 20: Proposed charges for Shore to Ship Communication

Frequency Range	Charges
156 - 162.025MHz	Rs.5000/- per equipment
162.025 – 174 MHz	Same power based charges as given for VHF wireless Station.

Table 21: Proposed charges for ship equipment

Ship' GT	Charges(Rs.)
<300	500
>300	10,000

Table 22: Proposed Annual Charges for VSAT terminals

Number of terminals used by operator	Annual charges(Rs.)
Hub terminal	25,000/-
1- 5 terminals	20,000/- per terminal
6-10 terminals	15,000/- per terminal
11-15 terminals	10,000/- per terminal
>15 terminals	8000/- per terminal

Table 23: Proposed Initial Application Processing Fee

S/No.	Category	Present Application Fee	Comments(existing fee)	Proposed Application fee(Rs.)	Comments(Proposed fee)
1.	Amateur	Nil	Only Rs. 450/- charged for 5 years	Nil	
2.	Site Registration	500	Nil for VSAT, SST. For sites used for Microwave links(WLL & CMTOs) its Rs.500/-	5000 from WLL/CMTOs/SST per site	Recommended to include sites for SST. For VSAT see satellite registration
3.	Broadcasting(BC)	500+100/equipment		5000	For Video BC and Audio BC
4.	Aeronautical	500	Per Aircraft	5000	
5.	Ship	0	per ship	5000	For Ships<300GT it is Nil
6.	Wireless(HF,VHF ,UHF)	500+100/equipment		5000	
8.	Fixed Microwave Link	1000/per link	e.g microwave links.	5000	
9.	Inmarsat	1000		5000	
10.	Satellite Earth Station	1000		5000 For all types	e.g Inmarsat,e.g VSAT Network