



Telecom Regulatory Authority of India



Recommendations

On

Guidelines on Spectrum Sharing

(Response to reference received from Department of
Telecommunications on recommendations of
21st July 2014)

21st May 2015

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CHAPTER-I: INTRODUCTION

1. In India, there are 7-13 licensees (2G, 3G and BWA) in a Licensed Service Area (LSA), which is a large number by any global standard¹. As a result, spectrum holding per Telecom Service Provider (TSP) is small and fragmented. Spectrum fragmentation results in its less efficient utilisation. The basic objective of spectrum sharing is to provide an opportunity to the TSPs to pool their spectrum holdings and thereby improve spectral efficiency. Sharing can also provide additional network capacities in places where there is network congestion due to a spectrum crunch.
2. To prepare its recommendations on ‘Guidelines for Spectrum Sharing, the Authority constituted a Steering Committee of senior officers of TRAI and representatives from various TSPs. Views of the Steering Committee were considered by the Authority before finalising these recommendations. The Authority had sent its Recommendations on “Guidelines on Spectrum Sharing” to the DoT on 21st July 2014.
3. Many of the recommendations have been referred back by the DoT to the Authority for reconsideration through its letter dated 27th April 2015. The Authority has gone through the DoT’s views on various recommendations and finalized its response. The Authority’s earlier recommendations, the views of the DoT thereon, and the response of the Authority are provided in Chapter II.

¹ Many countries have only 4-5 licensees such as UK-4, Denmark-4 and Sweden-5.

CHAPTER-II: PARAWISE RESPONSE

1. Para 2.1

Spectrum sharing refers to an arrangement between two access licensees (CMTS/UASL/UL (AS)/UL) in a LSA, where both licensees having access spectrum in the same band, pool their respective spectrum in that LSA for their simultaneous use, using a common Radio Access Network (RAN)². The shared RAN will be connected to the core networks of each of the licensee. Both licensees will continue to hold their primary right over their own spectrum.

² RAN refers to access network up to BSC in 2G network, while in 3G networks, it refers to access network upto Radio Network Controller (RNC) and is known as Universal Terrestrial RAN (UTRAN).

(TRAI Recommendation)

DoT View

Licensees having access spectrum as defined in UL will be permitted to share the spectrum in an LSA. Apart Basic/CMTS/UASL/UL (AS) licensees, ISPs may also be included as eligible.

Response of TRAI

It is essential to ensure that both the licensees pool (combine) their spectrum resources and also use it simultaneously; otherwise it would be akin to spectrum leasing. Therefore, it is required to define the spectrum sharing the way it has been recommended above.

Sharing of spectrum is a new concept. Therefore, to begin with, spectrum sharing, may be allowed only for the access service providers (CMTS/UASL/UL (AS)/UL with authorization of Access Service)

2. Para 2.3

Only those sites shall be treated as spectrum-shared sites, where the spectrum resource of each of sharing licensees is used in the BTS. Both the licensees will be required to have a common RAN only in respect of sites being shared. It shall be up to the licensees to decide the actual area/BTSs in the LSA where they want to pool and share their spectrum resources as per their requirement and mutual agreement. However, it is simply not possible to monitor quantum of spectrum being shared at each site and to segregate the AGR site-wise/area-wise. Therefore, for the purpose of charging Spectrum Usage Charges (SUC), the licensor shall consider that the licensees are sharing their entire spectrum holding in the particular band in the entire LSA.

Example 1: Licensees 'A' and 'B' have 8 MHz and 5 MHz spectrum respectively in the 1800 MHz band in Delhi LSA. Each of them pool 4 MHz and builds a common RAN. This arrangement of spectrum sharing is permissible. However, for the purpose of charging SUC, it will be considered that the licensee 'A' and 'B' are sharing their entire spectrum holding in 1800 MHz Band (i.e. 8 MHz and 5 MHz spectrum respectively).

Example 2: Licensees 'A' and 'B' have 8 MHz and 5 MHz spectrum respectively in the 1800 MHz band in Delhi LSA. Each of them pools their spectrum holding and builds a common RAN only in say Connaught Place area, whereas in other parts of the LSA, they do not share their spectrum. Such arrangement of spectrum sharing is permissible. However, for the purpose of charging SUC, it will be considered that the licensee 'A' and 'B' are sharing their entire spectrum holding in 1800 MHz Band in the entire Delhi LSA.

(TRAI Recommendation)

DoT View

For the purpose of charging Spectrum Usage Charges (SUC), it is to be considered as the licensees are sharing their entire spectrum holding in the particular band in the entire LSA, the concept of spectrum – shared site does not have any relevance for this purpose.

Response of TRAI

As recommended by the Authority, for the purpose of charging Spectrum Usage Charges (SUC), the licensor shall consider that the licensees are sharing their entire spectrum holding in the particular band in the entire LSA. Regarding applicable rate of SUC, please refer to Para 2.22 of the recommendations. However, it shall be up to the licensees to decide the actual area/BTSs in the LSA where they want to pool and share their spectrum resources as per their requirement and mutual agreement.

In view of the above, the Authority reiterates its recommendation.

3. Para 2.4

All access spectrum i.e. spectrum in the bands of 800/900/1800/2100/ 2300/2500 MHz will be sharable provided that both the licensees are having spectrum in the same band.

Example: It has been assumed that two Licensees ‘A’ and ‘B’ have spectrum holding in 900 MHz, 1800 MHz and 2100 MHz band as shown in Table below:

Licensee	Licensee A			Licensee B		
<i>Spectrum Band</i>	<i>900 MHz</i>	<i>1800 MHz</i>	<i>2100 MHz</i>	<i>900 MHz</i>	<i>1800 MHz</i>	<i>2100 MHz</i>
<i>Spectrum holding (MHz)</i>	6.2	3	0	0	4.4	5

These two licensees can share their spectrum holding in the 1800 MHz band because both of them have spectrum in this band. However, they cannot share spectrum in 900 MHz or 2100 MHz band because only one of them has spectrum in these bands.
(TRAI Recommendation)

DoT View

TRAI is requested to clarify whether spectrum acquired through trading can also be shared.

Response of TRAI

Yes, spectrum acquired through trading can also be shared.

4. Para 2.7

A licensee shall not be eligible to share its spectrum if it has been established that it is in breach of terms and conditions of the licence and the licensor has ordered for revocation/termination of its licence after giving appropriate opportunity.

(TRAI Recommendation)

DoT View

TRAI is requested to provide clarification of the following:

- (i) What should be done during notice period for termination/ revocation of the license or when such a notice is contemplated?
- (ii) What should be done when there are court cases against such notices?

Response of TRAI

The Authority reiterates its earlier recommendations.

5. Para 2.8

Both the licensees, willing to share their spectrum, shall inform the licensor at the time of entering into spectrum sharing agreement. No permission will be required from the Government for spectrum sharing. However, the Government shall have the right to annul the spectrum sharing agreement, if found to be flouting prescribed guidelines after giving due opportunity to the licensees. (Process described in Para 2.15 to 2.19)

(TRAI Recommendation)

DoT View

TRAI is requested to provide suggestions for making amendments in license agreements/wireless operating licence and any other steps to be taken for sharing of spectrum.

Response of TRAI

The Authority is of the opinion that after finalisation of guidelines of spectrum sharing, the DoT may carry out appropriate modifications in the various clauses of the relevant licenses.

6. Para 2.9

At present, there are many licensees having administratively assigned spectrum in the 800 MHz, 900 MHz and 1800 MHz band. If any one or both of the licensees, sharing their spectrum, have administratively assigned spectrum in that band, then, after sharing, they will be permitted to provide only those services which can be provided through the administratively held spectrum.

Example: If one of the licensees has liberalised spectrum in 1800MHz band and other licensee, sharing the spectrum, has some spectrum as administratively held spectrum and some spectrum as liberalised

spectrum in the same (1800MHz) band, then, after sharing their spectrum they can provide only GSM based mobile services.

(TRAI Recommendation)

DoT View

- (i). TRAI is requested to recommend methodology for liberalization of 900 MHz band spectrum.
- (ii). Following the principle of allowing use of any technology, TRAI is requested to consider that sharing of spectrum be permitted in respect of liberalized spectrum i.e. when both licensees have paid market price of the spectrum held by them which is proposed to be shared.

Response of TRAI

(i) & (ii)

As brought out in Para 1.1 of the recommendations, the basic objective of spectrum sharing is to provide an opportunity to the TSPs to pool their spectrum holdings and thereby improve spectral efficiency. Sharing can also provide additional network capacities in places where there is network congestion due to a spectrum crunch. Liberalisation of spectrum is related to the liberty to use any technology. Therefore, the Authority has recommended in Para 2.9 above that if any one or both of the licensees, sharing their spectrum, have administratively assigned spectrum in that band, then, after sharing, they will be permitted to provide only those services which can be provided through the administratively held spectrum.

In view of the above, the Authority reiterates its recommendations.

The issue of liberalisation of 900 MHz band spectrum is not related to spectrum sharing guidelines.

7. Para 2.10

If both the licensees are sharing the spectrum in a band in which they have only that spectrum which is either acquired through an auction in the year 2010 or afterwards, or on which the licensee has already paid the prescribed market value³ (as decided by the Government from time to time) to the Government, they can offer services using all those technologies (namely GSM, CDMA, WCDMA, LTE etc.), which they can independently provide through their own spectrum holding. For this purpose, the licensees are required to own a certain minimum amount of spectrum in that band throughout the currency of sharing.

³The prescribed market value shall be payable to the Government for the entire administratively assigned spectrum in that band after adjusting the entry fee paid by the Licensee for acquiring the spectrum (bundled with licence) prorated for the remaining validity of spectrum.

(TRAI Recommendation)

DoT View

It is understood that prior to sharing of administratively assigned spectrum market price has to be paid for such spectrum to DoT. However, use of technology shall be governed by the terms and conditions of respective NIA/ license.

TRAI in its recommendations of May 2010 recommended, among others, that spectrum sharing will not be permitted among licensees having 3G spectrum. Further TRAI has not defined the minimum amount of spectrum to be owned by the licensees throughout the currency of sharing.

TRAI is requested to clarify the above.

Response of TRAI

As stated in the response to Para 2.9, the Authority is of the view that it is not required that prior to sharing of administratively assigned spectrum market price has to be paid for such spectrum.

As brought out in Para 1.1 of the recommendations on spectrum sharing, the basic objective of spectrum sharing is to provide an opportunity to the TSPs to pool their spectrum holdings and thereby improve spectral efficiency. Therefore, the Authority does not find any plausible reason to exclude spectrum in 2100 MHz band from the list of the spectrum bands that can be shared.

Both the licensees are required to fulfil specified roll-out obligations and prescribed QoS norms. Moreover, subsequent to sharing the licensees can offer only those services which they can offer through their own spectrum holding. To fulfil all these required obligations, the licensee itself can determine the minimum spectrum holding that it is required to hold.

8. Para 2.11

Both licensees shall ensure that they fulfil the specified roll-out obligations and specified QoS norms.

(TRAI Recommendation)

DoT View

The primary purpose behind roll out obligations is that spectrum is used by the licensee in a timely manner and that networks spread to wider parts of the service area. This also helps in improved probability of network infrastructure availability during disaster. Hence, it is considered necessary that licensees should meet their roll out obligations without shared sites/RAN. Once roll out

obligations are met, the sites used for meeting roll out obligations may be shared. This will also be in line with TRAI recommendation in para 2.21 below.

All obligations with respect to license conditions including for lawful interception and security shall be the individual responsibility of each licensee.

TRAI is requested to provide its considered opinion in this regard.

Response of TRAI

The Authority agrees with the view of the DoT that all obligations with respect to license conditions including for lawful interception and security shall be the individual responsibility of each licensee. Being part of the licence, both licensees shall also be bound with the roll-out obligations and QoS norms. However, while testing roll-out obligations of each licensee, TERM Cell should ensure that only the spectrum resources assigned to that licensee are tested, irrespective of the fact whether the licensee has separate RAN or not.

In view of the above, the Authority reiterates its recommendations.

9. Para 2.12

For sharing spectrum, a non-refundable processing fee @ Rs.50,000/- (Rs. Fifty Thousand) will be payable individually by each licensee for each LSA to WPC for administrative purposes.

(TRAI Recommendation)

DoT View

TRAI is requested to kindly indicate the rationale for recommending Rs. 50,000/- as processing fees.

Response of TRAI

The processing fee is being imposed to cover the administrative charges. Therefore, the Authority has recommended a nominal amount of Rs. 50,000/- as processing fees.

10. Para 2.14

Both licensees will give an undertaking that, in case any interference is arising due to sharing of their spectrum, they will resolve it within 30 days failing which they will stop sharing in the affected areas till the problem of interference is addressed.

(TRAI Recommendation)

DoT View

The period of 30 days shall be reckoned with effect from date of issue of notice by the Government to resolve the cases of harmful interference.

Response of TRAI

The Authority agrees with the DoT's view.

11. Para 2.20

Intimation regarding the sharing shall be provided by both the licensees to the licensor, TRAI and any other relevant agencies prescribed by the Government from time to time within 30 days from the effective date of sharing of spectrum.

(TRAI Recommendation)

DoT View

Views in para 2.8 above may be referred.

Response of TRAI

TRAI' Response given in Para 2.8 may be referred to.

12. Para 2.22

SUC post-sharing:

Spectrum sharing does not give exclusive rights of use to any one licensee. It helps create additional capacity that is useful mainly in those areas where anyone or both licensees are facing a capacity crunch. Therefore, the usefulness of gain in spectral efficiency due to pooling of spectrum resources will be limited only to those areas where there is congestion in the access network. Moreover, both licensees will be tied to each other and as such cannot plan the expansion of their shared network independently. Therefore, access to additional capacities created through spectrum sharing cannot be considered at par with that created through spectrum acquired through auction/trading. Sharing of spectrum by the two licensees will result in higher revenues for both of them. Therefore, both the licensee will also pay higher amount of SUC to the Government. However, considering the fact that spectrum sharing results in additional quantity of spectrum with both the licensees to serve higher number of consumers, the SUC rate of each of the licensees post-sharing shall increase by 0.5% of AGR.

Example: It has been assumed that two Licensees 'A' and 'B' have spectrum holding in 900 MHz, 1800 MHz and 2100 MHz band as shown in Table below:

Licensee	Licensee A			Licensee B		
<i>Spectrum Band</i>	<i>900 MHz</i>	<i>1800 MHz</i>	<i>2100 MHz</i>	<i>900 MHz</i>	<i>1800 MHz</i>	<i>2100 MHz</i>
<i>Spectrum holding (MHz)</i>	6.2	3	5	0	4.4	5

Currently, both the Licensees 'A' and 'B' are liable to pay SUC as per the existing slab based rated on the basis of total spectrum holding in 900 MHz and 1800 MHz bands.

Post-sharing SUC rates applicable in following three scenarios are given the Table below:

Scenario I: They share their spectrum in the 1800 MHz band.

Scenarios II: They share their spectrum in the 2100 MHz band.

Scenario III: They share spectrum in both 1800 MHz and 2100 MHz bands.

<i>SUC rate for Licensee A</i>		<i>SUC rate for Licensee B</i>	
<i>Prior to Sharing</i>	<i>SUC Post Sharing</i>	<i>Prior to Sharing</i>	<i>SUC Post Sharing</i>
<i>Scenario I: Sharing in only 1800 MHz Band</i>			
6%	6.5%	3%	3.5%
<i>Scenario II: Sharing in only 2100 MHz Band</i>			
6%	6.5%	3%	3.5%
<i>Scenario III: Sharing in both 1800 and 2100 MHz Band</i>			
6%	6.5%	3%	3.5%

(TRAI Recommendation)

DoT View

- (a) Regarding requirement of liberalisation prior to sharing in paras 2.9 and 2.10 may be seen.
- (b) The TRAI in its recommendation of 2010 regarding SUC in case of sharing of spectrum, recommended, among others, the following:

“Spectrum usage charges will be levied on both the operators individually but on the total spectrum held by both the operators together. In other words, if an operator X having 4.4MHz of

spectrum shares 4.4 MHz of spectrum of another operator Y, then both X and Y will be liable to pay spectrum usage charges applicable to 8.8 MHz of spectrum.”

(c) Government has decided the following:

The Spectrum Usage Charges (SUC), as prescribed by the Govt. from time to time, will be levied on both the operators individually for the total spectrum held by both the operators together.

(d) Following type of SUC regimes are prevalent:

- a. Rates of SUC vary with methodology of allotment of spectrum i.e. (i) allotted administratively or (ii) through auction process in 800 MHz, 900 MHz, 1800 MHz and 2100MHz bands.
- b. Further, the rates of SUC vary with quantum of spectrum and provisions of the NIA for auction of spectrum through which spectrum has been allotted.
- c. In case of spectrum in 2100 MHz (3G), the prescribed rates of SUC as NIA for auction of spectrum in 2010 are:
 - (i) The spectrum charge for the 3G Spectrum shall be payable on total AGR of 2G and 3G services taken together;
 - (ii) Slab rate for standalone 3G operators shall be equal to the lowest slab rate i.e. 3% of AGR;
- d. In case of spectrum in 2300/2500 MHz (BWA), the prescribed rates of SUC as NIA for auction of spectrum in 2010 is:

Licensees using BWA Spectrum need to pay 1% of AGR from services using this spectrum as annual spectrum charge irrespective of the licence held by them. Such revenue would be required to be reported separately.

- e. Spectrum Usage Charges (SUC) has been prescribed for the spectrum in 900 MHz and 1800 MHz bands, as per the Order No. P-14010/01/2014-NTG dated 31st October 2014.
 - f. Spectrum Usage Charges (SUC) has been prescribed for the spectrum in 800 MHz, 900 MHz, 1800 MHz and 2100 MHz bands, as per the Order No. P-14010/01/2014 dated 5th February, 2015.
- (e) In view of above applicable SUC rates, particularly the weighted average SUC prescribed rates, TRAI is requested to reconsider the SUC to be applicable in case of sharing.
- (f) The example in Table showing sharing of spectrum in 2100 MHz band in Scenario II and III, indicates sharing even when Licensee A does not hold spectrum in 2100 MHz band, which is not as per recommendation of TRAI in para 2.4.

Response of TRAI

(a) TRAI' Response given in Para 2.9 and 2.10 may be referred to.

(b) to (e)

Please refer to Para 1.3 and 1.4 of the recommendations on spectrum sharing dated 21st July 2014, wherein the Authority's earlier recommendation on spectrum sharing given on 11th May 2010 and the Government decision taken on the same had been discussed.

Keeping in view the complexities involved in determining the SUC for various quantum of spectrum acquired through different methodologies, the Authority in its recommendations dated 9th September 2013 had recommended that SUC for all auctioned spectrum should be at a flat rate of 3% of AGR of wireless services. The reasons for the same are available in

paras 5.1 to 5.32 of its recommendations of 9th September 2013.

As far as SUC in case of spectrum sharing is concerned, the Authority has recommended that the SUC rate of each of the licensees post-sharing shall increase by 0.5% of AGR. Keeping the SUC regime simple and unambiguous is one of the foremost objectives of this recommendation.

In view of the above, the Authority reiterates its recommendations.

- (f) In its back reference, the DoT has erred in reproducing the table given in example at page no. 10 of the Authority's recommendations, due to which it has incorrectly pointed out that spectrum holding of one of the licensee in 2100 MHz band has been shown as NIL. In fact, both the licensees have spectrum holding in 1800 MHz and 2100 MHz band, where sharing of spectrum has been considered to illustrate the SUC post spectrum sharing.**

13. Para 2.23

Spectrum Caps:

As discussed in Para 2.22, additional capacities created through spectrum sharing cannot be counted at par with those created through spectrum acquired through auction/trading. However, considering the fact that spectrum sharing results in better spectral efficiency, a portion of additional capacity created needs to be counted for the purpose of applying the prescribed spectrum caps of 25% of total spectrum assigned and 50% in a band. For the limited purpose of applying the prescribed market caps, the spectrum holding of any licensee post-sharing shall be counted as given below:

50% of the spectrum held by the other licensee in the band being shared shall be counted as the additional spectrum being held by the licensee.

Example: Licensee 'A' and 'B' have spectrum in quantum X and Y respectively in a band, in which they decide to share their spectrum. The spectrum holding in that band subsequent to sharing, only for the purpose of applying the stipulated spectrum cap, shall be considered as per the following table.

	Quantum of spectrum in a band before sharing	Quantum of spectrum after sharing that will be counted as the spectrum being held in this band for the purpose of applying the stipulated spectrum cap
Licensee 'A'	X	$X+(Y/2)$
Licensee 'B'	Y	$Y+(X/2)$

(TRAI Recommendation)

DoT View

The TRAI in its recommendations of May 2010 recommended, among others, the following:

- Permission for spectrum sharing will be given for a maximum period of 5 years. There shall be no renewal.
- Spectrum sharing will be allowed only between parties each of whom does not have more than 4.4MHz /2.5 MHz (GSM/CDMA) of spectrum.
- Sharing will be allowed only if there are at least six operators in the LSA, post-sharing arrangement.
- Spectrum sharing will not be permitted among licensees having 3G spectrum.

The Government decided the following:

Cabinet Decision

Sharing of spectrum without any additional one time spectrum charge, be permitted between TSPs that have both paid for spectrum beyond 4.4 MHz (GSM) / 2.5 MHz (CDMA.) without any change in the terms and conditions of licence for use of spectrum including the carrier size indicated therein. Both TSPs would have to pay spectrum usage charge at the slab rate applicable on the entire combined spectrum holding.

DOT Decision on 15.2.2012

Spectrum usage charges will be levied on both the operators individually but on the total spectrum held by both the operators together. In other words, if an operator 'X' having 4.4MHz of spectrum shares 4.4 MHz of spectrum of another operator 'Y', then both 'X' and 'Y' will be liable to pay spectrum usage charges applicable to 8.8 MHz of spectrum.

It is noted that the spectrum sharing results in better spectral efficiency and the benefit of which shall accrue to both. Further, impact of consolidation of spectrum being similar there appears to be no reasonable justification for differentiating the spectrum holding in the case of M&A, spectrum trading, spectrum sharing or standalone basis.

TRAI is requested to reconsider this recommendation.

Response of TRAI

Please refer to Para 1.3 and 1.4 of the recommendations on spectrum sharing dated 21st July 2014, wherein the Authority's earlier recommendation on spectrum sharing given on 11th May 2010 and the Government decision taken on the same had been discussed.

As discussed in Para 2.23 above, additional capacities created through spectrum sharing cannot be counted at par with those

created through spectrum acquired through auction/trading. Therefore, the Authority has taken a considered decision to make the above recommendations in case of sharing of spectrum.