Spectrum Trading

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Introduction:

The private property regime expects the following conditions for maximisation of welfare in society:

- auctions in the primary market (spectrum auctions)
- freedom to decide the best use of the private property (liberalisation of spectrum)
- secondary market to reorganise efficiently (spectrum trading)
- low transaction costs (including cost of contracting trade, cost of dispute resolution before TDSAT; and cost of information before regulator and in the market)

The secondary market is essential for the private property regime be reorganise efficiently especially if the auctions in the primary market are inefficient as in the case of India. Currently, the auctions in the primary market are inefficient (in terms of size of spectrum, location of spectrum, price of spectrum etc), therefore liberalisation and trading in the secondary market are essential for the market to reorganise spectrum efficiently in terms of use, technology, size of blocks, geographic location, services etc. Additionally, trading will also allow discovery of market prices which has become a routine problem for the regulator and the government.

Keeping the above introduction in mind, the following questions are addressed in the course of this submission:

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Should spectrum trading be allowed only for that spectrum that is allocated through auctions in the primary market?

Since spectrum has previously been allocated through administrative (non-market) processes including first come first serve, beauty contests etc, any trading of such spectrum in secondary markets will result in windfall gains for the seller. From an economics perspective, this windfall

gains can be ignored because such an issue is that of equity and not of efficiency. That is, if windfall gains are allowed then we might enrich one person over another, but the trading will result in more efficient use of spectrum and higher gains for society. However, keeping concerns of level playing field (equity) in perspective this may be opposed by operators who have purchased spectrum in open auctions.

Option 1: Trading in secondary markets should only be allowed for that spectrum which has been allocated through auctions in the primary market.

- Con: Less efficient use of spectrum in comparison to Option 2 as a major chunk of spectrum is excluded from trading.
- Pro: Maintains level playing field

Option 2: Trading is allowed for all spectrum

- Con: Worsens the already distorted playing field

Option 3: Trading is allowed for all spectrum; however for those operators who have received spectrum from any administrative allocation will need to pay the difference between market price and administrative price (after indexation) as tax to the government.

In the present case, the author recommends option 3 as it appropriately deals with issues of equity and does not exclude a major chunk of the spectrum from trading.

An additional concern arises for those auctions in which reservations have been made. For example, in past and future auctions, there may exist a possibility that eligibility has been restricted to only incumbents or to only new operators. In such a case, the auctions may not reflect the true market price and therefore trading of such spectrum may also result in windfall gains. For example, a new operator may win spectrum through reservation at a low price and then sell it to an incumbent in the secondary market to make windfall gains. Therefore, if such reservations are made in any auctions in the future then the spectrum license (or NIA) should clearly mention that if such reserved spectrum is traded in the future then the difference between market price and the indexed price will need to be paid as tax.

Should trading only be allowed for spectrum that is liberalised?

An important tenet of trading is liberalisation. That is, the property owner should be free to decide what to do with the property allowing him to properly respond to market forces and make the most efficient use of the property. If trading is allowed without liberalisation then it will not be as efficient.

However, the corollary that trading should only be allowed for spectrum that is liberalised does not necessarily follow from the above proposition. The following paragraph attempts to explain why trading should be allowed for all spectrum regardless of whether it is liberalised or not.

In the present situation wherein some spectrum is liberalised and some is not, the following options emerge:

Option 1: All spectrum is first liberalised in the hands of the present owners and then allowed to be

traded.

Option 2: Only liberalised spectrum is allowed to be traded.

Option 3: All spectrum can be traded regardless of whether it is liberalised or unliberalised. In this case, on trading liberalised spectrum will remain liberalised, and unliberalised spectrum will remain unliberalised.

Option 1 is the most efficient but will result in problems of level playing field as new operators will argue against spectrum being liberalised in the hands of the incumbents.

Option 2 is the least efficient as only a small portion of the spectrum is put up for trading.

Option 3 is more efficient than option 2 for the reason that option 2 excludes a major chunk of the spectrum from trading. In option 3, even though an owner of unliberalised spectrum will not be able to respond to market forces in terms of technology, atleast trading will allow the operator to give up excess spectrum and use spectrum more efficiently for a given technology.

Therefore Option 3 is recommended in which trading is allowed for all spectrum regardless of whether it is liberalised or not.

Should trading only be allowed for spectrum that is delinked from licenses?

Please note, this question specifically addresses linking of spectrum with licenses and should not be clubbed with issues of auctioned spectrum or liberalised spectrum addressed previously.

The following options emerge in case of this question.

Option 1: Only UL licensees (with delinked spectrum) be allowed to trade. In case a UAS licensee (with linked spectrum) wants to trade, it should first be required to migrate to a UL.

Option 2: All licensees (UL and UAS) are allowed to trade. In case a UAS licensee (with linked spectrum) wants to sell spectrum, a higher administrative fee be charged for delinking that portion of the spectrum to be traded (or reducing the amount of spectrum linked to the license). All traded spectrum will thereafter remain delinked. In case a UAS licensee (with linked spectrum) wants to buy spectrum, he should be required to first migrate to a UL.

It is recommended that Option 2 be adopted. This is because Option 1 excludes a major chunk of the spectrum from the trading regime.

What forms of trading should be allowed?

To address this question, first a list of various kinds of trades need to be chalked. The following is an attempt towards that end:

- A transfer arrangement – In this, the seller sells his entire spectrum (or a portion of his entire spectrum) to the buyer. Administratively, the spectrum license between the seller and

government will need to be revoked (in respect of that portion of the spectrum to be transferred) and a new license between the buyer and government will need to be granted.

- A sharing arrangement[1] – In this, the seller retains ownership but extends co-ownership of his entire spectrum (or a portion of his entire spectrum) to the buyer.[2] Administratively, the spectrum license between the seller and the government will need to be re-contracted to include the buyer as a co-licensee.
- A leasing or subleasing arrangement – In this, the owner of the spectrum retains ownership but leases out his entire spectrum (or a portion of his entire spectrum) to the lessee for a specific purpose and for a limited period of time. Administratively, the government will not be involved in this arrangement. It will primarily be governed by the contractual agreement between the buyer and seller.

Accordingly, the following options emerge from the above line of thought:

Option 1: Only transfer arrangements are allowed.

Option 2: In addition to transfer arrangements, sharing arrangements are also allowed.

Option 3: All three arrangements of trading are allowed i.e. transfer, sharing and leasing.

Under Option 3, various complicated possibilities may emerge as a result of various combinations:

- An aggregation arrangement - In this, one central aggregator buys spectrum from various sources and then leases it to different operators on a demand basis.
- A pooling arrangement – In this, many operators collectively share spectrum and decide on a mutually beneficial institutional arrangement for appropriating spectrum from the pool.

The above mentioned arrangements may result in an extremely efficient and effective trading regime in the long run. Economic theory would prescribe Option 3 as the optimal policy prescription as it allows maximum flexibility for reorganisation of spectrum. Further, leasing in specific drastically reduces transaction costs for reorganisation of spectrum. However, these arrangements are also extremely complicated and difficult to regulate (especially issues like rollout obligations and lawful interception). Accordingly, costs of regulation and monitoring may drastically increase making the overall transaction costs substantially significant. Further, sub-leasing or sub-sub-leasing should be specifically avoided at this stage as it would be extremely difficult to regulate and monitor.

While Option 3 should be the end objective of the trading regime, it is presently recommended that trading be first initiated using Option 2 as the first phase.

Option 1 would be the least optimal and there are not substantive reasons for adopting Option 1 over Option 2.

How should roll out obligations dealt with in case of trading?

1 Ofcom calls this arrangement concurrent transfer

2 In return consideration, the buyer may or may not extend co-ownership of his spectrum to the seller.

Since rollout obligations are proposed to be defined in the spectrum license, if the licensee trades only a portion of the spectrum holding, there will need to be a framework for transfer of rollout obligations at the time of trading. The following options are considered:

Option 1: If a portion of the spectrum is traded, then that proportion of rollout obligations should become the responsibility of the buyer. For implementing this option, roll out obligations will need to defined as a function of the spectrum size. For example, let us assume that the rollout obligations stipulate that for every 1 MHz of spectrum, 20 DHQs need to be covered. Accordingly, all rollout obligations will need to be calculated on a pro-rata basis. For example, if 2 MHz is traded, then 40 DHQs will need to be deducted from the rollout obligations of the seller. Accordingly 40 DHQs will need to be added to the rollout obligations of the buyer.

- Pro: This approach is simplistic
- Con: Direct proportionality may not be the correct approach as technologically there isn't a linear relationship between quantity of spectrum and geographic coverage or the subscribers therein.

Option 2: There should be a lock-in period wherein the original winner of the primary market is required to fulfil roll out obligations. Alternately, rollout obligations remain the obligation of the winner in the primary market regardless of trading of spectrum in the future.

- Con: If there is lock-in and the licensee completes rollout obligations, once spectrum is traded, he might not be able to provide services to the same extent given the reduced spectrum.

Option 3: Rollout obligations are delinked from spectrum and are allowed to be separately traded. In this case, the winner of the primary market is given spectrum and its corresponding roll out obligations as two distinct properties. The winner is then allowed to separately trade the spectrum and the rollout obligations as two separate properties. For example, Videocon wins 5 MHz of spectrum in an auction. Lets say the spectrum comes with a requirement to provide coverage to 100 DHQs. As per the suggested framework, the 5 MHz of spectrum is a separate property and the rollout obligation of 100 DHQs is a separate property. In this case, since spectrum is delinked from rollout obligations, selling of 1 MHz by Videocon will not affect its current holding of rollout obligations, which will remain at 100 DHQs. However, Videocon may optionally separately transact with any UL holder to purchase its rollout obligations. For example, while Videocon may have sold 1 MHz of its spectrum to UL1 in which UL1 pays Videocon; it may separately sell 50 DHQs to UL2 in which Videocon pays UL2.

In this submission Option 3 is recommended. The regulator should in fact consider allowing a full fledged market for trading of roll-out obligations even for existing licenses. In addition to solving the present problem related to treatment of rollout obligation at the time of trading, the proposed framework has significant potential to make existing networks more efficient. For example, if Airtel is expanding to remote rural areas as a result of which it surpasses its present roll-out obligations, and if Vodafone does not have adequate footprint and is behind schedule on its present roll-out obligations, in this case Vodafone should be allowed to purchase roll-out credits from Airtel in order to meet its roll-out obligations. This would further finance Airtels expansion in rural areas instead of duplication of the network in the same areas by Vodafone.

How should lawful interception be dealt with in case of trading?

Lawful interception requirements should be linked to Unified License and not to the spectrum license. Therefore regardless of any spectrum trading, lawful interception should be complied with by all UL licensees.

What size of spectrum should be allowed for trading?

The size of the spectrum that should be allowed for trading is a function of the technology. For example, LTE, UMTS and GSM, all have different minimum spectrum size requirements. Future technologies may have presently-unknown minimum spectrum size requirements. Likewise, carrier aggregation technologies are also constantly improving. Therefore, to prescribe a minimum spectrum block for trading will be technology-specific and against the principles of liberalisation.

How should inefficiency or hoarding be dealt with?

There needs to be a framework for penalising hoarding. Hoarding may take place (i) as a result of underutilisation of spectrum or (ii) as a result of anticompetitive intentions. The following options are identified:

Option 1: The present system of SUC is followed in which SUC is calculated as a function of the slab (in terms of spectrum quantity) that the licensee falls in. Currently, 3% is fixed and 5% is variable according to slabs.

Option 2: A hard cap is placed on the maximum spectrum holding. For example, 50% of one band and 25% of all commercial bands.

Option 3: A system of SUC is adopted in which SUC is calculated as a function of efficiency (subscribers per MHz). Currently, 3% is fixed and 5% is variable according to spectrum quantity slabs. In the proposed system 4% is fixed and 4% is variable according to efficiency (subscribers per MHz). The proposed system is demonstrated to be revenue neutral in the annexed excel file in the original submission for question 18.

Option 1, the present framework, is particularly inefficient. The current SUC is a function of the slab of quantity of spectrum that an operator falls in. An analysis of the frequency held by each operator will reveal that it holds spectrum equal to either 4.4 or 6.2 or 8.2 MHz regardless of the technical inefficiency as a result of such holding. This is done keeping in mind the present structure of slabs created by the regulatory framework.

In addition, the present framework is inefficient as it may penalise the operator using spectrum efficiently while allowing the operator hoarding spectrum or using spectrum inefficiently to pay lower spectrum usage charge. For example, if one operator is serving 8 million people with 8 MHz of spectrum while another is serving only 1 million people with 6.2 MHz of spectrum, the present framework will still force the former to pay higher spectrum charges despite being more efficient. In trading this assumes special significance as the regulatory framework should incentivise

operators to sell excess spectrum and should penalise operators hoarding spectrum.

In Option 3, a system of SUC is proposed wherein the SUC is calculated as a function of the efficiency (subscribers per MHz). The proposed SUC structure creates an incentive for handling spectrum efficiently, selling excess spectrum, rewarding efficient TSPs and as a result promoting trading.

In the present submission, Option 3 is recommended.

Should the life of spectrum license agreement change on trading?

Needless to say, the duration of the spectrum license will not change or be renewed on trading.

Should spectrum trading be looked at as a source of revenue by the Government?

The central government should impose a fee equivalent to the administrative fee of revoking the old agreement and executing a fresh agreement in case of transfer arrangements. Trading should not be looked at as a source of revenue as the private property regime expects transaction costs to be zero (negligible) in order to efficiently reorganise. TRAI may refer to the Coase Theorem which expects transaction costs to be zero for the markets to become socially optimal.

Should trading be allowed to result in exit?

Trading may effectively result in exit from spectrum holding. However, the entity will still be left with a Unified License even after selling all spectrum by way of trading. Therefore, final exit from telecommunications services should be governed by the Unified License. As a result, trading will not affect the exit norms of the Unified License.

Other issues that need attention?

The following issues may be considered by the authority

- Trading may result in circumventing M&A norms. For example, a new entity may buy spectrum from two separate operators. This new entity may later be acquired by the two operators resulting in an effective merger between the two operators.
- The trading regime expects property rights to be clearly defined. In the case of spectrum, this needs to be done in terms of range of frequency, geographic area, duration of license, and most importantly interference limitations. Special attention is drawn to the need to use interference limitations to define property rights. This is because, in case of future disputes to be settled before TDSAT, the dispute resolution costs need to be low. The following test may be considered for dealing with interference:
    - The emission is in the licensee's band and area. If so, then no further action is required; otherwise it considers if:
    - The emission is below background noise. If the emission is below acceptable levels

of interference then everything would be fine; otherwise this would imply that:

- A third party user suffers from interference.

- Operators should not be allowed to reduce the geographic size of the spectrum while trading as this may result in a huge number of tradable properties, which can result in the trading regime falling victim to the tragedy of anti-commons.

Is there any potential for trading?

The potential for trading is significant as highlighted by the table below:

Peak Subcribers per MHz		Aircel	Bharti	BSNL	Idea	Loop	MTNL	Unitech	Videocon	Vodafone
(millions)	AP	0.21	1.78	0.66	1.37			0.49		0.86
	Assam	0.49	0.53	0.09	0.07					0.33
	Bihar	0.69	2.12	0.21	1.11			0.57	0.00	0.96
	Delhi	0.41	0.74		0.59		0.10			0.80
	Gujarat	0.01	1.08	0.35	1.33			0.57	0.09	1.55
	Haryana	0.00	0.37	0.16	0.60				0.10	0.51
	HP	0.09	0.31	0.11	0.12					0.09
	J&K	0.39	0.38	0.10	0.04					0.09
	Karnataka	0.23	1.59	0.39	0.95					0.76
	Kerala	0.00	0.55	0.50	0.99					0.77
	Kolkata	0.31	0.43	0.08	0.24					0.41
	MP	0.00	1.22	0.28	2.04				0.10	0.54
	MH	0.13	1.20	0.48	1.68			0.68		1.77
	Mumbai	0.21	0.39		0.62	0.14	0.07			0.58
	NE	0.39	0.43	0.09	0.05					0.13
	Orissa	0.39	0.85	0.26	0.18					0.41
	Punjab	0.09	0.85	0.39	0.71					0.56
	Rajasthan	0.52	1.67	0.35	0.89					1.45
	UP(E)	0.64	2.12	0.45	1.26			1.04	0.00	1.61
	UP(W)	0.07	0.98	0.23	1.33			0.73	0.00	1.07
	WB	0.47	1.47	0.22	0.41					1.33

This table reflects the pressure on the spectrum of different TSPs captured by the variable Peak Subscribers per MHz. It shows that in every circle some operators are carrying more subscribers per MHz than other operators. This shows potential for transfer of spectrum from operators underutilising spectrum to operators efficiently utilising spectrum for a given circle. The objective of the trading regime should be to make the efficiency of all operators maximum and equal. A similar analysis can be done using MoU per MHz or throughput per MHz.