

RESPONSE OF PROFESSOR MARTIN CAVE OBE OF WARWICK BUSINESS SCHOOL, UNIVERSITY OF WARWICK, UK TO TRAI CONSULTATION PAPER 6/2009 ENTITLED ‘OVERALL SPECTRUM MANAGEMENT AND REVIEW OF LICENCE TERMS AND CONDITIONS.

Introduction

I am responding to consultation paper 6/2009 of the Telecom Regulatory Authority of India, dated 16 October 2009.

I am a professor at Warwick Business School, University of Warwick, UK. I was formerly a professor of economics and Vice-Principal at Brunel University, UK. I hold degrees of BA, BPhil and DPhil from Oxford University.

I am a regulatory economist specializing in the communications sector. I am author or editor of several books and articles, including: co-editor of *Handbook of Telecommunications Economics* Volumes 1 and 2 (Elsevier 2002, 2005) and of the *Oxford Handbook of Regulation* (Oxford University Press, 2010), and co-author of *Essentials of Modern Methods of Spectrum Management* (Cambridge University Press, 2007). I am co-author of the spectrum unit of the *ITU/World Bank Regulatory Toolkit*. In addition to such academic work, I have undertaken strategic reviews of spectrum policy for the Governments of Australia, Canada and the UK. In the UK, I undertook a *Review of Radio Spectrum Management* in 2002 and an *Audit of Major Spectrum Holdings* in 2005. The UK Government accepted the recommendations of both of these reviews. I was awarded an OBE in January 2009 for public service, particularly in the area of spectrum reform. A brief CV is appended.

I am making this response at the request of Vodafone Essar, which is paying me an honorarium for the work, but has given me complete freedom to express my own independent views.

In what follows, I address the more fundamental questions raised by TRAI in its consultation document. I begin, however, with a few general remarks on the role and the instruments of spectrum management under the category of “Other Issues” which I believe are important to understand in order properly to address the questions raised in the consultation.

Some general considerations

Over the past decade, spectrum management has gone from being an arcane branch of radio-engineering to one of the most potent instruments of economic policy making.

The TRAI will be familiar with the startling conclusions reached by the World Bank from its analysis of the effects on economic growth of the spread of the ICT, particularly the

estimate that an increase in mobile penetration by 10 percentage points in low and middle income countries generates a 0.8% increase in GDP per capita, while the equivalent effect from a 10% percentage points in broadband penetration is 1.4%.¹

The data on mobile penetration in the TRAI publication, *The Indian Telecom Services performance Indicators April-June 2009*, and the mobile penetration projections to 2014 in the Consultation paper (an increase in subscribers from 440m to 1bn) indicate the scale of this effect. Moreover, as the population turns to use of (primarily wireless) broadband, the consequences, possibly even greater, of this ‘general purpose technology’ on both production and consumption will increasingly be felt. The impacts of spectrum policy are likely to be even more significant in markets such as India where penetration of fixed voice and data services is low.

The second key consideration is the dynamism of the global mobile wireless industry. Generations of wireless technology succeed one another at short intervals. New technologies such as Wifi, WiMax and LTE challenge existing ones with varying degrees of success; laptops get cheaper; devices more versatile and powerful.

These developments place a premium on a spectrum management regime which is both quick in its operation and flexible. There is an increasing recognition that traditional methods of spectrum management are less suited to today’s world of spectrum scarcity and dynamic change than they were to earlier times. Today, having a spectrum management which is fast-operating ensures that the growth benefits from increased use of wireless are not delayed; having a flexible regime means that spectrum can flow between firms and uses in a way which ensures that the market place for services can adapt to new technologies, new demands and new circumstances. In essence such a regime benefits end users by protecting the competitive process in services markets-enabling successful operators to expand and less successful ones to contract.

Inevitably, introducing such flexibility into a traditional system of spectrum management is likely to take some time, but the sooner the process starts, the sooner it begins to pay dividends to end users of services. This approach to improving end users’ experience is far more reliable than top-down or “command and control” regulatory interventions such as audits of spectrum use.

It is also vital to ensure that the growth of mobile communications is not stunted by avoidable spectrum shortages. There are two aspects to this, at least. The first concerns the speed at which spectrum is released. Delays in this regard can be very costly, in a long term as well as a short term sense, to the economy. Secondly, the growth of mobile communications raises the issue of the balance among the various traditional uses of spectrum. Historically, government and public uses accounted for a high proportion of it – perhaps as much as one half. But the opportunity cost of such use, especially in respect of bands which are internationally harmonized for mobile communications, has grown enormously, and suggests scope for a rebalancing of uses. For example, in several countries, an existing user, often in the public sector, has been newly equipped and

¹ World Bank, *Information and Communications for Development Report*, 2009

transferred to another band, while its spectrum is assigned, often by auction, to mobile communications. This creates the possibility of a gain for both parties.

Experience in spectrum management overseas suggests that use of market mechanisms can support quick and flexible adaptation to circumstances. Mobile services are provided to end users in the context of a competitive market, and other inputs into their production are bought in the market place. While spectrum markets in some countries have encountered teething troubles, they have flourished in the United States for several years.² Now spectrum awards are increasingly made through competitive auctions, and extending the use of markets to secondary trading in existing spectrum licences permits adaptation and innovation to take place continuously across a broader arena of spectrum use. Similar benefits can also be gained by other mechanisms discussed in the Consultation paper, including M & A and (to some degree) spectrum sharing. Because of the benefits such mechanisms can bring to customers, the regulator should take care not to block or limit them by introducing special charges for or taxes on such activity. Such charges make a one-off contribution to government but risk denying customers a permanent benefit and a permanent boost to the wider economy.

But spectrum markets can fail too. Especially if they lead to anti-competitive conduct by dominant firms. As the Consultation paper shows, Indian mobile markets are extraordinarily unconcentrated, with 10-12 operators in most of the 22 Circles, and remarkably low prices (see *Merrill Lynch Wireless Matrix, 1Q09*). Based on international experience, a more typical number of mobile operators would be between three and five. The industry structure in India has been achieved at the cost of fragmented spectrum assignments which impose heavy costs on more successful operators and may jeopardize the sector's ability to meet the population's growing demands for service. It is not the case that more operators are better than fewer, if the large number of operators is the result of regulation and the licensing regime rather than the result of the operators' own efforts in the market place. In India's present circumstances and for the foreseeable future, fragmentation appears to be a greater threat than concentration.³ And at this crucial juncture, India simply cannot afford inefficient use of spectrum

The Consultation paper is properly alive to the possibility of market failure, as shown in its discussions of restrictions on mergers and spectrum caps. This recognition opens the door to what seems to be the best way forward for spectrum policy in India - a combination of increased supply of spectrum, preferably assigned by auction, as is proposed for 3G, increased flexibility in its use, and a careful and proportionate assessment of any measures needed to safeguard competition. In my view such an assessment will lead to the view that the risk of harm from concentration is presently very remote, so that such measures are not generally required, and that some of those in place are likely to do more harm than good.

² John W Mayo and Scott Wallsten, *Enabling efficient wireless communications: the role of secondary spectrum markets*, June 2009.

³ I note that a similar view is reached in D Lewin *et al*, *An assessment of spectrum management policy in India: a final report to the GSMA*, Aegis spectrum engineering and Plum consulting, December 2008.

This general approach is now amplified in response to particular questions.

Responses to selected consultation questions:

Q.7

Should the spectrum be delinked from the UAS Licence? Please provide the reasons for your response.

In order to ensure efficient use of limited spectrum in the long term, an operator's spectrum holding should reflect its needs. (More formally, the 'opportunity cost' of spectrum in any band should be the same for all operators.) The past practice of making additional assignments proportionate to increases in subscriber numbers is designed to achieve this result, but it does so very approximately since subscriber numbers do not accurately reflect usage. Its effect can also be to transfer scarcity rents from the government to operators, if they receive spectrum assignments at less than market value.

In my view, delinking spectrum from the UAS licence is effectively a precondition for achieving a more efficient use of spectrum. In relation to future spectrum awards, it overcomes the problems of windfall gains and enables desirable measures such as trading, M & A and sharing to increase the flexibility of use of existing spectrum assignments.

Q 8

In case it is decided not to delink spectrum from UAS license, then should there be a limit on minimum and maximum number of access service providers in a service area? If yes, what should be the number of operators?

The 'optimal' number of operators in any Circle is determined by finding a balance between two considerations. On one hand, too many operators at inefficiently low scale cause unit costs to rise, and these unnecessarily high costs are passed on to end users. On the other, having too few operators may chill competition and lead to excessive prices and, in the longer run, lower innovation. In my view, India presently and for the medium term future faces the former problem of too many operators, as a result of manner in which spectrum has been assigned in the past. In this respect its situation is quite different from that faced by regulators in other jurisdictions, which are facing consolidation proposals which may reduce the number of operators to three or four. As noted above, the best way of resolving 'India's problem' is likely to be to delink spectrum from UAS licences and permit M&A and spectrum trading and sharing. This will permit successful operators to expand to meet the needs of their customers and unsuccessful ones to decline or exit the market. By this means, the problem of inefficient and excessive entry will be eliminated through a market process. At the same time, the contrary danger of excessive concentration can be guarded against measures to prevent excessive concentration. Experience of other jurisdictions suggests the number of operators in India is way above the number at which concerns about concentration have surfaced in other jurisdictions

(which happens when, roughly speaking, there are only three or four operators in the market).

It follows from the above that if the link between spectrum and the UAS licence is maintained, issuing more licences and fragmenting the spectrum further will add to the inefficiency with which spectrum is used and cause harm to customers. At the same time there is scope for an efficiency-enhancing reduction in the number of licensees, each with its own inflexible spectrum assignment. The focus of policy should be to achieve this goal.

Q. 9-10

What should be the considerations to determine maximum spectrum per entity?

Is there a need to put a limit on the maximum spectrum one licensee can hold? If yes, then what should be the limit? Should operators having more than the maximum limit, if determined, be assigned any more spectrum?

Spectrum only confers benefits when it is combined with other inputs to produce services which are of use to end users (national defence; air travel; above all, mobile telecommunications). It follows from this that restrictions on spectrum holdings should be directed at preventing detriments to end users of mobile communications and other services rather than imposed for their own sake. It is not hard to see how these might arise. In principle an operator or operators could ‘corner’ the market for spectrum in any market and use control of spectrum to limit the output and raise the price of mobile services. Innovation by new entrants would also be stifled.

The gravity of this risk in practice depends crucially upon the spectrum management regime. If spectrum is very inflexible, with bands being pre-assigned to specific uses, it will be relatively easy for some operators to foreclose entry by others into individual downstream markets. But where there is a flexible choice of spectrum use (often called ‘technology and service neutrality’) over a broad range of frequencies (e.g. from 200 MHz to 5GHz), it should be beyond the capacity of operators to corner so large a spectrum market. This suggests that flexibility of spectrum use can operate in favour of competition.

Subject to whatever restrictions on spectrum use there may be (ideally very few), imposing a spectrum cap on operators is one possible way of preventing them from blockading entry.⁴ The cap can be applied to the amount which any operator can acquire at an auction, in order to ‘set aside’ some spectrum for new entrants; this is called a time-specific cap. Or it can apply to the stock of spectrum an operator holds at any time; a

⁴ In 2005, the present author was commissioned by the European Regulators Group (ERG) and the Radio Spectrum Policy Group (RSPG) - the colleges of, respectively, European Union telecommunications and spectrum regulators - to write a paper on *Anti-competitive uses of spectrum*. It discusses other approaches to discouraging ant-competitive conduct in spectrum markets.

permanent cap on stock. It can be a ‘hard’ cap – an absolute prohibition on holding more than the limit, or a ‘soft’ cap, such that the operator has to report any (proposed) breach of the limit and proceed only if approval is granted for it. Caps on stock can either apply across all bands, or separate caps can be imposed on particular ranges of spectrum which can be used to provide broadly substitutable outputs (e.g. on spectrum up to 1GHz).

It follows from this preliminary discussion that the key to determining whether a spectrum cap is needed is to be found in an analysis of the competitiveness of the mobile services market place. If there is a danger of excessive concentration, a cap can help to ward it off, particularly. But if spectrum is excessively fragmented, a cap which is set too low can prevent more efficient spectrum use and harm consumers.

As the consultation document points out, the HHI index in the 22 Circles ranges from 0.16 to 0.30, which is very low by international standards. Para 2.14 also says that several studies suggest that four competitors is the minimum number to ensure effective competition (which conclusion probably needs qualification in the circumstances of any particular case). In almost all the Circles there are currently more than 10.

Given the starting point, it is doubtful whether a cap of any kind is needed at all. But if (and only if) it could be shown that there were a real risk to the competitiveness of end user markets, and if it could be shown that a spectrum cap was a better way of dealing with it than measures taken in the downstream services market, it is worth considering some possible approaches. Consider, for example a ‘hard cap’ on an operator’s stock, stocks based on one-third of the spectrum available for mobile communications in the 2G, 3G and BWA spectrum bands.⁵

The most concentrated spectrum market structure this provision would lead to would be, one in which three operators had equal spectrum holdings. Yet there could easily be a highly competitive end user market of which one operator had 40%, and imposing a 33% cap in an effectively competitive market would harm, rather than assist end users, because depriving the most efficient competitor (assumed to be the one with the largest market share) of its optimal amount of spectrum would raise its unit costs. This illustrates the danger that an unnecessary cap might deprive an operator’s customers from benefitting from its superior performance, and suggests that even a one-third cap might have non-trivial down-side risks for consumers.

I draw from this the conclusion that spectrum caps may be better avoided if other mechanisms are in place to protect competition (see Question 17 below), and if permanent caps on the stock of spectrum held by any operator are set, they should be set fairly high- say 50-60% of all the spectrum available in any Circle for mobile communications. However, a time-specific cap might be imposed to accompany an auction if an operator looked likely to cement through it a dominant position.

⁵ We consider hard rather than soft caps, because a hard cap is a ‘bright line’ approach which does not involve a detailed case-by-case evaluation.

If a stock cap were exceeded as a result of a merger, for example, it would be right to allow the combined entity some time to sell the excess spectrum. Not doing so would artificially discourage efficient M&A activity.

Q 12

In the event fresh licences are to be granted, what should be the Entry fee for the licence?

I have suggested above that fresh licences linked to spectrum should not be granted. Moreover, given the current “queue” of applicants, and the current unavailability of spectrum in most Circles, I understand that it would be impossible to grant each of them a licence with spectrum. Making distinctions among them would appear invidious. It may be better to announce the cessation of awards of licences which link the operating license with spectrum. This would not blockade entry into the sector provided new entrants had options to gain spectrum by other means – see below.

Q.13

In case it is decided that the spectrum is to be delinked from the license then what should be the entry fee for such a Licence and should there be any roll out condition?

Issuing a licence imposes an administrative cost which can properly be recovered from the applicant. But the chief physical constraint on entry is spectrum, and it is more important to create an efficient means for pricing spectrum, than to price operating licences delinked from spectrum.

The question of roll-out conditions is difficult and complex. On one hand, it might be said that it is not necessary for all networks to roll-out to all areas. On the other hand, differential roll-out conditions should not distort competition among operators. Rather than continue to impose roll-out conditions, the Indian government might be better advised to review its coverage objectives (i.e., set out clearly what it is trying to achieve in terms of coverage) and seek the least cost way of achieving those objectives rather than to impose *ad hoc* requirements on each bundle of spectrum that is issued.

In relation to roll out conditions, I understand that every UASL has to satisfy specified targets and receives additional obligations with additional spectrum ranges (e.g. as is proposed for 2.1GHz spectrum).

However, it may be appropriate to ask whether it makes sense to have symmetrical obligations which apply equally to all licensees in any given class, if there are as many of them as there are at present. Where an operator would roll out in any case, the obligation is redundant, but there is an obvious problem arising from costly duplication (or replication a dozen times) of equipment in service areas which are not commercial. In a

competitive market, end users will eventually pay the price for such an approach, as it is they who ultimately will fund the cross-subsidy imposed on all operators.

What is implied by this line of thought is a review of the purposes of roll out obligations, whether those purposes can be achieved at lower cost, and how to find a competitively neutral means of dealing with them and the legacy issues created by existing obligations.

A general observation on M&A, Spectrum Trading and Spectrum Sharing (Q 17-Q36)

The general observations (at pp 1-2 above) noted the need to ensure, in the context of the expected growth of demand for wireless services, that efficiency in spectrum allocation and usage can be promoted. I also noted that the large number of operators in each of the 22 Circles (and the relatively low HHIs that this produces) created a starting point from which considerable consolidation could occur without significant risk of harm to end users. This is illustrated by the approval by competition authorities in Australia, Europe and the US to consolidations which take the number of operators (or joint ventures) down to four or even three operators.

In terms of promoting technical efficiency in spectrum use, each of the above mechanisms – M&A, trading, sharing – has a role to play. Thus, if one operator were short of spectrum and another had an abundant supply, in a competitive market place the imbalance could be corrected by i) a merger between the two; ii) sale or lease of spectrum by one to the other; iii) an agreement to share spectrum. Each of these has its own advantages and disadvantages for the operators concerned, and, provided that competitive safeguards are in place to ensure end user benefits (or at least no end user harm), it would be desirable for all three options to be available in some form. It has to be recognized, however, that all three present challenges to the regulatory system which have to be addressed. These may take different periods of time to resolve in each case.

It also follows from this that, provided the authorities are satisfied there is no risk to end users, barriers to the three activities should not be artificially created in the form of special taxes, fees or imposts on mergers, trades or sharing arrangements. Such measures place at risk the attainment of greater overall efficiency and end user benefit within the sector.

However, there are other considerations in play. Past policy and regulatory practice has placed an extremely valuable resource (an operating and spectrum licence) in the hands of certain firms. There is a natural reluctance to allow them to make large windfall profits from the sale of such licences or the underlying physical assets. This can be moderated by imposing a tax on any such transaction, which could take the form of a fixed fee per transaction, or a fee which varied according to the value of the assets acquired or MHz traded or shared, or (as in some jurisdictions) a tax on any capital gains made by the seller.

The first problem is that these very charges and taxes may deter a transaction from which end users would benefit. Secondly, if it is only the transactions noted above which trigger the charge, then a licensee which engages in none of them continues to enjoy the windfall profits associated with the licensing process, by earning excess profits from assets maintained in its possession.

Thirdly, there is evidence that adding to the flexibility of a licensing regime by reducing restrictions on spectrum use in fact lowers the market value of spectrum rather than increases it.⁶ This means that increasing the flexibility of spectrum use, whether by countenancing M&A, by spectrum trading and spectrum sharing or by other means, removes localized market power and *reduces* the value of many existing spectrum holdings.

Inevitably, the regulator or government setting charges for transactions involving spectrum has to balance these considerations – efficiency for consumers and equity for taxpayers. But it is important to bear in mind that charges give a once-off benefit to the Exchequer, whereas the efficiency benefits to consumers will survive from one year to the next.

In combination, I believe that these considerations militate strongly in favour of lower rather than higher charges and taxes. In my review of spectrum management for the UK government,⁷ I was faced with the task of making a recommendation in this regard. In the event, I noted that a general liberalization should reduce many spectrum values, by eliminating artificial shortages, and that capital gains realized by companies were in any case covered by the corporate tax system. The UK Government accepted this advice. At the same time, I recognize that other countries have different values and approaches to equity issues. That said, and recognizing that limited information is available is about firm's response to tax incentives, my instinct is to keep any special tax on windfall gains down to no higher than 25-33%, on the ground that the risk of and the harm from blocking efficient re-allocations of spectrum (through imposing taxes which are too high) is large. There is also the risk of mistakes in measurement of the real economic gains (for example in the case that an operator sells not only spectrum, but other assets such as towers or customers, in which case the regulator would be forced to judge the value of all assets in order to disaggregate the windfall specific to spectrum). This also suggests biasing the rate towards the lower end to ensure that any windfall tax does not impede the efficient reallocation of spectrum.

⁶ See Thomas W Hazlett, 'Property rights and wireless license values' *Journal of Law and Economics*, 51 (3) 563-598.

⁷ M Cave, *Review of Radio Spectrum Management*, Department of Trade and Industry and Her Majesty's Treasury, 2003, p 115,

Q.14

Is there a need to do spectrum audit? If it is found in the audit that an operator is not using the spectrum efficiently what is the suggested course of action? Can penalties be imposed?

If a market is competitive, operators are punished by loss of customers and revenues if their offerings do not meet consumer expectations, and they are punished by loss of profit due to increasing costs if they use inefficient or outdated technologies. Regulators of competitive markets are normally content to rely on these mechanisms to guarantee efficiency and protect consumers.

It is true that spectrum is a scarce resource, and that a lack of sufficient flexibility can lead to it being distributed inefficiently among operators. However, if this is the problem, then the more direct solution is to increase competitive pressures in spectrum markets by allowing flexibility. It is very doubtful that a top-down regulatory approach to enhancing efficiency would help.

It would also be difficult for a regulator to decide when spectrum was being used inefficiently. The better question is to ask whether the mobile communications outputs are being produced inefficiently. The answer to this depends on customer tastes, judgements about economic obsolescence and so on. The TRAI would find it hard to acquire the necessary information to adjudicate on such matters. Ordinarily, as long as the market for the output is competitive, regulators are content to leave such detailed choices to firms who are rewarded or punished by consumers according to the efficiency of their decisions.

In summary, an audit of spectrum use is unnecessary where, as in the case of mobile communications, the output market is competitive. Such micro-management by the regulator often has adverse unintended consequences. If there are competition problems, it is the competition problem- the illness- that should be tackled, not inefficient spectrum use, which is a symptom.

M&A

Q.17

Whether the existing licence conditions and guidelines related to M&A restrict consolidation in the telecom sector? If yes, what should be the alternative framework for M&A in the telecom sector?

The licence conditions and guidelines currently used in India embody tests for impact on competition of the 'bright line' type: that is, they place a numerical ceiling on specified variables, such as market shares or the number of market participants. There is a justification for such an approach on grounds of clarity and predictability.

In the present instance, however, there are numerous bright lines, as paras 2.31 and 2.32 of the Consultation paper make clear. In fact, a successful merger has to cross several hurdles that apply on a Circle by Circle, rather than a national basis. These include subscriber and revenue market shares, limitations on spectrum holdings, regulations for the return of spectrum, and compliance with lock-in rules. It is also proposed that a spectrum cap be imposed on any single or combining entity, that the licence period of the combined entity should be the shorter of the two original licence periods, and that a windfall tax be imposed. In my view, the licence period consequence mentioned above points to how a well-intentioned regulatory intervention can deter efficiency-enhancing actions by firms.

Thus my concern is that this proliferation of 'bright lines', obligations and charges produces a regime which is at best opaque and hard to enforce and at worst raises unnecessarily high barriers to finding an efficient equilibrium of spectrum allocation and pricing. Moreover, I understand that each restriction, where it can, applies at the Circle level, rather than at the national level, which given the homogeneity of competitive conditions in the 22 Circles might well be a more natural geographical area, and in any case is necessarily more restrictive when applied to each and every circle independently than it would be on a national basis.

Since the transaction in question is one which affects the services market place, which impinges directly on end users, it is natural to address its effect on that market. In an ideal world, a case by case approach would be appropriate, based upon whether it would create an operator with dominance; i.e. an operator capable of behaving independently of its customers and competitors. This would replace the 40% test, which is likely to be over-restrictive if applied at the level of the individual Circle. Because of the low levels of concentration to date in India, relatively few mergers would require detailed consideration. If, however, a bright line test were considered appropriate in merger evaluation, then a market share test in terms of revenue should be preferred. The threshold, which would only apply to M&A and not to market share gained by organic growth, might be 40% of revenue on a national basis and 50-60% on a Circle basis. In my view, one or other of the alternative tests described in this paragraph - the dominance test or the market share test, should be the only one adopted. A separate spectrum cap is not necessary.

Q.18

Whether the lock-in clause in UASL agreement is a barrier to consolidation in telecom sector? If yes, what modifications may be considered in the clause to facilitate consolidations?

Lock-in clauses are capable of delaying rationalization and improvements in spectrum efficiency. I understand that they are designed to prevent short-term profiteering from 'trafficking' in licences. As noted above, balancing these considerations is difficult. In the longer term, the issue can be resolved by assigning spectrum initially by auction, thus

eliminating the expectation of a windfall gain. In relation to past or future spectrum awards made by other means than auctions, dealing with the issue through an overall approach to the treatment of windfall gains is almost certainly preferable to a specific restriction on transactions in the early years of a licence.

Q.19

Whether market share in terms of subscriber base/AGR should continue to regulate M&A activity in addition to the restriction on spectrum holding?

As noted above, the goal of economic activity is to further the interests of consumers. Restrictions on holdings in other markets should follow from their impact on end user markets. It is logical to examine a merger between operators on the basis of their expected effect in that market. Only if there is an adverse effect would it be appropriate to consider how it might be remedied if the merger went ahead, for example by a divestment of spectrum. The connections between share of spectrum and share of retail in an mobile communications market are complex. Thus in relation to M&A, a test based on the mobile market place seems best. Running both tests simultaneously in such a case would be disproportionate and confusing.

Q. 20 – 22

Whether there should be a transfer charge on spectrum upon merger and acquisition? If yes, whether such charges should be same in case of M&A/transfer/sharing of spectrum?

Whether the transfer charges should be one-time only for first such M&A or should they be levied each time an M&A takes place?

Whether transfer charges should be levied on the lesser or higher of the 2G spectrum holdings of the merging entities?

As noted above, the worry about transfer charges is that they may impede M&A and other transactions and activities which benefit the economy and the end users of mobile services. It is natural for the state to want to capture directly some of the benefits of a merger, but in a competitive market, after an interval, those benefits will tend to accrue permanently to end users of mobile services in any case, who – the projections- suggest- will shortly make up the bulk of the population of India. Any transfer charges should thus reflect this; if they are likely to prevent rationalization of spectrum holdings, end users will be worse, not better off.

Nor should the transfer charges skew choices for firms across the three options considered – M&A, trading and sharing. Similarly, the transfer charges should not skew efficiency-improving commercial deals towards one set of operators (those with spectrum not subject to a transfer charge) and away from another set of operators (those who face a transfer charge). In other words, in a competitive market firms should be free to use any efficient method of rationalization, and governments or regulators should not attempt

without good reason to encourage or discourage one method at the expense of another or encourage or discourage dealings with one set of operators at the expense of another.

Q. 23

Whether the spectrum held consequent upon M&A be subjected to a maximum limit?

The discussion of spectrum caps above (see Q9-Q10 above) applies here. In brief, in certain circumstances, where harm to consumers can be shown to flow directly from a concentrated holding of spectrum, there may be a basis for having a cap equal to, say, a proportion of all frequencies available for mobile communications (say 40 % nationally or 60% in any Circle). But given the current starting point such a cap is unlikely to bite (and hence is unlikely to be required) for some time.

Spectrum trading

Q 24

Is spectrum trading required to encourage spectrum consolidation and improve spectrum utilization efficiency?

Spectrum trading involves the re-assignment of rights of access to particular bands from one organization to another, by agreement and in return for a payment. It occurs on the basis of a specification of rights and responsibilities accorded to the licensee by the license, which are transferable. A key element of these might concern the degree to which the use of the spectrum is restricted to producing a particular output. In some jurisdictions, licences are not fixed to particular services or technologies, but are service- and technology-neutral. This requires a particular specification of user rights and responsibilities which can accommodate change of use. In essence the licensee is prohibited, whatever the use to which the spectrum is put, from inflicting more than a specified level of interference on its geographical and frequency neighbours. This system takes some time and resource to implement, but trading can be introduced relatively speedily if, as is the case in India, it is highly likely in the short term that any spectrum currently used for mobile communications will remain in the same use. Trades on this basis can be accommodated without a wholesale redefinition of spectrum user rights.

In my opinion, spectrum trading, even subject to these restrictions on change of use, offers the best means of improving the technical efficiency of spectrum use, the development of competition in Indian mobile markets and resultant benefits to end users. Provided it is subject to the necessary competitive safeguards, it allows frequencies to gravitate to those operators which can use them most efficiently, and this keeps down costs and, in a competitive environment, end user prices. Where both parties are in operation, M&A requires consolidation of all the operators' assets – towers, antennae, retailing activities, brand etc. It wholly eliminates a market participant. Spectrum trading is more flexible and potentially less destructive of competitors. It is thus a major weapon

in the armoury of regulators like the TRAI which may be seeking to increase the intensity and flexibility of use of scarce spectrum. M&A and spectrum sharing (see below) have certain benefits, but cannot match the flexibility of spectrum trading. For this reason, the development and implementation of spectrum trading is a vital part of any reform programme.

Q25

Who all should be permitted to trade the spectrum?

It flows from the above that, subject to any spectrum cap discussed above (Q9-Q10), all licensed operators should be allowed to trade spectrum.

Q.27-28

Should transfer charges be levied in case of spectrum trading?

What should be the parameters and methodology to determine first time spectrum transfer charges payable to Government for trading of the spectrum? How should these charges payable to Government for trading of the spectrum? How should these charges be determined year after year?

Levying charges on spectrum trading has the potential to stop or limit trades. This has the potential to defer or deter trades which increase efficiency and benefits for industry and end users. Accordingly charges should ideally be eliminated or confined to the administrative costs of supervising a trade. Beyond that they should be applied sparingly.

Q.29

Should such capping be limited to 2G spectrum only or consider other bands of spectrum also? Give your suggestions with justification.

Separate caps for different bands are only needed if i) the service end users buy cannot be produced using different bands, so that the different bands are not good substitutes or ii) there are regulatory restrictions in the use of bands, which prevent substitute bands being employed. The first condition might arise if the bands in question had significantly different propagation characteristics, for example with respect to range of signal or capacity to penetrate buildings, which prevented 900 MHz services from being adequately reproduced on 2.1 GHz. I do not believe that this is generally the case- though there may be exceptions. If this is so, the first condition does not apply, and a cap could apply to all bands. If the second condition applied, based on current regulatory restrictions, then the TRAI may wish to introduce a higher degree of technology neutrality, such that the various varieties and generations of mobile technology can use all bands indifferently, subject to interference issues being resolved. If this is a good long term policy, there will be in principle be a race between liberalization of spectrum use

and the date when a short term problem associated with 2G spectrum required a separate cap. I believe that this race is likely to be won by freeing up spectrum use.

Q.30

Should size of minimum tradable block of spectrum be defined or left to the market forces?

The disincentives to trade a small block, which would incur disproportionately high guard band costs, should be enough to deter inefficient transfers.

Q.31

Should the cost of spectrum trading be more than the spectrum assignment cost?

As noted above, to encourage efficient trading, the cost should ideally be no more than that of the administrative burden placed on the regulator as it effects the trade. If the spectrum assignment cost is set at that level, the cost of spectrum trading should use that as a point of reference.

Spectrum Sharing

Q32-3

Should spectrum sharing be allowed? If yes, what should be the regulatory framework for allowing spectrum sharing among the service providers?

What should be criteria to permit spectrum sharing?

In practice, spectrum sharing is predominantly implemented in other jurisdictions through a mobile virtual network operator (MVNO) framework. In this framework, a mobile network operator (MNO) shares assets with an MVNO. The degree to which other network assets than spectrum are also shared depends upon the form of the MVNO. A so-called 'thin' MVNO is little more than a reseller of airtime; whereas a 'thick' MVNO provides almost all its own assets apart from spectrum. The latter are extremely rare.

However, the scarcity of spectrum is and will be particularly acute in India, and no measure to reduce it should be ruled out. Thus the examples in paras. 2.46 and 2.48 of the Consultation paper appear to envisage sharing between two mobile network operators. And 2.49 contemplates the possibility of dynamic spectrum access, based on agile technologies, which might work more efficiently across a broader range of frequencies which could be 'pooled' effectively.

As with trading, the key issue seems to be whether the arrangement would lead to benefit to end users, without jeopardising Government revenues from spectrum. Absent

competition problems (for example an operator ‘sharing’ spectrum and then warehousing it or with holding it in a manner which led to reduced output and raised prices; or if spectrum sharing held back competitive innovations), permitting sharing seems desirable, and likely to generate efficiencies which, in a competitive market place, would be passed on to consumers.

Q. 34

Should spectrum sharing charges be regulated? If yes then what parameters should be considered to derive spectrum sharing charges? Should such charges be prescribed per MHz or for total allocated spectrum to the entity in LSA?

It would only be appropriate to regulate spectrum sharing charges if one operator, or several working in open or tacit collusion, gained a position of dominance in a relevant spectrum market which was used to charge excessive service prices to end users, or to exclude competitors from the market. In Europe, such conduct has in rare cases provided a basis for the regulator mandating and regulating not access to spectrum but the terms on which an MVNO can gain access to an MNO’s networks. It does not seem at all likely that these conditions apply in the current context of the Indian market.

The basis for setting administrative charges for a spectrum sharing arrangement should ideally be that set out in Q27-Q28 above; i.e. the cost of receiving notification of any arrangement entered into, and any other essential regulatory supervision.

Annex: CV - Martin Cave

BA (Oxford), BPhil (Oxford), DPhil (Oxford)

Director, Centre for Management under Regulation
Warwick Business School
The University of Warwick
Coventry
CV4 7AL
United Kingdom

Biography

Professor of Economics 1986-2001, and Vice Principal 1996-2001, Brunel University. Adviser to OFTEL, CAA and Post comm Member, Competition Commission.

Research interests

Economic regulation of industry, especially the communications industry, and competition law and policy.

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