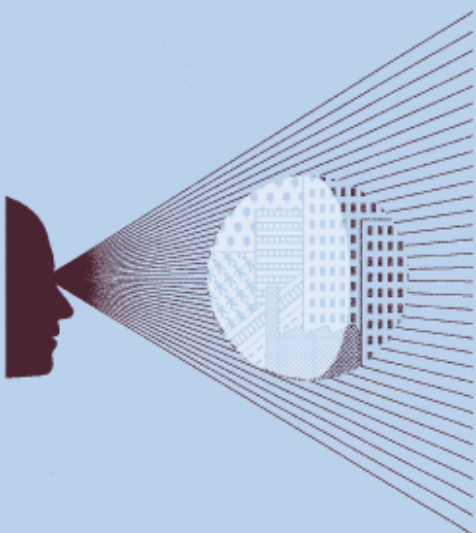


Spectrum trading issues

A framework for competition assessments

Report prepared for
Commission for
Communications Regulation

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Executive summary

ComReg has commissioned Oxera to assist it in establishing the most appropriate and proportionate system of reviewing spectrum trades, having regard to the regulator's statutory functions and objectives. These include, in particular, its function to ensure the efficient management and use of spectrum and its objective to ensure that competition is not distorted by any spectrum trade or by the accumulation and hoarding of spectrum rights of use. This report has been prepared together with Helios, which, in particular, has contributed to the technical aspects of the analysis.

Trading of the rights to use radio frequency spectrum, together with any associated obligations, aims to ensure that these rights are owned by operators that value them most, and will therefore use them most efficiently, in turn benefiting the economy.

The principal economic rationale for spectrum trading is that it creates a market-based mechanism for ensuring that spectrum rights of use can be allocated to the operators that value them most, in order to maximise their full economic value and ensure their efficient use. While spectrum auctions initially help to achieve an economically efficient allocation of spectrum, spectrum trading seeks to ensure that operators face continuing incentives to target productive use of the resource throughout the lifetime of the licence, by framing their production decisions within the context of the opportunity cost of using the spectrum.

Spectrum trading can lead to the following benefits:

- removing barriers to entry by allowing small operators and start-ups to acquire spectrum rights of use more readily, thereby promoting the development of market competition;
- allowing operators increased flexibility to accommodate shifting demand driven by market changes;
- given the first two benefits, providing customers with greater choice.

In particular, spectrum trading, it is claimed, has the potential to foster further competition and investment in the communications market, with the potential to spur greater innovation in new technologies and to reduce lead times from innovation to market. While this report focuses on certain risks of competition problems that might result from the trades, it is important to recognise that the rationale for spectrum trading is indeed to promote efficient market outcomes.

Focus of the study

Spectrum trades could be categorised by scale—ie, whether the trade covers the entire spectrum right of use, or only part of it. Transfers of entire spectrum right of use are likely to involve corresponding transfers of other (network) assets (as there is little point in retaining the equipment if the spectrum right of use has been traded). It is not within ComReg's remit to assess merger aspects, if any, associated with such complete trades, which may trigger the application of Irish or EU ex ante merger review rules. **The framework presented in this report therefore pertains to all trades that take place outside a merger situation that involves the Competition Authority.**¹

¹ Even if it were a merger scenario, ComReg would still have to have an administrative role and the trade would still have to be notified.

‘Spectrum trades’ is an umbrella term for ‘spectrum transfers’ and ‘spectrum leases’. Although both represent categories of spectrum trading, there is a key difference between transfers and leases of spectrum in terms of whether the operator requires a licence. Under a spectrum transfer, the holder of the right of use could surrender its licence altogether, or agree to have it amended, and a new licence could then be granted to the operator to which the right is being transferred, reflecting the effect of the transfer. Spectrum leasing, on the other hand, could involve the trading of a spectrum right of use by means of a contract between two parties, without the regulator necessarily revoking the existing licence of the ‘lessor’ or granting a new licence to the ‘lessee’ (depending on the duration of the lease). **The focus of this report is on spectrum transfers. However, the framework set out here is equally applicable to long-term spectrum leases, which give rise to similar competition issues (and may also result in similar market outcomes) to spectrum transfers.**

The implementation procedure for spectrum trades can vary. Trades can occur on the back of bilateral negotiations or public tenders. By definition, spectrum trades are agreed and occur on a commercial basis, and there are few reasons why a regulator would intervene to influence the specific way in which trades may take place. **Therefore, the framework presented here does not have any bearing on the commercial process leading to any proposed trade; rather, it is concerned exclusively with the regulatory process for reviewing any such trade**, in terms of assessing the potential effects on competition and how the traded right to use spectrum is licensed.

Mechanisms through which competition distortions could arise

One of ComReg’s key objectives is that the spectrum trading regime ensures that spectrum rights do not become concentrated in too few hands such that competition in downstream markets is restricted to a significant extent (or otherwise foreclosed).² Specifically, Regulation 9(11) of the Authorisation Regulations requires ComReg to ensure that no distortion of competition arises from spectrum trading:

[ComReg] **shall ensure that competition is not distorted by any transfer or accumulation of rights of use for radio frequencies.** For this purpose the Regulator may take appropriate measures such as mandating the sale of the lease of rights of use for radio frequencies.³ [emphasis added]

Thus, the framework designed for the assessment of spectrum trades, as set out in this report, applies the standard analysis of ‘distortion to competition’, which Oxera, on the basis of a comprehensive review of analogous practices in a range of countries, concludes to be a concept consistent with the ‘substantial lessening of competition’ test applied in the context of mergers in Ireland and several other countries. However, some aspects of the analysis would need to be applied differently having regard to the particular circumstances where a spectrum trade does not involve merger-type considerations. While the merger regimes serve as an appropriate basis for spectrum trades, the differences between the purpose and the characteristics of the two are recognised in the framework put forward by Oxera.

In designing a framework that satisfies this objective, it is important to recognise that spectrum trades do not affect operators’ competitive positions in downstream markets directly. Without a corresponding sale of the hardware assets and customer base, operators’ market shares in the downstream markets (in terms of subscribers) are, in a static sense, unaffected in the direct aftermath of the trade. Rather, the potential implications—in terms of

² ComReg (2011), ‘Strategy Statement: Strategy for Managing the Radio Spectrum: 2011 – 2013’, November 22nd.

³ European Communities (Electronic Communications Networks and Services) (Authorisation) Regulations 2011. Statutory Instruments S.I. No. 335 of 2011.

both (post-trade) quantity of spectrum and type of spectrum—that spectrum allocations might have on the market are as follows:

- cost advantages for those with more suitable spectrum holdings and cost disadvantages for those with less suitable holdings;
- increased capacity for those with more suitable spectrum holdings and capacity constraints for those with less suitable holdings;
- as a result of the cost and capacity implications, there may be changes in operators' competitive positions and possibly concentration in wholesale and retail markets;
- inefficient use and/or hoarding of spectrum, which may result in spectrum ending up in the hands of an operator that does not use the spectrum efficiently, but seeks to increase its spectrum holdings in order to foreclose other competitive operators from entering the market.

All these competition issues have the potential to lead to a distortion to competition in related markets.

Overview of findings and recommendations

Oxera's recommendations on the elements of the competition framework to be employed in the context of spectrum trades in the Irish market are summarised in the figure below, followed by an explanation of the reasoning behind these recommendations.

Summary of Oxera's findings

Element of the framework	Oxera recommendation	
Ex ante or ex post?	Ex ante approach recommended. An ex ante framework provides more transparency and certainty to trading parties; the prospect of a solely ex post intervention would distort the valuation of spectrum and hinder or pre-empt trades	Mechanisms and measures
Define competition test standard	The 'distortion to competition' is defined consistently with the significant lessening of competition test applied by the Irish Competition Authority. This definition is in line with international best practice	
Define de minimis threshold	ComReg requires notification of all transfers . Transfers could be approved on a case-by-case basis, rather than subject to a de minimis threshold, as the straightforward cases without disproportionate burden can be cleared in phase 1	Process to assess competitive implications
Phases and breadth of assessment	A two-phase approach is recommended, consistent with competition law practice and to provide flexibility in the breadth and burden of the analysis process	
Practical implementation	ComReg could clear certain trades with remedies	Practical features of spectrum transfers and leases
	ComReg could define key information requirements as part of the framework	
	ComReg could apply timelines that are consistent with the merger control regime	
	ComReg may not need an ex post monitoring scheme, which could increase uncertainty and have unintended consequences	

Source: Oxera.

An ex ante framework is more suitable for spectrum trades. ComReg could assess trades before or after the trade is implemented. The latter approach, referred to as an ex post regime, would not involve regulatory scrutiny at the time of the trade, but rather ComReg could rely on its existing powers under primary legislation to intervene retrospectively, should distortions to competition emerge. The ex post regime could be less predictable for the parties proposing a trade—the trading parties need certainty at the time of the trade on whether they will indeed retain the spectrum for the licence period, which in turn affects their investment plans and incentives. Furthermore, any ex post intervention would take place after the distortions to competition have already materialised. On balance, an ex ante

framework is less distortive than an ex post assessment and provides greater regulatory certainty.

It is appropriate to define distortions to competition consistently with the ‘significant lessening of competition test’. In terms of choosing a substantive test for ComReg in the context of assessing spectrum trading, the significant lessening of competition (SLC) test is appropriate for two reasons. First, insofar as ComReg is granted competition powers under Sections 4 and 5 of the Competition Act 2002,⁴ it would be appropriate to bring its practices into line with those of the Competition Authority, to ensure that there are no inconsistencies between the two approaches. Second, as described in section 2.1, spectrum trades do not necessarily lead to consumer harm—indeed, they may bring substantial benefits to consumers (eg, in the form of lower prices and higher-quality products/services). This possibility should therefore be captured within the test/analysis carried out by ComReg, as it would be within the SLC test, so as to prevent the blocking of a trade that could be beneficial to consumers.

De minimis thresholds are not needed or appropriate in this context. A two-phase process allows sufficient flexibility to clear trades that are insignificant without disproportionate burden. This finding is also underpinned by technical considerations given that even small changes in spectrum allocations could trigger concerns about interference.

A two-phase assessment would provide ComReg with flexibility to clear straightforward trades with minimum burden on the trading parties. Oxera has concluded that only trades that are less clear-cut would require a thorough analysis and extensive data, which might require several months of analysis (ie, timescales similar to a two-phase merger assessment). Given that the mechanisms through which spectrum trades could result in distortions to competition are not straightforward (see above), the decision to proceed to the second phase would need to be assessed on a case-by-case basis and explicit ‘trigger thresholds’ such as market shares are not applicable. Oxera has nevertheless provided examples of metrics that could be employed and factors that could be analysed.

Remedies could be imposed to address potential concerns. There may be cases where ComReg has concerns (after the second phase), but where these concerns could be mitigated by imposing remedies on one or both of the trading parties. In particular, ComReg may wish to consider pre-empting any possibility of spectrum hoarding through remedies that seek to ensure efficient use of spectrum. Remedies could be offered by the trading parties up to the point of the completion of the assessment by ComReg, or be imposed by ComReg at the outcome of its assessment.

While not part of this ex ante framework, there is an important question about whether licence conditions should ‘travel’ with the trade. Given that there are economic and technical advantages and disadvantages with different approaches, Oxera notes that ComReg may need to analyse proposals on a case-by-case basis in line with its statutory objectives. In this report, Oxera identifies some of the implications and issues of the different approaches. From a policy perspective, ComReg may want to ensure that the current policy (eg, population coverage), as enshrined in licence conditions, is maintained after a trade. However, there are circumstances in which it may not be proportionate to apply exactly the same licence conditions to the new licence holder. In any event, the decision on whether licence conditions travel can have implications for the valuation of spectrum, and the post-trade market structure.

The framework presented in this report is intended to provide ComReg and the industry with coherent guidance on how to assess the competitive implications of spectrum trades. The framework seeks to recognise that the underpinning of spectrum trading is to enhance

⁴ Government of Ireland (2002), Competition Act 2002, Sections 4 and 5.

efficiency and flexibility in the use of spectrum in the market; hence, it would not be consistent to introduce a regime that is too complicated and burdensome, as this could distort incentives to trade. Nevertheless, a transparent ex ante framework is needed to provide market players with sufficient certainty about ComReg's approach to assessing trades in accordance with the regulator's functions and objectives within the appropriate legal framework.

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1 Objectives of the report

Trading of the rights to use radio frequency spectrum, together with any associated obligations, aims to ensure that these rights are owned by operators that value them most, and will therefore use them most efficiently, in turn benefiting the economy.

ComReg has commissioned Oxera to assist it in establishing the most appropriate and proportionate system of reviewing spectrum trades, having regard to the regulator's statutory functions and duties. These include, in particular, its function to ensure the efficient management and use of spectrum and its duty to ensure that competition is not distorted by any spectrum trade or by the accumulation and hoarding of spectrum rights of use.

This report has been prepared together with Helios, which, in particular, has contributed to the technical aspects of the analysis.

1.1 The concept of spectrum trading

1.1.1 EU initiatives to introduce market-based schemes for spectrum

The European Commission has had a long-standing objective to liberalise spectrum and introduce market-based mechanisms for its use and allocation. Spectrum trading is a broad concept encompassing various means of introducing a 'secondary market' for spectrum rights of use—ie, the means to enable spectrum rights of use to be traded between the holders of the rights,⁵ within the fixed terms of their licences, with the objective of enhancing the efficient use of spectrum

Spectrum liberalisation and trading is generally of economic benefit where operators have the flexibility to use their spectrum rights in a technology-neutral (and potentially service-neutral) way. Setting the technical parameters so as to permit technology-neutral use of the assigned spectrum rights of use requires careful thought as the operators' rights need to be expressed in non-technology-specific terms.

Much work is under way at the European Conference of Postal and Telecommunications Administrations (CEPT) to draw up technical parameters in non-technology-specific terms (eg, CEPT Report 39), and there are even moves to harmonise initiatives, such as the use of agreed technical parameters through EU Decisions for certain bands. While not explicitly within the scope of this report, an important feature of the broader policy initiative to introduce market-based spectrum trading is the liberalisation of spectrum rights of use.

One of the objectives of the Commission's proposals has been to increase the flexibility of spectrum rights of use by removing what it considers unnecessary existing regulatory restrictions, while maintaining sufficient regulatory control to ensure that operators are able to operate effectively. One way to do this is to define both incoming and outgoing interference parameters. Wireless Access Policy for Electronic Communications Services (WAPECS) is attempting to identify interference protection methods that can be used in a technology- and service-neutral way, so as to enable electronic communication networks of any kind to be operated as freely as possible, within their spectrum assignments.⁶ As explained in more detail in section 2 below, the competitive implications of spectrum trading depend on whether operators (i) are constrained to use their acquired spectrum rights of use for prescribed

⁵ The holders of the spectrum rights are referred to as 'operators' in the remainder of the report.

⁶ See the Commission's documentation, available at: http://ec.europa.eu/information_society/policy/ecomms/radio_spectrum/topics/ecs/index_en.htm.

services and/or wireless technologies; or (ii) are free to choose the services they will provide and technologies they will employ.

Economic benefits of spectrum trading

The principal economic rationale for spectrum trading is that it creates a market-based mechanism for ensuring that spectrum rights of use are allocated to the operators that value them most, in order to maximise their full economic value and ensure their efficient use. While spectrum auctions initially help to achieve an economically efficient allocation of spectrum, spectrum trading seeks to ensure that operators face continuing incentives to target productive use of the resource over the lifetime of the licence, by framing their production decisions within the context of the opportunity cost of using the spectrum.⁷

Spectrum trading is typically linked to benefits in terms of the following:

- removing barriers to entry by allowing operators and start-ups the opportunity of acquiring spectrum rights of use more readily, thereby promoting the development of market competition;
- allowing operators increased flexibility to accommodate shifting demand driven by market changes; and
- given the first two benefits, providing customers with greater choice.

In particular, spectrum trading has the potential to foster further competition and investment in the communications market, with the potential to spur greater innovation in new technologies and to reduce lead times from innovation to market.⁸ While this report focuses on certain risks of competition problems that might result from the trades, it is important to recognise that the rationale for spectrum trading is indeed to promote efficient market outcomes. This contrasts spectrum trades with mergers, which reduces the number of firms in the market.

Technical considerations

As technology and services develop over time, operators may wish to re-farm⁹ their holdings (eg, by introducing new technologies into their existing allocations). Several operators are re-farming their existing 1800MHz rights of use away from GSM in order to introduce LTE technology into the band.¹⁰ In other cases, such internalised re-farming might not be feasible because the operator's holdings:

- in a particular band might be too small to accommodate a new service. (For example, UMTS requires 5MHz channels whereas GSM requires only 200kHz channels);
- might not have enough contiguous spectrum in a band to introduce a new service;
- if transferred to a new technology, might result in unused spectrum owing to incompatible channel sizes;
- might not consist of enough spectrum to re-farm customers to an alternative during the period when the band is being cleared for the new technology;
- might be incompatible with the new technology. (This could be for a variety of reasons).

In these cases, the operator may wish to seek additional or alternative spectrum, for example, through spectrum trading.

⁷ As will become clear below, there are other, complementary, ways to achieve efficient allocations, such as setting spectrum usage fees.

⁸ See, for example, Cave, M. (2002), 'Review of Radio Spectrum Management: An independent review for the Department of Trade and Industry and HM Treasury', March.

⁹ Re-farming is the process of changing the conditions of usage rights in a particular unit of spectrum. Changes could include alterations to allocation, application or technical conditions.

¹⁰ In the UK, Everything Everywhere has applied to permit re-farming of 1800MHz to LTE and many operators in Nordic countries have already enabled LTE in this band.

Notwithstanding the above, from the regulatory perspective, there is a need to ensure that spectrum is used efficiently. There are cases where usage can be seen to be inefficient—ie, where a spectrum right of use is held by an operator that is either not using it (it is surplus to their requirements) or only uses it on rare occasions (eg, in one or two geographic locations or only for certain times or events). In these cases, no detailed analysis is needed, and it is arguable that giving the operator the right to allow others to use that spectrum within a restricted geographic or time-bound area) will serve to improve overall spectrum efficiency.

There is also a need to ensure a stable interference environment. The re-farming of spectrum from one use to another could affect the interference environment within a particular spectrum band (eg, changes in power spectral density or overall radiated power), or between that band and adjacent allocated bands (owing to out-of-band emissions). Such matters are generally covered by block-edge masks, which serve to restrict in- and out-of-band emissions, and these generally form part of the technical conditions attached to a spectrum right of use. Most block-edge masks are based on the notion that a discrete number of technologies may wish to operate in a certain band, and are thus designed to accommodate these technologies. While this offers some flexibility, it could be that a new technology introduced since the creation of the mask may not be covered by the mask (or may have to be designed to fit within the mask and, in the process, impair its performance) and this can have an impact on technology flexibility.

1.1.2 Forms of spectrum trading

In many political and academic papers, spectrum trading is referred to in a generic manner. In reality, however, spectrum trading could take a number of forms, as detailed below.

Scale of trades

Spectrum trades could be categorised by scale—ie, whether the trade covers the entire spectrum right of use, or only part of it. Transfers of entire spectrum right of use are likely to involve corresponding transfers of other (network) assets as well (as there is little point in retaining the equipment if the spectrum right of use has been traded). In the case of a merger that is being assessed by the Competition Authority, competition aspects of the merger are not assessed by ComReg.¹¹ In other cases involving a spectrum trade including mergers, not being assessed by the Competition Authority, ComReg will conduct a competition assessment. The framework presented in this document relates to the latter cases.

Transfer and lease of spectrum

‘Spectrum trades’ is an umbrella term for ‘spectrum transfers’ and ‘spectrum leases’. Although both represent categories of spectrum trading, there is a key difference between them in that a lease is akin to a transfer for a duration less than the remaining duration of the licence.

Under a spectrum transfer, the holder of the right of use could surrender its licence¹² altogether to ComReg for revocation, or seek ComReg’s consent to have it amended, and have a new licence granted to the operator to which the right of use is being transferred, reflecting the effect of the transfer. (Section 4.1 considers whether the licence conditions after the transfer would be the same or different.)

Spectrum leasing, on the other hand, could involve the trading of a spectrum right of use by means of a contract between two parties, without the regulator necessarily revoking the

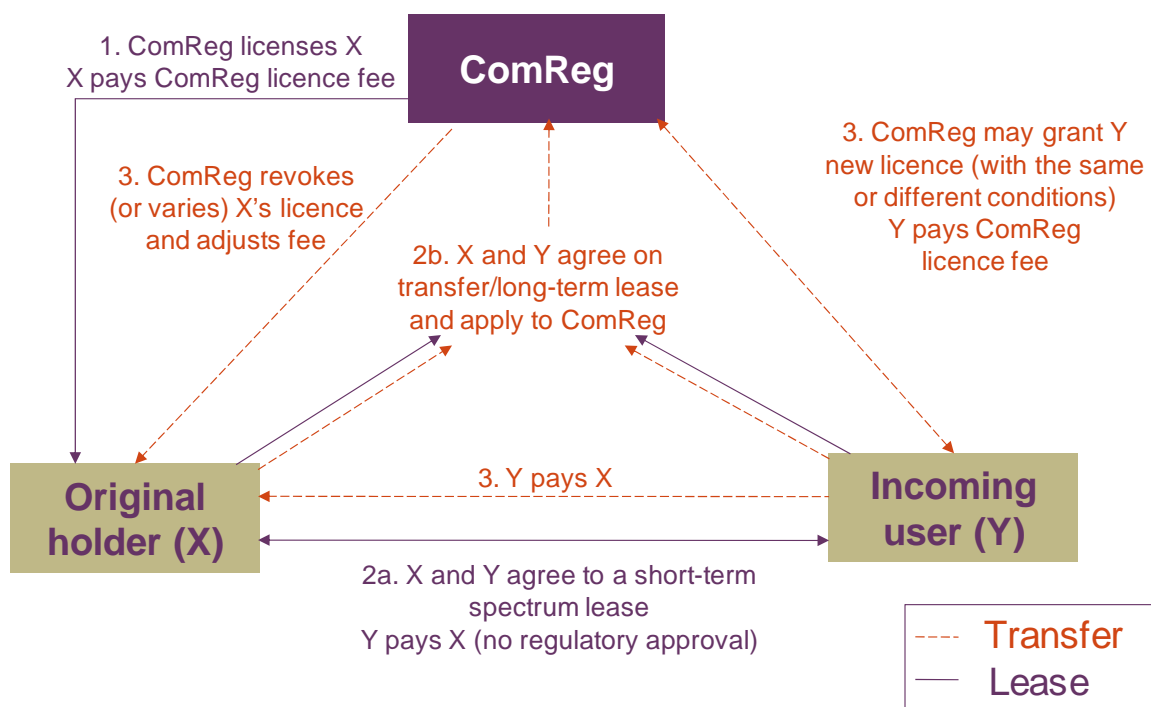
¹¹ It is Oxera’s understanding that there would remain some administrative items for ComReg, such as changing the names on the licences and updating its databases.

¹² Here, licence is understood to refer to a licence granted by ComReg under the Wireless Telegraphy Acts 1926–2009, which permit the licensee to keep, possess, install, maintain and use apparatus for wireless telegraphy.

existing licence of the ‘lessor’ or granting a new licence to the ‘lessee’ (depending on the duration of the lease).¹³

One means of differentiating between spectrum transfers and spectrum leases is illustrated in Figure 1.1. Under this approach—consistent with that applied by the UK regulator, Ofcom, at least (if not by others)—for spectrum transfers and leases, the recipient of the right of use (the ‘transferee’ or ‘lessee’) would pay the original holder (the ‘transferor’ or ‘lessor’) for same. For a spectrum transfer, the parties would need to receive regulatory approval before the original holder’s licence was revoked (or amended) and a new licence was drawn up for the recipient. Spectrum lease, however, might not require regulatory approval, insofar as the lease is short-term, and unlikely to influence the long-term competitive process in the market.¹⁴

Figure 1.1 Potential different stages in spectrum transfers and spectrum leasing



Source: Oxera based on Ofcom (2010), ‘Simplifying spectrum trading: Reforming the spectrum trading process and introducing spectrum leasing’, April 15th, p. 2.

A spectrum transfer *could* thus go through the following steps (to illustrate the difference between a transfer and a lease):

- step 1—initially, X holds the spectrum right of use and pays ComReg a spectrum usage fee;
- step 2a—if, in step 2, X and Y (the purchaser of the right of use) agree to a short-term spectrum lease, the need for regulatory approval might be different than for a long-term lease. In this particular example, the lease begins, Y pays X for the spectrum, and the process ends. Y would not pay a spectrum usage fee to ComReg for a short-term lease as X would continue to pay all the spectrum usage fees, although the specifics of this step might depend on how ComReg plans to achieve its statutory objectives;

¹³ Ofcom (2010), ‘Simplifying spectrum trading: Reforming the spectrum trading process and introducing spectrum leasing’, April 15th.

¹⁴ According to Ofcom, for time-limited spectrum trades, there would be no requirement to receive regulatory approval for leases of less than 24 months’ duration, and no need to revoke or grant licences. See *Ibid.*

- step 2b—if, on the other hand, the parties agree on a long-term lease or transfer, they would have to notify ComReg, and await regulatory approval;
- step 3—if ComReg approved the transfer or long-term lease, X's licence would be revoked (or amended), and ComReg would grant Y a new licence (with the same or different conditions). Y would then pay ComReg a spectrum usage fee, and would pay X for the transfer of the spectrum right of use.

The focus of this report is spectrum transfers. The framework set out here could, however, be adapted to apply to long-term spectrum leases, which effectively result in the same market outcome as transfers. Where the term 'trade' is used, the meaning is intended to refer to transfer of a right of use of spectrum as Oxera understands that this is the focus of ComReg's analysis at this time.

Trading mechanism

The implementation procedure for spectrum trades can vary. Trades can occur on the back of bilateral negotiations or public tenders. By definition, spectrum trades are agreed and occur on a commercial basis, and there are few reasons why a regulator would intervene to influence the specific way in which trades may take place. Therefore, the framework presented here does not have any bearing on the commercial process leading to any proposed trade; rather, it is concerned exclusively with the regulatory process for reviewing any such trade, in terms of assessing the potential effects on competition, and how the traded right of use of spectrum is licensed.

Other assets transferred

The spectrum trade may form part of a broader acquisition of assets such as network equipment and/or customers in a merger situation, in which case it may be outside ComReg's remit to assess it for a distortion of competition where the merger is subject to national or EU merger control.¹⁵ This would fall instead under the merger control regime implemented by the Competition Authority/European Commission. The transfer would still have to be notified to ComReg and the notification published.

More specifically, to constitute a merger or acquisition for the Competition Authority to review, there must be an actual transfer of ownership between the entities themselves. Section 16 of the Competition Act 2002 states that a merger occurs if:

- (a) 2 or more undertakings, previously independent of one another, merge, or
- (b) one or more individuals or other undertakings who or which control one or more undertakings acquire direct or indirect control of the whole or part of one or more other undertakings, or
- (c) the result of an acquisition by one undertaking (the "first undertaking") of the assets, including goodwill, (or a substantial part of the assets) of another undertaking (the "second undertaking") is to place the first undertaking in a position to replace (or substantially to replace) the second undertaking in the business or, as appropriate, the part concerned of the business in which that undertaking was engaged immediately before the acquisition.¹⁶

The mere acquisition of assets does not mean that a merger or acquisition is occurring; it depends on the particular circumstances and whether one entity is gaining 'control' over the other—'control' being a defined term in Part 2 of the Competition Act 2002.

¹⁵ European Commission (2011), 'Position of the Council at first reading with a view to the adoption of a Decision of the European Parliament and of the Council establishing a multi-annual radio spectrum policy programme', Common Guidelines 16226/11, Article 5 1(d), December 5th. Retrieved from <http://register.consilium.europa.eu/pdf/en/11/st16/st16226.en11.pdf> on July 4th 2012.

¹⁶ Government of Ireland (2002), Competition Act 2002, Section 16.

1.2 Legal framework for spectrum trading

This report analyses, from an economic perspective, what an appropriate framework for spectrum trading is. It is outside the scope of the report to review all the relevant statutory provisions—spread across several statutes (Wireless Telegraphy Act 1926, Communications Regulation Act 2002, Authorisation Regulations, and Framework Regulations). Below is a summary of the legal background; it is not intended to be comprehensive and ComReg will need to take proper account of all its relevant statutory provisions when designing its spectrum trading regime.

As noted above, the (revised) EU Common Regulatory Framework seeks to harmonise the use of spectrum across the EU. Specifically, The European Communities (Electronic Communications Networks and Services) Regulations 2011 (S.I. 333/2011) provide for the ‘transfer or lease of individual rights to use radio frequencies’. Indeed, the intention of the proposed framework is to follow the pan-European policy of establishing the procedures and measures required to implement spectrum trading in Ireland (as stated also in ComReg’s spectrum strategy¹⁷) in line with the objective of promoting competition and contributing to the development of the internal market.¹⁸

Any recommended approach for spectrum trading needs to take into account ComReg’s regulatory objectives. Specifically, it needs to be consistent with the underlying legal framework, the key features of which are summarised below.

- One of ComReg’s statutory *functions* is to manage the radio frequency spectrum, while one of its statutory *objectives* is to ensure the efficient management of radio frequencies.¹⁹
- Regulation 19(1)(a) of the Framework Regulations provides that ComReg will ensure that operators may transfer or lease their spectrum rights for the use of other operators, in the bands for which this is provided, in accordance with implementing measures adopted by the European Commission under Article 9b(3) of the Framework Directive.
- The transfer or leasing must be done in accordance with any conditions attached to the rights of use for radio frequencies, and with any procedures specified by ComReg in this regard it is important to note that:

ComReg **must ensure that competition is not distorted by any transfer or accumulation of rights of use for radio frequencies**, and, for this purpose, ComReg may take appropriate measures such as mandating the sale or the lease of rights of use for radio frequencies.²⁰ [emphasis added]

Given these Irish and EU statutory provisions, the main objective of the framework is to establish an appropriate and proportionate system of review of spectrum transfers or leases through which to meet ComReg’s statutory obligations, including its duty to ensure that competition is not distorted by either trades or accumulation of rights (referred to as ‘hoarding’, as discussed in further detail below).

¹⁷ ComReg (2011), ‘Review of the Period 2008 – 2010 & Proposed Strategy for Managing the Radio Spectrum: 2011 – 2013’, November 28th.

¹⁸ ComReg (2011), ‘Strategy Statement Strategy for Managing the Radio Spectrum: 2011 – 2013’, Document No: 11/89, November 22nd.

¹⁹ Communications Regulation Act 2002 as amended, Section 10.

²⁰ Authorisation Regulations 9 (11) S.I. 334 of 2011.

1.3 Radio Spectrum Policy Programme spectrum bands

ComReg has envisaged that the trading regime will initially apply to the spectrum bands set out in Article 6.8 of the Radio Spectrum Policy Programme (RSPP). These bands, together with Oxera's understanding of their current use in Ireland, are detailed in Table 1.1 below.

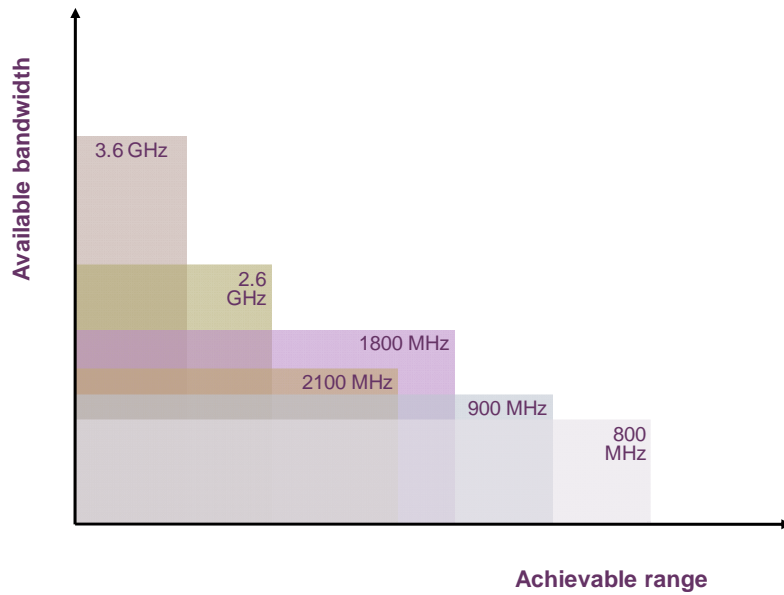
Table 1.1 Current use of RSPB bands

Band	Usage	Characteristics	Position in Ireland
791–821 // 832–862MHz (2 x 30MHz)	800MHz band Television broadcasting Will be made available on a liberalised use basis	Good for wide area coverage	Analogue broadcasting expected to close Q4 2012 Will form part of the forthcoming multi-band spectrum award
880–915 // 925–960MHz (2 x 35MHz)	900MHz band Will be made available on a liberalised use basis	Good for wide area coverage	Currently licensed to Meteor, O2 and Vodafone Will form part of the forthcoming multi-band spectrum award
1710–1785 // 1805–1880MHz (2 x 75MHz)	1800MHz band Will be made available on a liberalised use basis	Reasonable balance between coverage and capacity	Currently licensed to Meteor, O2 and Vodafone Will form part of the forthcoming multi-band spectrum award
1920–1980 // 2110–2170MHz (2 x 60MHz)	2100MHz band Used for 3G (UMTS) services. Usage unlikely to change in medium term	Reasonable balance between coverage and capacity	Currently licensed to 3, Meteor, O2 and Vodafone Licences due to expire in 2022/2027
1900–1920MHz (1 x 20MHz)	2100MHz TDD band Made available for 3G services	Reasonable balance between coverage and capacity Necessity of TDD technologies has limited usage	Licensed to O2 and Vodafone 1 x 10 MHz currently unassigned
2010–2025MHz (1 x 15MHz)	2100MHz TDD band	Reasonable balance between coverage and capacity Necessity of TDD technologies has limited usage	Unassigned
2500–2690MHz (2 x 70MHz) plus (1 x 50MHz)	2.6 GHz band Used for MMDS services in Ireland. Common band for future LTE/WiMAX networks	Usage for mobile networks restricted to relatively small cells. Good for infill in densely populated areas	Licences for MMDS services are currently set to expire in 2014. Provision for extension until 2019. (see S.I. no 529 of 2003)
3400–3800MHz Various pairing options	3.6 GHz band Most commonly used for fixed/nomadic wireless access	Usage for mobile networks restricted to small cells Fully mobile usage is problematic Good for infill in densely populated areas	Portions of the band already licensed to various FWA operators Future use set out in ComReg document 11/03

Source: Helios.

Figure 1.2 below shows the characteristics of the frequency bands set out in Article 6.8 of the RSPB Decision.

Figure 1.2 Indicative bandwidth/coverage of RSPB bands



Source: Helios.

The 800MHz and 900MHz bands are particularly good at providing wider area coverage (from a single site) and have some advantages in providing indoor penetration into certain types of building (especially commercial and retail buildings). The 2.6GHz and 3.6GHz bands have the greatest available bandwidth but can achieve only a relatively short range. To achieve the same kind of coverage with a higher frequency band as that of a lower frequency band is not impossible, but is likely to require many more cell sites.

One question that arises when considering competition issues in spectrum is therefore the extent to which the frequency bands are substitutable. While it is feasible to offer similar services in both (with similar amounts of spectrum), the associated costs could vary significantly.

In addition to these coverage and capacity issues, there are issues about technology harmonisation. While there are readily available GSM handsets that operate in the 900MHz and 1800MHz bands, there are no off-the-shelf GSM handsets that operate in any of the other bands. This is less the case with newer technologies, which have a greater range of available bands, but it does provide some restrictions when considering both re-farming and substitutability. Table 1.2 gives a general indication of the availability of technologies in the RSPB bands.

Table 1.2 General indication of availability of technologies in RSPB bands

Band	GSM	UMTS	LTE	WiMAX
800MHz			✓	
900MHz	✓	✓	✓	
1800MHz	✓	✓	✓	
2100MHz		✓		
2.6 GHz			✓	✓
3.6 GHz			(TD-LTE)	✓

Source: Helios.

While it is possible, in theory, to use almost any of these technologies in any of the bands, the cost of using an irregular band arises as a result of the need to have a bespoke network infrastructure and handsets. The use of an irregular band for mobile handsets is unlikely to be viable; unless a large enough market is achievable, the costs are prohibitive and operators often resort to dongles to support such bands.

Details of the frequencies licensed to operators in Ireland in these bands are provided in the Table 1.3, together with information on the award process used and licence expiry dates. At present, none of the licences is tradable.

Table 1.3 Spectrum allocations and licence expiry dates

	Allocation (MHz)	Award process	Expires
Meteor Mobile	892.7–899.9/937.7–944.9	Comparative selection	2015
O2 Ireland	907.5–914.7/952.5–959.7	Comparative selection	2013
Vodafone Ireland	900.1–907.3/945.1–952.3	Incumbent	2013
Meteor Mobile	1745–1750/1840–1845; 1765–1775/1860–1870	Comparative selection	2015
O2 Ireland	1750.9–1765.3/1845.9–1860.3	Comparative selection	2014
Vodafone Ireland	1736.3–1750.7/1831.3–1845.7	Incumbent	2014
3 Ireland	1920–1935/2110–2125	Comparative selection	2022
Meteor Mobile	1935–1950/2125–2140	Comparative selection	2027
O2 Ireland	1910-1915	Comparative selection	2022
O2 Ireland	1965-1980/2155-2170	Comparative selection	2022
Vodafone Ireland	1905–1910	Comparative selection	2022
Vodafone Ireland	1950–1965/2140–2155	Comparative selection	2022
Budget Telecom	3635–3660/3735–3760	Comparative selection	2017
Clearwire	3540–3575	Comparative selection	2017
Digiweb	3610–3635/3710–3735	Comparative selection	2017
eircom	3424–3435/3524–3535	Comparative selection	2017
Fastcom	3635–3660/3735–3760	Comparative selection	2017
HS Data	3635–3660/3735–3760	Comparative selection	2017
Irish Broadband	3475–3500/3575–3600	Comparative selection	2017
Irish Broadband	3540–3575	Comparative selection	2017
Last Mile	3635–3660/3735–3760	Comparative selection	2017
LEAP Broadband	3610–3635/3710–3735	Comparative selection	2017
Real Broadband	3540–3575	Comparative selection	2017

Note: Comparative selection refers to a process where spectrum is allocated by the regulator based on comparison of candidate operators.

Source: Helios.

1.4 Overview of Oxera's findings

This report presents a framework that could be employed to assess whether and how spectrum trades could result in 'distortion to competition' and should be blocked or altered on competition grounds. In summary, the framework presented here seeks to recognise the following regulatory and commercial features.

- Spectrum trading and liberalisation are introduced as welfare-enhancing amendments to the relevant EU Directives. Therefore, the framework for assessing trades in Ireland should not be over-complicated or burdensome; it should encourage, rather than impede, efficient market-based trading. Nevertheless, a transparent ex ante framework is needed to provide the market players with sufficient certainty about ComReg’s approach to assessing trades in accordance with the regulator’s objectives within the appropriate legal framework. The framework applied needs to be consistent with the overall regulatory package and provide sufficient transparency to stakeholders.
- What matters is the impact that changes in spectrum holdings may have on competition in the relevant wholesale and retail markets. Any trading arrangements should recognise the mechanisms through which spectrum holdings affect licensees’ cost structures and capacity, and hence their ability to compete. The test standard employed is ‘distortion to competition’, which, on the basis of Oxera’s comprehensive review of the literature and case law, is recommended to be interpreted as consistent with the Competition Authority’s competition test in the merger context.
- The design of specific features of the ex ante framework should strike the right balance between practicality (ie, avoiding unnecessary regulatory burden), economic reasoning, and the technical characteristics of RSPB spectrum bands.

Figure 1.3 summarises Oxera’s proposed approaches to the various elements of the competition framework to be employed in the context of spectrum trading.

Figure 1.3 Summary of Oxera’s recommendations

Element of the framework	Oxera recommendation	
Ex ante or ex post?	Ex ante approach recommended. An ex ante framework provides more transparency and certainty to trading parties; the prospect of a solely ex post intervention would distort the valuation of spectrum and hinder or pre-empt trades	Mechanisms and measures
Define competition test standard	The ‘distortion to competition’ is defined consistently with the significant lessening of competition test applied by the Irish Competition Authority. This definition is in line with international best practice	
Define de minimis threshold	ComReg requires notification of all transfers . Transfers could be approved on a case-by-case basis, rather than subject to a de minimis threshold, as the straightforward cases without disproportionate burden can be cleared in phase 1	Process to assess competitive implications
Phases and breadth of assessment	A two-phase approach is recommended, consistent with competition law practice and to provide flexibility in the breadth and burden of the analysis process	
Practical implementation	ComReg could clear certain trades with remedies	Practical features of spectrum transfers and leases
	ComReg could define key information requirements as part of the framework	
	ComReg could apply timelines that are consistent with the merger control regime	
	ComReg may not need an ex post monitoring scheme, which could increase uncertainty and have unintended consequences	

Source: Oxera.

This report explains the reasoning behind the recommendations presented in Figure 1.3, and is structured as follows.

- Section 2 explores the mechanisms through which competition implications could arise as a result of spectrum trading, followed by a discussion of the measures that can be used to assess competition in the context of spectrum trades.
- Section 3 sets out the processes to assess the competitive implications of spectrum trades, including a recommendation on the phases of analysis.

- Section 4 describes further the practical implementation of the proposed framework and processes.
- Section 5 presents hypothetical scenarios that are designed to illustrate how the assessment of spectrum trades could proceed in practice.
- The appendix highlights the most relevant case studies including spectrum trading frameworks in other countries, as well as certain other competition investigations where spectrum allocations have played an important role.

2 Competition implications of spectrum trades

As noted above, the rationale behind spectrum trading stems from its welfare-enhancing properties—in general, trades of spectrum are expected to result in more efficient allocation of spectrum and therefore to foster competition and investment in the market. Indeed, introducing a secondary market for the RSPP bands does not necessarily imply that competition concerns would arise; on the contrary, trades could be ‘pro-competitive’ (eg, a smaller new entrant buying additional capacity to compete), or trades may be small and relate to technical optimisation of a network, as manifested through some of the case studies reviewed for this report (for example, mutually beneficial swaps of channels).

Some trades, however, could result in a concentration of spectrum sufficient to raise competition concerns. This section first explains the mechanisms through which distortions in the market structures could arise as a result of a spectrum trade, followed by analysis of the measures to assess any competition implications.

2.1 Mechanisms through which distortions could arise

ComReg has noted the requirement that:

a spectrum trading regime will need to ensure that spectrum rights do not become concentrated in too few hands such that competition in downstream markets would be restricted to a significant extent (or otherwise foreclosed).²¹

Spectrum trades do not affect operators’ competitive positions directly. Without a corresponding sale of the hardware assets and customer base, operators’ market shares in the downstream markets (in terms of subscribers) are, in a static sense, unaffected in the direct aftermath of the trade. Therefore, any assessment of the competitive implications of spectrum trades should, on a forward-looking basis, recognise the mechanisms through which spectrum allocations influence the operators’ ability to compete. More specifically, the potential implications that spectrum allocations (post-trade) might have on the market are as follows:

- cost advantages for those with larger (or more suitable) spectrum holdings and cost disadvantages for those with smaller (or less suitable) spectrum holdings;
- increased capacity for those with larger spectrum holdings and capacity constraints for those with smaller holdings;
- as a result of the cost and capacity implications, concentration in wholesale and retail markets;
- inefficient use and/or hoarding of spectrum.

There may be secondary impacts on licensees not involved in the trade owing to changes in the interference environment that might produce other direct or indirect distortions in the market. These should be taken into account in the regulatory assessment (discussed in section 4). In principle, these interference implications could be significant, to the extent that they result in ‘distortion to competition’. In such circumstances, ComReg could decide not to clear the trade.

2.1.1 Impact on competition through cost advantages and capacity constraints

From an economic perspective, it is important to examine the implications of a trade in the wholesale markets (MVNO access, national roaming) and retail markets—a concentration of

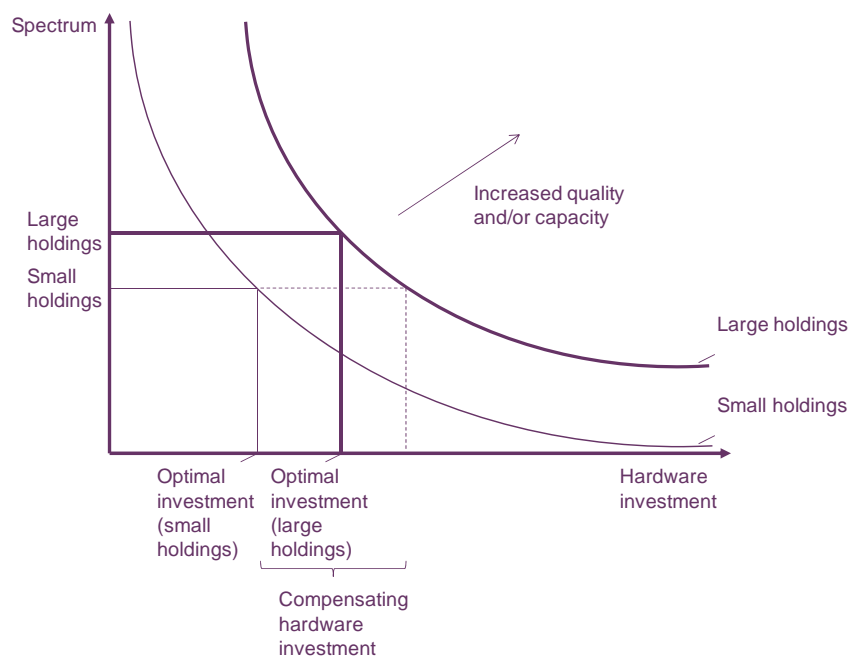
²¹ ComReg (2011), ‘Strategy Statement: Strategy for Managing the Radio Spectrum: 2011 – 2013’, November 22nd.

spectrum alone is not a sufficient reason to block or alter a spectrum trade. In this analysis, it is important to recognise the economic characteristics of spectrum rights of use and whether cost savings or other benefits passed on to customers are sufficient to compensate for any restrictions arising from a trade.

The starting point for any competition analysis is to recognise a spectrum right of use as a factor of production that combines with other intermediate inputs to provide a product to end-users. The rationale for this ‘technologically neutral’ approach is a focus on the actual use of spectrum, rather than on the technology employed, on the assumption that end-users of a particular wireless electronic communications service generally have no preference as to the particular technological means of delivering that service. In this context, technologies used in electronic communications are inputs which, combined with spectrum rights of use in the RSPB bands, are able to provide wireless transmission services to end-users.

Thus, any competition assessment should recognise the cost (dis)advantages and capacity constraints determined by the allocation of spectrum rights of use. This economic principle that lies behind any economic analysis relating to spectrum management is illustrated in Figure 2.1. The curve illustrates what combinations of the two main factors of production (spectrum and hardware) are required to deliver a given level of capacity and/or quality of service. In simple economic terms, a spectrum right of use is therefore, to some extent, a substitutable factor of production with hardware investment—a given market output can be reached with different combinations of spectrum and network hardware.

Figure 2.1 How much spectrum and hardware are required to deliver a given level of capacity and/or quality of service: a stylised illustration



Source: Oxera; see also Etlatiето (2005), ‘GSM 900 ja GSM 1800 spektrien teknisen ja taloudellisen arvon analyysi’, September 6th.

While this stylised relationship between hardware investments and spectrum is present (one way or the other) with respect to all RSPB bands and the associated services downstream, other factors need to be taken into account when assessing the likely affects of a proposed trade on competition, notably the following.

- **Substitutability between different frequency bands.** Owing to the distinct physical properties of different radio frequency spectrum bands, some bands have the ability to support the same services at a higher quality and/or more efficiently (at a lower cost). For example, with the improved propagation characteristics, low frequency spectrum

generally has superior properties. Different frequencies can be used to provide services that may be substitutable, from the end-users' point of view, and operators' ability to compete depends on the composition of their overall portfolio of spectrum holdings. Therefore, any assessment of the effects on competition of a proposed spectrum trade should recognise the extent to which, and at what cost, different bands can be employed to provide substitutable wireless electronic communications services.²² The extent of these potential comparative advantages depends substantially on parameters, such as the future take-up of the services in question by consumers, or the rate employed to discount benefits that could be realised in the future.

- **Asymmetric positions to use spectrum.** Different operators have different production functions. For example, some incumbent operators can use their existing sites and apparatus to deploy new services in 'new' spectrum bands (such as those used for LTE). This implies that the incremental cost of achieving a given level of output and quality is higher for new entrants than for operators that can draw on their existing infrastructure. Hence, an assessment of a proposed spectrum trade should include an appraisal of the operator-specific costs of providing certain services downstream for each operator, post-trade. For example, when assessing whether the use of spectrum by an alternative operator would facilitate greater competition, it would need to be understood how and over what timescale a small new entrant without any existing network would be able to bring competitive offers to the market.

Economic analysis of changes in spectrum allocations

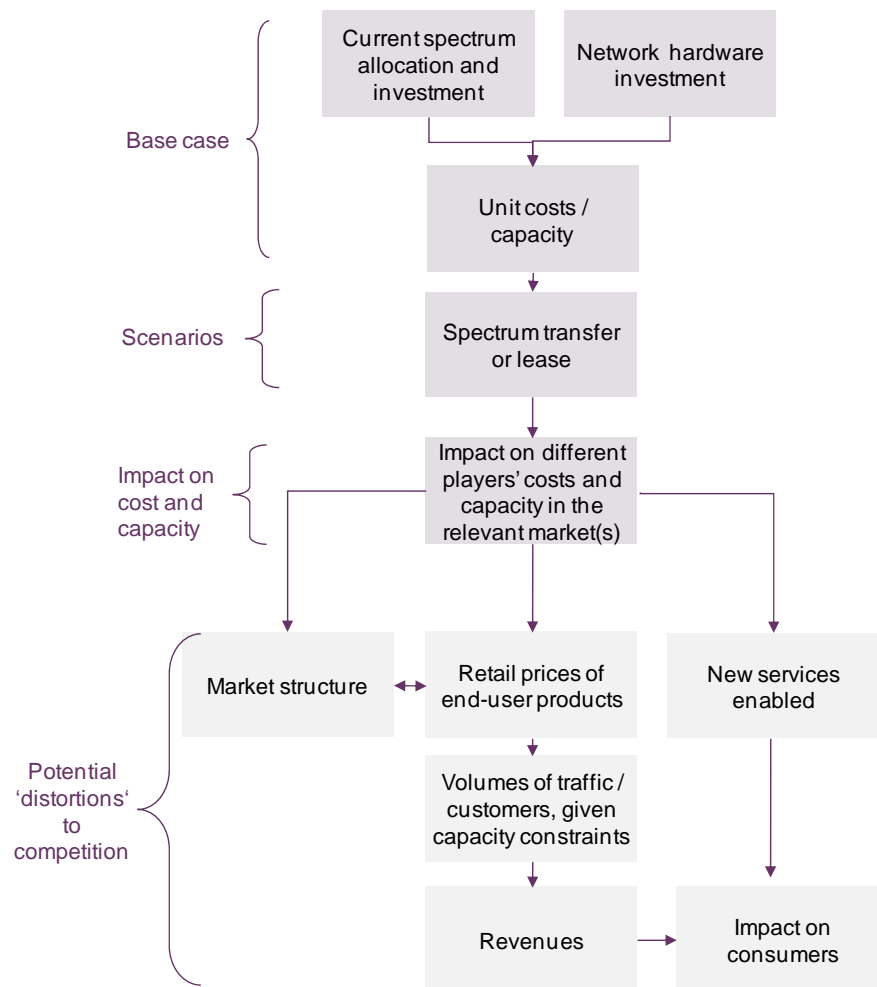
The impact that spectrum trades may have on competition in terms of the effect on market structure can be assessed within a qualitative or a quantitative framework, depending on the significance of the spectrum trade in question. Indeed, certain smaller trades may not require a full economic analysis, while others could be of significant magnitude and may thus require a comprehensive analysis before they can be approved, with or without remedies.²³

It is outside the scope of this report to undertake a complete economic analysis of the spectrum trades that could occur. Rather, the report provides an economic framework within which to assess trades, highlighting the specifics of spectrum trades compared with other transactions. Figure 2.2 below illustrates how the economic impact of spectrum trades could be assessed, applying a microeconomic framework.

²² If the recurring spectrum charges are set to reflect the opportunity cost of spectrum (ie, the cost of producing the same output with an alternative input), operators would be indifferent in terms of their spectrum portfolios. This is what the administrative incentive pricing (AIP) intends to achieve, although setting such optimal prices is challenging in practice, and not currently used in Ireland.

²³ European Commission (2005), 'Annexes to impact assessment guidelines', p. 40, June. Section 3.1 sets out an approach to determining an appropriate de minimis threshold that would trigger an ex ante assessment. However, even if an ex ante assessment were required, the level of analysis might depend on the specific trade in question.

Figure 2.2 Illustrative framework for assessing economic impact of spectrum trades



Source: Oxera and Helios.

As illustrated in Figure 2.2, spectrum trades may distort competition if they result in significant cost advantages, and consequently in asymmetric capacity constraints giving an undue competitive advantage to a single operator; or if they result in a market structure that is likely to be conducive to concentration and, in terms of competition law and economics, to give rise to potential coordinated effects to the detriment of end-users. Furthermore, a trade could result in hoarding and prevent a potentially more efficient operator from having access to the spectrum.

An assessment of the competition implications of spectrum trades should start by identifying the 'base case'—ie, the existing degree of competition with respect to services relying on relevant spectrum bands before the trade and the likely evolution of competition if no further trades were to take place. This would need to take account of the current and future capacity constraints of operators; the likelihood of entry or exit in the absence of any spectrum trades; and the evolution of prices.

Spectrum trades should be assessed in terms of their implications for costs and capacities of both the seller and the buyer. It would be necessary to establish the extent to which operators' unit costs (depending on the frequency band) might change in the longer term, and to what extent the spectrum trade in question would result in changes in traffic volume/customer numbers that operators can accommodate in their networks. This type of analysis is relatively complex, and requires both technical and economic input. In practice, ComReg might consider an in-depth analysis with respect to only those trades that are considered to carry a significant risk of distortions to competition. (Such practical

considerations and phases of assessment are discussed below.) That said, regulators have undertaken similar complex economic analysis in other countries (see Box 2.1).

Box 2.1 Economic analysis of spectrum allocations in practice

There are examples where regulators have carried out in-depth analysis of how different spectrum allocations affect firms' costs and capacity, and therefore pricing and consumer welfare.

- As part of its assessment of whether the 900MHz band should be redeployed, Ofcom analysed the cost and price implications of different spectrum allocations. Oligopoly modelling was undertaken to establish circumstances under which alternative allocations would result in net gains for the society in net present value terms.
- The Finnish regulator, FICORA, commissioned an economic impact assessment similarly in the context of the 900MHz re-deployment. The analysis was based on three building blocks: (i) technical simulations of how the networks would need to be adjusted in different scenarios of spectrum allocations; (ii) analysis of the cost implications of the network changes in these scenarios; and (iii) given the changes in costs and capacity, an economic welfare analysis in terms of consumer and producer surplus.

While it would not be proportionate to conduct an analysis of a similar scale for all spectrum trades, these examples illustrate that regulators have recognised the importance of spectrum allocations for the functioning of the market, and thus larger trades could warrant more detailed analysis (see discussion on Phase 2 analysis below).

Sources: Ofcom (2007), 'Application of Spectrum Liberalisation and Trading of the Mobile Sector', September. Finnish Communications Regulatory Authority; relevant documentation (including an economic study) available at http://www.ficora.fi/index/viestintavirasto/asiakastiedotteet/radiotaajuudet/2005/P_7.html.

Once the above implications on the costs and capacity of the trading parties have been assessed, the impact on—and, specifically, distortions to—competition can be examined. This is not straightforward and needs to recognise, in particular, how changes in costs are translated into changes in prices, and how changes in spectrum capacities may lead to changes in market structure (eg, an increase or decrease in the concentration of market shares, in terms of positions in the downstream markets), market exit of one or more players), and consequently in the risk of anti-competitive unilateral or coordinated effects. (These concepts are discussed further below.)

Such an analysis should be forward-looking. Indeed, there are regulatory precedents where the rationale for a proposed regulatory intervention (eg, re-farming of spectrum) has been prompted not by competition concerns in the relevant downstream market, but by concerns about the likely asymmetries in operators' competitive positions going forward.²⁴

Further to the potential implications for the downstream market, unit costs and spectrum capacity may have an impact on operators' ability and incentives to serve wholesale customers in the upstream market (eg, MVNOs and national roaming in mobile markets). Additional spectrum capacity (and enhanced quality) can provide an operator with a competitive advantage not only in the retail market for the provision of services to end-users but also in the upstream wholesale market for the provision of services to MVNOs. Indeed, MVNOs can, in principle, can give rise to significant capacity requirements and may in part incentivise spectrum purchases. The MVNOs currently operating in the Irish market are relatively small, and Oxera is not aware of capacity constraints that would constrain MNOs in accommodating any increased MVNO traffic on their networks.

²⁴ This was Ofcom's reasoning when it proposed the re-deployment (or forced selling of) 900MHz spectrum in the UK, and FICORA's rationale in reallocating spectrum in Finland. Ofcom (2007), 'Application of Spectrum Liberalisation and Trading of the Mobile Sector', September. Finnish Communications Regulatory Authority; relevant documentation (including an economic study) available at http://www.ficora.fi/index/viestintavirasto/asiakastiedotteet/radiotaajuudet/2005/P_7.html

The impact on consumers is illustrated in Figure 2.2 as the last possible stage of economic analysis. This does not necessarily mean that ComReg should quantify the consumer surplus implications of each of the trades, given the nature of the ‘distortions to competition’ test. Put another way, it may not be necessary to undertake a fully fledged analysis of the effects on consumers if the previous steps in the analysis suggest that the changes in competition are not significant enough to trigger concerns. As elaborated below, a finding of a ‘distortion to competition’ does, however, require that consumers are affected.

2.1.2 Impact on competition through hoarding—implications for the trading framework

The assessment framework should take into account ComReg’s statutory functions, including its objective to ensure the efficient management and use of spectrum and its responsibility, under Regulation 17(10) of the Framework Regulations, to lay down rules in order to prevent spectrum hoarding. Specifically:

The Regulator may, having regard to its objectives under section 12 of the Act of 2002 and Regulation 16 and its functions under the Specific Regulations, lay down rules in order to prevent spectrum hoarding, in particular by setting out strict deadlines for the effective exploitation of the rights of use by the holder of rights and by withdrawing the rights of use in cases of non-compliance with the deadlines. Any rules laid down under this paragraph shall be applied in a proportionate, non-discriminatory and transparent manner.²⁵

In economic terms, hoarding can be an impediment to competition if an efficient operator’s growth is constrained by an incumbent operator holding spectrum that it does not need to provide services to its current or projected customers. The *existence* of hoarding does not change the proposed approach to trading, but hoarding could be considered in the context of the proposed ex ante competition assessment of trades—for example, if there were a concern that a trade could give rise to hoarding. Thus, the competition assessment outlined in this report considers spectrum hoarding only to the extent that trades give rise to issues regarding levels of spectrum ownership. It is not intended to cover ongoing monitoring or assessment of levels of spectrum use.

Should concerns of post-trade hoarding exist—for example, an operator that is already abundant in terms of spectrum holdings purchases additional spectrum from a smaller operator—there are means to address such concerns without necessarily having to block the trade. The remedies designed to pre-empt post-trade hoarding are discussed in section 4.4.

2.2 Measures to assess trades

2.2.1 Ex ante or ex post?

The first stage of this assessment is to consider whether the regulatory framework for assessing spectrum trades should be ex ante or ex post. In other words, ComReg could choose not to define an upfront framework, but instead allow spectrum trades to occur and rely on its existing competition law powers under current legislation to intervene afterwards, if necessary.

International comparison provides some, albeit limited, guidance in this respect, as summarised in Box 2.2.

Box 2.2 Examples of ex ante spectrum trading frameworks

While the Framework Directive states the objective of establishing a regime of spectrum trades, it supersedes a framework in which trading was optional. According to the European Commission Framework 2009 Directive, ‘national regulatory authorities may allow spectrum users freely to

²⁵ The European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011 (S.I. No. 333 of 2011)

transfer or lease their usage rights to third parties.²⁶ There is thus far no explicit guidance by the Commission on how the trading framework should be implemented in Member States.

Currently the ex ante assessment frameworks in EU Member States are not clearly specified in many countries (in terms of the processes and thresholds discussed in this report). For instance, some countries (Germany, Norway, and Sweden) assess and permit trades on a case-by-case basis with no formal or abstract rulings defined in advance. Many countries require approval for every trade.

In Austria, the legislation has defined a two-stage assessment process: the first stage is to decide whether a proposed spectrum trade is likely to distort competition. If competition is not likely to be distorted, approval is granted, otherwise the process reaches the second stage which determines the conditions (or remedies) that would be required to prevent the identified distortion²⁷.

In Australia, there is a two-stage authorisation process, whereby the spectrum management authority (the Australian Communications and Media Authority, ACMA) can highlight issues before undertaking more in-depth analysis. The ACMA delegates competition assessment to the competition authority (the Australian Competition and Consumer Commission, ACCC), which has defined the competition tests and market definition process. The ACMA can also specify a range of remedies as part of the authorisation.

New Zealand has a division of responsibility similar to in Australia, with the Commerce Commission responsible for the competition assessments and Radio Spectrum Management (RSM) responsible for technical aspects. The trading framework operates within a two-tier management rights regime, where management rights holders of national blocks of spectrum can assign and specify the conditions of tradable spectrum with their block. The authorisation process takes place in one stage, with a ten-day timeframe for decision.

A high-level assessment of the merits of the two options is as follows.

Benefits of an ex post monitoring scheme

Relying on an ex post monitoring scheme would mean that ComReg would not intervene at the time of the trade. However, if it were considered that 'distortions to competition' were likely to emerge or had emerged, it could decide to alter operators' spectrum holdings with respect to the traded spectrum.

The benefits of this approach are that it is potentially less interventionist and may arguably encourage trading; and it may remove some administrative hurdles. The trades could take place in short timescales and there would be no or limited uncertainty regarding ComReg's conclusions on the competition effects of the trade.

Risks of relying on an ex post monitoring scheme

Notwithstanding the lighter regulatory burden of an ex post approach, there are sound reasons to suggest that spectrum trades should be assessed ex ante.

- **Regulatory certainty.** The trading parties need certainty about their current and future spectrum holdings, given that their network configuration and hardware investments depend on specific spectrum allocations. Operators need long-term certainty in order to undertake investments in wireless networks elements which have relatively long asset lifetimes and hence payback periods. The possibility of an intervention midway through the lifetime of the investments could distort incentives to invest. Insofar as there is uncertainty surrounding spectrum holdings, operators might not invest to the extent that they would if they had commitment that they can use the spectrum they have purchased for the entire licence period. Also, if the review were ex post and, following such a review, ComReg determined that the trade had to be undone, it could be difficult and costly for the trading parties to undo it. Imposing such a measure might also be disproportionate to the perceived risk of a distortion in competition.

²⁶ European Commission (2009), 'Directive 2009/140/EC of the European Parliament and of the Council', *Official Journal of the European Union*, L337, /37, November 25th.

²⁷ Lichtenberger (2003), 'Spectrum trading in Germany, Austria and the UK', ITS Conference paper, August 23rd.

- **Administrative burden.** If assessments were conducted ex post, and ComReg were to determine that the trade would lead to a distortion of competition, significant costs and administrative burdens could be imposed on the trading parties in reversing the trade.

An ex ante framework would not necessarily impose a disproportionate regulatory burden on the trading parties, as trades that were unlikely to distort competition could be cleared without having to conduct a full economic analysis.²⁸

- **Valuation of spectrum.** It is likely that there would be greater uncertainty as to whether ComReg would look to pursue an ex post intervention than whether a proposed trade breaches the criteria of an ex ante framework. Consequently, ex post intervention could increase the risk of pursuing spectrum trades relative to an ex ante framework, and therefore could have a greater impact on the valuation of spectrum. Put another way, if there were a risk that ComReg could intervene ex post, the spectrum could be worth less than it would without the risk of intervention. This could create additional distortions to trading.
- **Identifying distortions to competition ex post.** It is difficult to assess whether any post-trade market developments result from inefficient spectrum allocations or other reasons. Wireless services markets are generally dynamic and operators may gain competitive advantages through legitimate practices such as marketing campaigns and successful innovation. It would be difficult for ComReg to identify to what extent enhanced performance in the market (for example, manifested through an increased market share) is due to a spectrum trade that took place in the past, or the firm simply performing well commercially.
- **Ex post may be too late.** Given the above-explained complexity inherent in disentangling spectrum-related concerns from other market developments, such an ex post intervention would be justified only if based on solid evidence on sufficiently long-term ‘distortions to competition’. It might thus take a long time before ComReg could intervene. The risk might be that an ex post approach might take place at a stage when distortions to competition have already materialised. This reasoning is consistent with the wider EU Regulatory Framework—one of the criteria for identifying markets susceptible for ex ante regulation is that ex post competition law alone is not sufficient.
- **Consistency with merger controls.** It would not be consistent with the merger control practices to intervene ex post. Merger controls are typically (and also in Ireland) implemented as ex ante regimes precisely because they seek to pre-empt any structural competition concerns before they materialise.

Conclusion on ex ante versus ex post

Ex ante and ex post frameworks both have costs and benefits. Table 2.1 below gives an overview of the main factors informing Oxera’s recommendation.

²⁸ The distinction between such Phase 1 and 2 assessments is further explored in section 3.

Table 2.1 High-level overview of the likely benefits of ex ante versus ex post framework for spectrum trades

Criteria	Assessment of the relative merits
Regulatory certainty	Ex ante provides greater certainty over time
Administrative burden	Ex post likely to be less costly, but would involve a significant burden in the event of an intervention
Valuation of spectrum	The possibility of an ex post intervention could affect the valuation of spectrum
Ease of identifying distortions	Both approaches <i>may</i> require complex analysis Additional complexity in identifying market developments that are attributable to spectrum holdings
Timeliness / effectiveness	Ex post intervention may occur too late; ex ante may bring the risk of clearing a trade that results in distortions
Consistency with merger controls	Merger control functions ex ante

Source: Oxera.

Therefore, on balance, it is Oxera’s recommendation that an ex ante framework be introduced. The analysis presented below builds on the presumption that an ex ante framework would be introduced, although the principles are largely applicable to ex post assessments as well.

2.2.2 Test standard—distortion to competition

Regulation 9(11) of the Authorisation Regulations requires ComReg to ensure that no distortion of competition arises from spectrum trading:

[ComReg] **shall ensure that competition is not distorted by any transfer or accumulation of rights of use for radio frequencies.** For this purpose the Regulator may take appropriate measures such as mandating the sale of the lease of rights of use for radio frequencies. [emphasis added]

However, the Authorisation Regulations do not provide guidance on what would constitute a ‘distortion of competition’ and to what standard such a distortion needs to be proven (ie, what the appropriate substantive test is) before ComReg is required to prohibit a spectrum trade (or take appropriate measures). These aspects of the assessment are therefore open to ComReg’s interpretation.

Selecting an appropriate substantive test to determine whether a distortion in competition is likely to occur as a result of a spectrum trade is a necessary step in designing a framework for the assessment of the competition effects of spectrum trading. The proper application of such a test would determine the scope and depth of ComReg’s assessment of spectrum trades and would form the basis for any decision to approve or prohibit the trade, or to approve it subject to certain conditions.

The phrase ‘distortion of competition’ is often used in competition law—competition law generally prohibits any actions that ‘restrict, distort or prevent competition’. An overview is given below of the substantive tests that different competition authorities adopt in different contexts. Although these have not specifically been designed for spectrum trading, they are useful in highlighting the options available to ComReg for assessing competition impacts in the electronic communications markets.

Substantive tests in mergers

As described in section 2.1, spectrum trade analysis is akin to merger analysis. Therefore, it may be informative to examine the use of substantive tests by competition authorities in the context of mergers.

The OECD recently surveyed member countries to find out which tests competition authorities use for merger review. Most of the surveyed authorities apply one of two tests:²⁹

- the significant lessening of competition (SLC) test; or
- the dominance test.

As well as being used in mergers, these two tests, but in particular the first, could potentially be used to assess the competitive effects of other commercial trades, including spectrum trades.

The dominance test assesses whether a merger strengthens or creates a dominant position in the market. Dominance typically refers to a situation where a market leader enjoys a degree of independence from competitive pressures. Dominance can be interpreted as the merged firm becoming dominant (narrow definition), or it can be extended to cover collective dominance (broad interpretation). Examples of countries that still use the dominance test are Germany and Switzerland.

The SLC test assesses whether a merger substantially lessens competition in the market. As set out in the OECD report: ‘the SLC test focuses on the effects of the merger on the market and on the loss of competition among firms rather than on threshold structural issues such as market shares. Under the SLC test, the investigation and assessment of a merger are more concerned with whether prices are likely to rise after the merger is consummated.’ The Competition Authority in Ireland has applied the SLC standard since the introduction of the new merger review regime under Section 22(3) of the Competition Act 2002.³⁰ The SLC test is also applied by the European Commission and by competition authorities in the UK, Australia, the Czech Republic, Poland and the Netherlands.

As described in the Competition Authority’s merger guidelines, the SLC test is interpreted in terms of consumer welfare. According to the Authority, consumer welfare depends on a range of variables including price, output, quality, variety and innovation (with an increase in price or a reduction in the other factors leading to a reduction in consumer welfare). As a result, the Authority defines an SLC with reference to whether a merger is likely to lead to an increase in price to buyers (or a reduction in output).³¹

The substantive test used by the European Commission is that of ‘significant impediment to effective competition’ (SIEC), in particular ‘as a result of the creation or strengthening of a dominant position’. As stated in its Merger Regulation: ‘The notion of significant impediment to effective competition is to be interpreted as extending beyond the concept of dominance, only to the anti-competitive effects of a concentration resulting from the non-coordinated behaviour of operators which would not have a dominant position on the market concerned’. In practice, this test is similar to an SLC test.

The difference between the two arises only when the concept of dominance is interpreted narrowly, in which case the assessment of the same merger might lead to different outcomes depending on which test is used. In horizontal assessment, two types of effects are typically considered:

- **unilateral effects** arise from the strengthening of the merging firm’s position in the market, which may allow it to act more independently of its competitors post-merger. For example, a spectrum trade could result in cost advantages, or monopolisation of certain spectrum band, to such extent that a single operator could, in the longer term, possess market power to an extent that distortions to competition could emerge.

²⁹ OECD (2009), ‘Policy Roundtables: Standard for Merger Review’.

³⁰ The new merger regime came into effect on January 1st 2003. Before this, a dominance test was applied. Government of Ireland (2002), ‘Competition Act, 2002’, number 14 of 2002.

³¹ The Competition Authority (2002), ‘Notice in respect of guidelines for merger analysis’, decision document, December 16th.

- **coordinated effects** arise when the merger leads to a change in the market structure such that more favourable conditions for tacit (or explicit) collusion are created. Again, concentration of critical assets such as spectrum rights of use leads to further concentration in the downstream market and could create a situation whereby two (or possibly more) operators can tacitly collude, to the detriment of consumers.

The SLC test would address both unilateral effects and coordinated effects.³²

With regard to practical considerations, there may be an advantage to using an SLC test, as it means that effects can be assessed directly without necessarily defining the market first. For example, the test can be applied by identifying the competitors of the acquirer or the seller of spectrum trade directly (using, for example, a 'diversion ratio' consumer survey). This approach may capture competitors outside the relevant market as defined by a SSNIP test. These additional competitive pressures may nevertheless be relevant for the assessment of the spectrum trade and should therefore be considered when conducting the analysis.

The European Commission policy on radio spectrum may provide some indication on tests. RSPP Article 5(2)(d) states that:

Member States may adopt measures...prohibiting or imposing conditions on transfers of rights of use of spectrum, not subject to national or Union merger control, where such transfers are likely to result in **significant harm to competition**.³³ [emphasis added]

This wording may suggest that an SLC-type test is appropriate for assessing harm to competition in spectrum trades.

If the dominance test is used, the market definition stage is seen as essential before calculating market shares, which may potentially be time-consuming. An SLC test can also be more flexible with regard to the analysis that could be undertaken during the assessment. This may be an advantage in the context of spectrum trades, where the competition assessment is often forward-looking and may consider services that have not yet been launched. The flipside of this is that the use of an SLC test may lead to a loss of certainty in relation to the outcome of the assessment, which may be seen as a disadvantage by the firms participating in the trade.

Tests in other competition contexts

There are further test standards which are useful to acknowledge in identifying the most appropriate standard for the spectrum trading framework. In particular, there are differences in terms of whether the test standards require the regulator or the competition authority to show that consumers are affected as a result of a structural change in the market.

The substantive test used by the UK competition authorities under the Enterprise Act 2002 is an 'adverse effect on competition' (AEC) test (see Box 2.3 below).

³² However, if a narrow definition of dominance is adopted (creation or strengthening of dominance of the merged firm), the dominance test would address only unilateral effects and not coordinated effects. If dominance is defined more broadly (ie, as including collective dominance), the dominance test should lead to an outcome similar to that from the SLC test. The OECD paper highlights, however, that 'even if dominance is given a broad economic interpretation, there may still be mergers leading to potentially anti-competitive unilateral effects that could escape scrutiny under the dominance test. This may occur with respect to mergers that lead to non-collusive oligopolies or vertical and conglomerate mergers.' See OECD (2009), 'Policy Roundtables: Standard for Merger Review'.

³³ European Commission (2011), 'Position of the Council at first reading with a view to the adoption of a Decision of the European Parliament and of the Council establishing a multi-annual radio spectrum policy programme', Common Guidelines 16226/11, December 5th. Retrieved from <http://register.consilium.europa.eu/pdf/en/11/st16/st16226.en11.pdf> on July 4th 2012.

Box 2.3 The UK's AEC test

For the purposes of the assessment, the CC sees competition as a process of rivalry between firms and other suppliers. This rivalry process may be illustrated by changes in market structure, the pattern of pricing over time, or the extent of product innovation, for example. Whatever form the process of rivalry takes, the CC will consider its effects over time and how it may be expected to develop.

The CC's presumption is that rivalry generates benefits for consumers such as lower prices and costs, an increase in innovation and productivity, an increase in quality and in choice for customers. Therefore, when this process is 'hampered, or otherwise hindered, by features of the market that competition may be adversely affected', the CC, in its analysis, will consider 'the extent to which the process of rivalry in the market will ensure that all firms in the market are open to challenge, that no firm's position or market share is insulated from competitive pressure and that none can exert market power'.

Source: Competition Commission, 'Market Investigation References: Competition Commission Guidelines', June 2003.

As such, the AEC test does not go as far as requiring that harm to consumers be demonstrated. It stops short of that, on the presumption that distortion of rivalry between operators would lead to negative effects on the customers.³⁴

In its investigation into the 1800MHz spectrum licences held by Everything Everywhere in the UK, Ofcom used a test similar to the AEC. In assessing distortion of competition, Ofcom took into account any technical advantages that would accrue to the spectrum holder and considered whether competitors would be able to respond to this by adopting alternative strategies. As winners of 800MHz and 2.6GHz spectrum would be able to compete with Everything Everywhere, Ofcom concluded that there was no material risk of distortion of competition from Everything Everywhere's holdings of 1800MHz spectrum. In light of this conclusion, there was no need for Ofcom to consider the potential negative impacts arising from distortion of competition on consumers. This example is summarised in more detail in Box 2.4.

Box 2.4 Ofcom's approach to distortion of competition

Ofcom has recently looked into whether to amend the 1800MHz spectrum licences held by Everything Everywhere, a joint venture between Deutsche Telekom and France Télécom, to authorise LTE and WiMAX use. In assessing the impact of such an amendment, Ofcom followed three steps:

- it considered whether consumers and citizens would accrue benefits from the provision of LTE and WiMAX technologies;
- having established that LTE delivers benefits—in terms of greater cell spectral efficiency, improved latency, etc—it considered whether the amendment to the licence would give rise to a material risk of distortion of competition;
- if it had identified a material risk of distortion of competition, it would have then determined whether any objectively justifiable, proportionate, non-discriminatory and transparent measures could be introduced to address the competitive distortion.

The regulator's analysis of distortion of competition focused on whether Everything Everywhere would benefit from a first-mover advantage by having early access to LTE, since it determined that an operator holding a combination of 800MHz and 2.6GHz spectrum would be able to compete with

³⁴ Another context in which the test for distortion of competition is used is state aid assessment. This test is relatively specific. The questions are concerned with 1) selectivity of state aid; 2) market position of the company; 3) price charged by the company granted the aid; 4) the particular form of state aid that would lead to distortion; and 5) the procedure for selecting beneficiaries.

an operator holding 1800MHz spectrum in launching LTE services in the future.³⁵ The analysis of distortion of competition covered:

- whether technical advantages associated with owning spectrum suitable for LTE grant significant commercial advantages;
- whether such advantages accrue over a significant period of time;
- whether competitors could have wholesale access to LTE services in the short term;
- the scope for competitors without 1800MHz spectrum to respond through the adoption of alternative strategies.

Ofcom provisionally concluded that there was no material risk of distortion of competition from Everything Everywhere's use of 1800MHz to deploy LTE and WiMAX technologies. In particular, this related to the fact that the advantages would not be accrued over a significant period of time, since winners of 800MHz and 2.6GHz spectrum in forthcoming auctions would be able to compete with Everything Everywhere. Everything Everywhere had also agreed to divest some of its spectrum to competitors following the auction. Its competitive advantage would therefore last for no more than three months.

Source: Ofcom (2012), 'Notice of proposed variation of Everything Everywhere's 1800MHz spectrum licences to allow use of LTE and WiMax technologies', March 13th.

While there are examples where 'adverse effect on' or 'distortion to' competition tests have been applied without any explicit assessment of harm to consumers, the above-examples seem to rely on the presumption that if the competitive process was sufficiently distorted, the effects would be felt throughout the value chain, also by consumers.

Furthermore, regulators typically, and ComReg in this context, have statutory duties to protect consumers. Application of competition test that does not explicitly take into account consumers, might not be consistent with these objectives.

Certainty threshold for substantive tests

Another aspect of a substantive test that ComReg may want to consider is determining the degree of certainty that the regulator places on its finding of a distortion of competition before it is able to block a spectrum trade (or take appropriate measures). For example, if ComReg adopts an SLC test for assessing spectrum trades, how sure would it need to be that a trade would distort competition, before going ahead and blocking it? ComReg would need to decide whether the level of certainty in relation to an SLC finding would need to vary according to the phase of assessment, where there are multi-phase assessments.

In the context of merger assessment, the Competition Authority needs to form a judgement that the notified merger would not lead to an SLC if it is to be cleared at Phase 1 of the assessment:³⁶

Having considered the information provided and all submissions received, the Authority, if it forms the opinion that the result of the merger or acquisition will not be to substantially lessen competition in markets for goods and services in the State, will determine that it may be put into effect.

If the Competition Authority is unable to reach such a judgement, the notified merger would be referred to a Phase 2 assessment:

Where, having considered the information provided and all submissions received, the Authority is unable on the basis of the information before it to form the view that the result of the merger or acquisition will not be to substantially lessen competition in

³⁵ 800MHz and 2.6GHz spectrum is to be auctioned will be available throughout most of the UK by the end of 2013.

³⁶ The Competition Authority (2002), 'Notice in respect of guidelines for merger analysis', decision document, December.

markets for goods and services in the State, the Authority will make a determination to carry out a full investigation, ie, proceed to phase 2.

The level of certainty required in order to clear a notified merger following a Phase 2 assessment appears to be the same as in Phase 1—the Competition Authority needs to reach the judgement that the merger will not:

substantially lessen competition in markets for goods or services in the State or, as appropriate, will not be to substantially lessen such competition if conditions as specified are complied with.³⁷

A contrasting example is the merger regime from the UK, where the Phase 1 competition authority (the OFT) has a higher certainty threshold to cross (ie, it has to be more sure that a merger would not lead to an SLC) in order to clear the merger than the Phase 2 competition authority (the CC). This is set out in Box 2.5.

Box 2.5 Certainty threshold in merger regime in the UK

Useful examples where the degree of certainty with regard to the findings of distortion of competition varies is the UK merger regime. The Phase 1 competition authority, the OFT, has a duty to refer a merger to the CC (the Phase 2 competition authority) ‘where it believes that it is or may be the case that the merger has resulted or may be expected to result in an SLC’.³⁸ The CC, on the other hand, has to find that the merger will lead to an SLC.

More specifically, the OFT applies a ‘realistic prospect’ threshold, whereas the CC applies a ‘balance of probabilities’ threshold. This means that if the OFT believes that the relevant likelihood of the merger resulting in SLC is ‘greater than fanciful, but below 50 per cent, it has a wide margin of appreciation in exercising its judgement’—in other cases, it would be bound to refer the merger to the CC.³⁹

This is relevant in the context of the test for spectrum trading, because the realistic prospect threshold is deliberately more cautious for an SLC applied by the CC after more extensive investigation. The OFT’s judgement on whether there is a realistic prospect of an SLC will take due account of the extent of the evidence available to it at the time of its decision. The Guidelines further state that:

The CC will apply a ‘balance of probabilities’ threshold to its analysis, ie it addresses the question: is it more likely than not that an SLC will result? It must therefore form an expectation which has a higher level of probability than that required of the OFT, calling for a more extensive investigation than that carried out at Phase 1⁴⁰

Source: Joint publication of the Competition Commission and the Office of Fair Trading, ‘Merger Assessment Guidelines’, September 2010, (CC2 Revised) OFT1254.

The US telecoms regulator, the Federal Communications Commission (FCC), appears to adopt a cautious approach to examining mergers in the telecoms sector; an appreciable possibility of a merger leading to an SLC appears to be sufficient to block a merger. In the recent AT&T/T-Mobile decision,⁴¹ the FCC states:

The Commission’s view accords with Federal Antitrust law. Mergers that result in a highly concentrated market and the new firm controlling an undue share of that market are presumptively illegal. The antitrust laws do ‘not require proof that merger or other acquisition has caused higher prices in the affected market. All that is necessary is that

³⁷ Government of Ireland (2002), Competition Act 2002, Section 22 (3).

³⁸ Joint publication of the Competition Commission and the Office of Fair Trading, ‘Merger Assessment Guidelines’, September 2010, (CC2 Revised) OFT1254.

³⁹ Ibid.

⁴⁰ Ibid.

⁴¹ See section 2.1.5 for a summary of this case study.

the mergers create an appreciable danger of such consequences in the future'. 'The Congress used the words 'may be substantially to lessen competition'⁴²

Generally, competition authorities use a more cautious approach at the first phase of the assessment than at the second phase. This reflects the fact that, by the end of the second phase, they would have had more time to consider the merger and have collected additional information and had the opportunity to carry out additional analysis to reassure themselves that the merger would not lead to an SLC.

The review of current practices of some selected jurisdictions highlights that several types of substantive test have been used to assess the effects on competition of mergers and acquisitions. Conceptually, these tests appear to have different scope, ranging from those with a lower threshold for finding a distortion of competition and therefore blocking a merger (such as the dominance test) to those with a higher threshold (such as the SLC test). This is summarised in Table 2.2 below.

Table 2.2 An overview of selected substantive tests (in order of the threshold for finding a distortion of competition increasing)

Test	Description	Context in which used	Jurisdiction
Dominance	Examines whether a merger strengthens or creates a dominant position in the market. Dominance is defined as a situation where a market leader enjoys a degree of independence from competitive pressures	Mergers	Germany, Switzerland
Adverse effect on competition	Examines whether there is a distortion to the process of rivalry between firms. Stops short of assessing the impact of the distortion on customers, on the presumption that a reduction in rivalry would lead to adverse effects for customers	Market studies	the UK
Significant impediment to effective competition	Similar to the SLC test, this test highlights that the negative effects arising from the merger (such as price rises or quality deterioration) would result from the creating or strengthening of a dominant position	Mergers	the EU
Significant lessening of competition	Focuses on assessing the effects of the merger, such as whether it would lead to price rises and/or quality deterioration	Mergers	Ireland, the UK, Australia, the Czech Republic, Poland, the Netherlands

Source: Oxera based on documentation published by the competition authorities in selected countries.

Note: The test in some countries is worded as 'substantial lessening of competition', however, this test does not appear to be different from the 'significant lessening of competition' test.

In practice, these tests are likely to involve the assessment of similar factors, such as the creation or strengthening of market power, the ability to raise prices without worrying about the reaction of one's customers (countervailing buyer power) or competitors, barriers to entry, and incentives to collude, all of which would ultimately be detrimental to consumers.

Conclusion on distortion of competition

In terms of choosing a substantive test for ComReg in the context of assessing spectrum trading, the SLC test is appropriate for two reasons. First, it is appropriate that there is consistency in the principles underlying competition tests applied by authorities within the same jurisdiction. As such, the principles that guide ComReg's spectrum trade assessment framework should be consistent with those applied by the Competition Authority in its

⁴² FCC (2011), 'Staff Analysis and Findings', Bureau analysis, November 29th, taken from: <http://transition.fcc.gov/transaction/att-tmobile.html>, on June 20th 2012.

analysis of mergers, while recognising ComReg's different statutory obligations, and, in particular, the promotion of competition. Second, as described in section 2.1 spectrum trades do not necessarily lead to consumer harm—indeed, they may bring substantial benefits to consumers (in the form of lower prices and high-quality products and services). This possibility should therefore be captured within the test, as it would be within the SLC test, so as to avoid a trade that could be beneficial to consumers being blocked.

2.2.3 Specific elements of competition analysis

In applying the SLC test, ComReg would need to address the following questions as part of its assessment of a notified spectrum trade. These factors are informed by the Competition Authority's merger assessment guidelines, which have been in effect since December 2002.⁴³

- **Will the trade lead to unilateral effects?** ComReg would need to assess whether the increased spectrum holding would give the operator the incentives and ability to increase its prices.⁴⁴ ComReg would have to bear in mind both short- and long-term effects. The long-term horizon is relevant if spectrum acquisition is likely to lead to a long-term cost advantage for the acquirer over its competitors. As part of the assessment of the incentive to raise prices, ComReg may consider the market position of the acquirer resulting from the spectrum trade and its ability to charge higher prices in the long term. The assessment of its ability to increase prices should take into account (among other factors) the ability of competitors to compete effectively with the acquirer post-acquisition,⁴⁵ the likelihood of new entry into the market (although this is likely to be small in almost all instances, given that entry into the market is likely to occur only via the acquisition of spectrum or through an MVNO arrangement), and the ability of customers to react to a price increase by switching to competitors (ie, countervailing buyer power). This analysis is consistent with the Competition Authority's merger guidelines.
- **Will the trade lead to coordinated effects?** Similar to the assessment of unilateral effects, ComReg would need to examine whether the acquisition would increase incentives and improve the ability of other operators in the market to coordinate on price (or other aspects of competition, such as holding back investment or delaying quality improvements). As per the Competition Authority's merger guidelines, ComReg could assess the impact of the spectrum acquisition on symmetry in the market, the extent of multi-market contact, barriers to entry and the availability of a credible punishment mechanism.⁴⁶
- **Will a detriment to consumers be expected as a result of the trade?** This part of the assessment would need to weigh any potential negative effects of the acquisition against any positive effects that may arise (such as quality improvements for consumers). This part would therefore need to focus on any countervailing factors that would support the trade (ie, if the trade gives rise to efficiencies that compensate for any anti-competitive effects).

In relation to the extent of certainty that ComReg needs to place on its findings of an SLC, it appears that it might be prudent to adopt a more cautious approach during a first-phase

⁴³ The Competition Authority (2002), 'Notice in respect of guidelines for merger analysis', Decision No. N/02/004, December 16th.

⁴⁴ The Competition Authority defines unilateral effects as arising 'where, as a result of the merger, the merged firm finds it profitable to raise price, irrespective of the reactions of its competitors or customers.'

⁴⁵ This could include reference to the displacement concept, as applied by the Competition Authority, which covers the proportion of sales that a party would lose if it increased its price by a certain percentage. If a large proportion of the sales that would be lost by the party would be gained by the other merging party in the pre-merger market, these sales will not be lost post-merger. The Competition Authority (2002), op cit.

⁴⁶ A credible punishment mechanism refers to the ability of firms to detect and punish a firm that deviates from the coordinated action (eg, by lowering its price below the collusive level).

assessment of a spectrum trade. An appreciable possibility of a trade leading to a SLC might lead to a decision to proceed to a second-phase assessment. Once ComReg has had additional time and information to assess the trade in more detail, following a second-phase assessment, it may be better placed to conclude whether or not the trade would lead to an SLC. In this regard, ComReg could consider adopting an approach consistent with the Competition Authority, which is not able to block a trade on the basis of a Phase 1 assessment. At the end of Phase 1, it must decide:

- a) that, in its opinion, the result of the merger or acquisition will not substantially lessen competition in markets for goods or services in the State and, accordingly, that the merger or acquisition may be put into effect, or
- b) that it intends to carry out an investigation under section 22 in relation to the merger or acquisition.⁴⁷

The following paragraphs describe the criteria that could be used to assess whether a spectrum trade or an accumulation of spectrum rights of use would be likely to distort competition.

Spectrum holdings and market position of parties participating in the trade

The assessment may examine whether the trade would significantly increase the spectrum holding and/or market power of an operator that already has a significant spectrum holding, and therefore increases its competitive advantage beyond the level that its competitors can achieve.

Concentration in the market

The size of the trade is likely to be important as substantial trades of spectrum may lead to significant changes in the structure of the market.

Concentration takes into account the number of competitors in the market as well as their respective shares. High concentration is indicative of a small number of large firms being present in the market.⁴⁸ In this respect, spectrum concentration as such is not the principal concern (provided that spectrum is not purchased and then hoarded), but the market shares that would result in the relevant wholesale and retail markets. Therefore, in line with the conceptual discussion in section 2.1, any assessment of competitive implications (eg, market concentration post-trade) should recognise the extent to which, and at what cost, different bands can be employed to provide substitutable services. For example, a single operator may hold all or a vast majority of 1800MHz (as Everything Everywhere does in the UK). Notwithstanding its position with respect to a certain spectrum band, there may be no competition concerns insofar as the spectrum holdings for substitutable services (in this case 2G, 3G and 4G) remain sufficiently fragmented.

Spectrum concentration analysis has played an important role in several merger and acquisition investigations undertaken by the FCC, and is instructive in this context (see Box 2.6 below).

Box 2.6 The Federal Communications Commission's 'spectrum screen'

In its assessment of mergers and acquisitions, FCC adopts a three-part approach to assessing competitive concerns. The first two parts cover existing market concentration analysis, using the Herfindahl–Hirschman Index (HHI), and analysis of the change in market concentration as a result of the transaction. The third part covers **spectrum concentration**.

Prior to 2003, the FCC's spectrum concentration analysis consisted of a 55MHz cap on the amount

⁴⁷ Government of Ireland (2002), Competition Act 2002 as amended, Section 21(2).

⁴⁸ Concentration is frequently measured by the Herfindahl–Hirschman Index (HHI) which is calculated as sum of squares of individual firm's market shares.

of spectrum held by any individual entity in any single geographic market within the 734 defined Cellular Market Areas (CMAs) in the USA. Since 2003, the FCC has adopted a 'spectrum screen', as opposed to a cap, to help it to determine whether a spectrum trade would create excessive concentration in spectrum holdings, thereby limiting competition. The level of the screen is determined on a case-by-case basis and there are no rules or guidance on how this is set.

Unlike the cap that preceded it, the spectrum screen is not intended as a final analysis; rather, it is a 'rule of thumb' for identifying transactions that require further analysis, to determine whether they are in the public interest. However, the screen has been used as strong evidence that a merger would be anti-competitive, as in the case of the proposed horizontal merger between AT&T/T-Mobile. In that instance, the FCC noted that the merger triggered 'an unprecedented 274 CMAs...or 66 percent of the US population' and exceeded the screen by a significant amount (15MHz) on average.⁴⁹

In the past, the FCC has approved acquisitions where the spectrum screen was triggered, on the basis of the HHI and other evidence.⁵⁰ Equally, the fact that the screen is not triggered is not regarded as conclusive evidence that the transaction should not be subject to further scrutiny, or that it will be in the public interest: in such instances, the transaction is still analysed against other criteria.

There has been some criticism of the current screen on the basis that all sections of spectrum are notionally treated to be of equal value, the measure ignores the intrinsic value of a given geographic zone, and because the screen is adjusted on a case-by-case basis.

[it] is ineffective in measuring the competitive effects of spectrum acquisitions, because the screen unrealistically treats all the mobile broadband spectrum as equal. In the real world, the spectrum bands differ in a variety of ways, the most important being propagation characteristics, but also in other factors such as equipment availability. These differences mean that the capability to deliver mobile broadband depends not on the raw number of MHz held by a carrier, but on the carrier's specific portfolio of types and amounts of spectrum held.⁵¹

It is not entirely clear whether and how the FCC conducts an analysis of the marketplace to establish the spectrum screen, nor precisely how it uses that screen in review of a transaction. The FCC has never adopted formal rules of process to govern the setting and use of the spectrum screen, which has resulted in uncertainty as to the FCC's process, reasoning, and rationale.⁵²

With the finding of high concentration in its assessment of the AT&T/T-Mobile merge, the FCC has flagged that this might indicate a reduction in choice for buyers, as well as making unilateral and coordinated effects more likely. Not only the absolute levels of concentration but also the changes in concentration following the transaction are important, as significant changes in concentration may indicate potentially substantial changes in the market structure resulting from the transaction.

Source: Federal Communications Commission (2011), 'Staff analysis and findings in the Matter of Applications of AT&T Inc. and Deutsche Telekom AG For Consent to Assign or Transfer Control of Licences and Authorizations', 11-1955, November 29th.

In line with the FCC's approach, it would not seem appropriate to assess spectrum concentration according to firms' absolute amounts of spectrum, but on a case-by-case basis. This is because different spectrum bands can be used to provide services in the same service markets, and the technical characteristics (propagation, capacity) vary across bands.

⁴⁹ Federal Communications Commission (2011), 'Staff analysis and findings in the Matter of Applications of AT&T Inc. and Deutsche Telekom AG For Consent to Assign or Transfer Control of Licences and Authorizations', 11-1955, November 29th, p. 24, paras 46-47.

⁵⁰ See, for example, FCC (2008), 'In the Matter of Spring Nextel Corporation and Clearwire Corporation, Applications for Consent to Transfer Control of Licenses, Leases, and Authorizations', 08-259, November; and FCC (2004), 'In the matter of Applications of AT&T Wireless Services, Inc. and Cingular Wireless Corporation for Consent to Transfer Control of Licences and Authorizations', 04-255, pp. 86-87, paras 226-27.

⁵¹ Cramton, P. (2012), 'Supplemental Declaration of Peter Cramton', Exhibit C before the Federal Communications Commission *In the Matter of Application of Cellco Partnership d/b/a Verizon Wireless and SpectrumCo LLC For Consent To Assign Licences*, March 26th, p. 2.

⁵² Committee on Energy and Commerce (2012), 'Letter to the Honorable Julius Genachowski', December 7th.

Closeness of competition between transacting parties

The extent to which the firms were competitors before the trade may affect the loss of competition, and therefore the distortion to the competitive dynamic in the market. The loss of competition would be greater the closer competitors the firms were before the trade (eg, two mobile operators targeting similar customer profiles and/or offering similar tariffs and bundle, which are perceived by consumers to be close substitutes).

Possibility of unilateral effects

An assessment of unilateral effects involves examining the firms' incentives to raise prices after the trade. Important factors that are likely to influence these incentives may be the extent of customer switching in the market and whether they are able to switch to alternative suppliers; and the extent to which other competitors are able to react to the trade—for example, by increasing their spectrum holdings. Swift responses from customers and competitors may be sufficient to ensure that the trade does not lead to unilateral effects. A spectrum trade could create cost advantages, or allow operators to monopolise certain spectrum bands (and its uses), to an extent that a single operator could possess market power such that it could 'distort' competition.

Coordinated effects

An assessment of coordinated effects would consider whether the trade means that the ability and incentives to agree and sustain a collusive price (via tacit or explicit collusion) increases as a result. The important factors to consider include whether the trade has an impact on transparency in the market, the availability of a punishment mechanism, and barriers to entry that preclude new entrants. Again, concentration of critical assets such as spectrum feeds into further concentration in the downstream market, and could create a situation whereby two (or possibly) more operators can tacitly collude to the detriment of consumers. It has been established in the economics research that symmetry in terms of market shares and cost structures could facilitate collusion, although such symmetry does not necessarily lead to further coordination.

Barriers to entry/potential competition

If entry into the market is easy, and the current operators' pricing is constrained by the threat of potential entry, the impact of the trade on competition may be minimal since potential entry would prevent both unilateral and coordinated effects. In most cases, scarcity of spectrum implies that market entry is difficult, although the barriers may be undermined by liberalisation of the usage of spectrum, which could allow the provision of substitutable services over alternative technologies.

Efficiencies arising from the trade

In some cases, the trade of spectrum may lead to potential benefits to customers in terms of high quality and lower prices (translated from the lower costs enjoyed by the operator), which may outweigh any potential distortions to competition. This depends on the spectrum band in question, as the marginal benefits of holding spectrum, or holding contingent blocks of spectrum, differ across bands. It is important to assess the likely magnitude of these benefits and to ensure that any benefits are passed on to the customers. The burden of proof for demonstrating that any efficiency benefits outweigh any negative effects should lie with the trading parties.⁵³

⁵³ This is the case for the Competition Authority, which requires that merging parties show that any efficiencies: must be directly achieved by the merger; cannot be achieved by another less restrictive (of competition) means; and will be achieved within a reasonable timeframe and with sufficient likelihood. The Competition Authority (2002), op cit., p. 26.

3 Processes and procedures to assess spectrum trades

Section 2 examined how the ‘distortion to competition’ concept can be interpreted and how the likelihood of such distortions arising could be assessed in the ex ante framework. This section further explains the processes and procedures that seem necessary in this assessment. If ComReg were to adopt a test to determine a distortion of competition, analogous to an SLC test, it is sensible to ensure that the procedures are consistent with the Competition Authority’s guidance for mergers, while adapting them to the spectrum trading context and regime.⁵⁴ The following aspects are explained:

- whether a de minimis threshold should apply to approval;
- whether the process should be a one- or two-phase assessment;
- which factors should be assessed under each phase, and how in-depth the analysis should be at each stage;
- what would be the trigger thresholds between phases of analysis—ie, how might ComReg determine whether certain trades require less or more analysis.

3.1 De minimis thresholds

Regulation 19(4) requires that any operator intending to transfer its spectrum right of use must notify ComReg of its intention to do so, in accordance with procedures specified by ComReg. However, a de minimis threshold could potentially be set, which would allow trades that are unlikely to create competitive concerns to be granted immediate approval, without a requirement for further investigation. Indeed, de minimis thresholds are often set to ensure that resources are used efficiently and are not taken up by the assessment of mergers/trades that are unlikely to have a significant effect on competition in the market. It may therefore be helpful to set a de minimis threshold for spectrum trades, although the nature of spectrum as a transferred asset implies some practical complexities.

The threshold would need to take into account a number of factors including:

- the size of the parties to the trade (which could potentially be in terms of spectrum holdings, turnover, number of subscribers, etc); and
- the size of the trade (ie, the amount of spectrum that is being traded).

In relation to the precedent, de minimis thresholds can be set in terms of both absolute and relative measures of size. For example, the Competition Authority in Ireland requires notification of proposed mergers and acquisitions where, among other factors, the worldwide turnover of each of the merging parties is greater than €40m, and at least one of the companies has a turnover within Ireland greater than €40m.⁵⁵ On the other hand, the European Commission specifies that, for horizontal mergers, the joint market share of the parties involved must be more than 15% before notification is necessary.

In the context of spectrum trade assessment, it appears that the relevant measure for a de minimis threshold should be set in relation to the amount of spectrum (rather than in relation to turnover, for example), since some operators may have limited turnover in Ireland but significant holdings of spectrum, and others vice versa. For instance, an external investor could purchase large amounts of spectrum through a subsidiary with zero turnover.

⁵⁴ For guidelines, see The Competition Authority (2002), ‘Notice in respect of guidelines for merger analysis’, decision document, December.

⁵⁵ Government of Ireland (2002), Competition Act 2002 as amended, number 14 of 2002, Section 18(1).

Both the amount of spectrum already held by the transacting parties and the amount being transacted appear to be important. A trade may be more likely to distort competition if the operator already holds a significant amount of spectrum. The amount of spectrum being sold is important since it is indicative of the extent to which the trade is likely to have an impact on the structure of the market—a large trade would be expected to have a more substantial impact on the market structure. Different RSPB bands have different propagation and capacity characteristics, and hence their economic significance varies. For example, even a relatively small amount of 800MHz enables substantial marginal increase in the ability to provide lower-cost services over wider areas.

However, even small trades may have interference implications. Given this possibility, it would seem reasonable not to apply any de minimis thresholds. In practice, this would mean that none of the trades would receive immediate approval, but could be cleared without any in-depth investigation in the first phase (possibly over a short timeframe). Furthermore, the appropriate way of defining de minimis thresholds would be in terms of the amount of spectrum, which would need to be done for each band separately, taking into account their substitutability. This might not be proportionate in practice.

As established above, not all Member States have introduced ex ante frameworks thus far, and hence there are few examples of explicit de minimis rules. That said, requiring all trades to be notified is consistent with the EU's requirements and the spectrum management regimes across countries; regulators administer and monitor spectrum usage closely for technical (eg, interference management) reasons.⁵⁶

The FCC's framework provides an example of an 'immediate approval' process in the USA for certain trades, where the trading parties nevertheless inform the FCC about the trade and whether they meet the de minimis criteria or not (see Box 3.1).

Box 3.1 Federal Communication Commission's immediate approval procedures

The FCC has immediate approval procedures in place for certain categories of spectrum trading and leasing arrangement that do not raise potential public interest concerns relating to a set of predefined criteria. The parties involved in spectrum leasing arrangements must complete 'form 608', which asks them to confirm their compliance with basic eligibility and use requirements, foreign ownership regulations (eg, that the lessee is not a foreign government), and other public interest concerns.

In terms of competition criteria and de minimis thresholds, the FCC excludes from its immediate approval procedures trades involving spectrum that:

- (1) is, or may reasonably be, used to provide interconnected mobile voice and/or data services and (2) creates a 'geographic overlap' with other spectrum used to provide these services in which the spectrum lessee holds a direct or indirect interest (of 10 percent or more) either as a licensee or as a spectrum lessee.

Trades that exceed the 10% threshold are subject to case-by-case review and approval by the FCC (10% refers to minimum 'interest' of spectrum that overlaps with the traded spectrum). If all the above criteria are met, the FCC requires only that the parties involved notify it of the trade within 14 days.

Source: Federal Communications Commission (2004), 'Second Report and Order, Order on Reconsideration and Second Further Notice of Proposed Rulemaking in the Matter of Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets', September 2nd.

⁵⁶ While not specifically a de minimis rule, Italy has different thresholds (or procedures) for different types of spectrum. Rare spectrum is defined for television and radio broadcasting, while all other spectrum is not rare. For spectrum that is not rare, this may be traded under general authorisation (but must be notified) and the ministry has a set duration in which it can respond. For rare spectrum, both the ministry and the competition authority must be notified.

Conclusion on de minimis threshold

ComReg may wish to carry out (at least) a Phase 1 assessment of all trades, rather than setting a de minimis threshold which would allow for immediate approval of some trades. This is reasonable, given that even small changes in spectrum allocations can have interference implications. Furthermore, the absence of de minimis thresholds does not necessarily imply that the process would be burdensome for the trading parties. If a two-phase approach is applied, trades that are insignificant in scale or otherwise straightforward can be cleared in the first phase (this is discussed below).

3.2 One-phase versus two-phase assessment

The choice of one- versus two-phase assessment can be made by considering the relative merits of both approaches. The advantages of the former approach are as follows:

- the single timeline might give certainty to the trading parties in relation to the length of the assessment;
- it should help to avoid undesirable situations whereby a trade (which may be beneficial to consumers) is withdrawn if it is referred to Phase 2 (due to the perceived and actual costs in terms of time and effort associated with the assessment).

The current practices adopted by competition authorities for merger assessment (which is akin to the assessment of spectrum trades, as described above) in different jurisdictions typically involve a two-phase assessment. This is the case for the Irish Competition Authority, the European Commission, the US Department of Justice (DOJ), the US Federal Trade Commission (FTC); the UK OFT and the UK CC (see Table 3.1).

Table 3.1 Summary of approaches to merger assessment by competition authorities

Jurisdiction	Authority	One- or two-phase assessment?	Summary details
Ireland	The Competition Authority	Two-phase	The Authority has one month from the effective date (Phase 1) in which to decide whether to clear the notified merger or to carry out a more detailed investigation. A full investigation (Phase 2) gives the Authority four months from the notification within which to determine whether to clear the merger, clear it subject to conditions (which could be offered by the undertakings), or prohibit it
Europe	The European Commission	Two-phase	Phase 1 starts once the notification (ie, Form CO) has been submitted. The Commission has 25 days to issues a Phase 1 decision from notification if no undertakings are offered (if undertakings are offered the period extends to 35 days). The Commission can start the second phase by issuing a statement of objections, which sets out the Commissions' concern. Second-phase proceedings must be concluded within 90 days (unless the Commission stops the clock—ie, suspend its informal timeline)
The USA	Department of Justice and Federal Trade Commission	Two-phase	Following notification, a 30-day waiting period applies, at the end of which the competition authorities notify the merging parties whether they will go ahead with a 'second request'. Once the second request has been submitted, another 30-day notification period applies before the competition authorities announce their decision
The UK	OFT and the CC	Two-phase	In the UK, the two stages are undertaken by separate competition authorities. Phase 1 is carried out by the OFT, which should be able to issue a decision within 40 working days (this is suggested by the administrative timetable; the timetable is not binding). The CC merger assessment typically takes 24 weeks, with the possibility of extending this by a further eight weeks

Source: Competition Commission (2003), 'Market Investigation References: Competition Commission Guidelines', June. Joint publication of the Competition Commission and the Office of Fair Trading (2010), 'Merger Assessment Guidelines', September, (CC2 Revised) OFT1254. FCC (2011), 'Staff Analysis and Findings', Bureau analysis, November 29th. Parisi, J.J (2010), 'A Simple Guide to the EC Merger Regulation', Technical Report, Federal Trade Commission, January 1st. Martineau, D.J. (2010) 'UK Merger Control', event publication, May.

The advantage of a two-phase approach is that the assessment of each case is determined by its complexity. Phase 1 allows for the more straightforward cases that are unlikely to affect competition to be cleared quickly. Phase 2 allows for more complex cases to be assessed in more detail. The approach therefore offers flexibility to the authority in relation to its assessment of the case.

Conclusion on phases

In light of this flexibility, Oxera's assessment is that a two-phase approach is more appropriate for assessing spectrum trading. As explained in section 2.1, spectrum trading does not necessarily lead to negative outcomes for the customer and may lead to significant benefits in terms of price reduction and quality improvements. These benefits should be carefully weighted against any potential negative impacts, which may complicate the assessment. Furthermore, assessment of spectrum trading may involve consideration of long-term effects—for example, if a spectrum trade is expected to result in a significant cost advantage for the operator in the long term—which may make some assessments less straightforward. Therefore, having the flexibility to consider these more complex cases in more detail would be advantageous for ComReg.

Box 3.2 summarises examples from other countries.

Box 3.2 Selected examples of spectrum trading regimes

Austria: legislation indicates that the spectrum transfer process is a one-phase process. If the regulator finds that competition is distorted, subsequent analysis may be done to examine whether the distortion would be unlikely if certain remedies were imposed.

France: authorisation not required for licences originally granted on spectrum that was not auctioned, although notification is required. Within a six-week period, the regulatory authority has the option to intervene and reject such trades. Publicly auctioned spectrum follows a one-stage process.

Germany: there is no threshold system or screen for trades, and the decision is to accept or reject.

Italy: the assessment depends on a scarcity categorisation of spectrum. For spectrum that is not in 'limited quantity', the ministry for communications has 60 days to decide on the transfer. Within this 60-day period, the minister can consult on competition issues with the competition authority (AGCOM).

Source: Lichtenberger (2003), 'Spectrum trading in Germany, Austria and the UK', ITS Conference paper, August 23rd; and ComReg.

3.3 Breadth and depth of analysis under each phase

In light of the recommendation of a two-stage assessment, it is necessary to define the scope of each stage. It is envisaged that the first stage of the assessment would be an initial/indicative phase, which would allow ComReg to identify quickly and approve any trade that would be unlikely to lead to a competitive concern. The second phase would allow for more in-depth analysis for trades for which competitive implications are less clear.

The two-phase analysis can be carried out in the following ways.

- One option would be to carry out certain elements of the assessment in detail during the first phase (these would be elements which would flag up a potential problem with the trade), with the rest of the elements being considered in the second phase. For example, if market shares and concentration indicators do not indicate a problem, the trade could be cleared. 'Countervailing' arguments, such as efficiencies and barriers to entry, could be assessed in the second phase, if necessary.
- Another option is to carry out a high-level assessment of all elements of the case at the first phase, and, if this leads to a concern, the same factors could be assessed in more detail in the second phase. This is broadly the approach adopted by the Competition Authority in Ireland, which undertakes a high-level Phase 1 assessment and, within one month of notification, makes an initial decision on whether to clear the merger or to pursue a more in-depth investigation. For example, the first-phase assessment could rely simply on the information provided by the parties and third-party operators in response to an initial questionnaire from ComReg; whereas the second phase might involve some data analysis and primary market research.

In light of the presumption that spectrum trading may result in significant consumer benefits (which may outweigh any potential competition concerns), it would appear that some analysis of 'countervailing' arguments should be undertaken during a Phase 1 assessment. This would correctly reflect the expectation that an increase in spectrum concentration does not automatically lead to an increase in market power of the operator acquiring the rights, and the anti-competitive incentives following on from that, as described in section 2.1. The effect of analysing the countervailing arguments during the first phase would be to increase the number of spectrum trades cleared in this initial assessment phase.

Conclusion on breadth and depth of analysis in different stages

Factors that ComReg would need to assess in the first phase are as set out in section 2.2.3, and would include:

- market shares;
- concentration of spectrum holdings and retail market positions for parties participating in the trade. ComReg could take into account differences between spectrum bands, for example, in terms of their propagation characteristics (see Figure 1.2), whether or not the band is liberalised, and other factors that may affect substitutability and may result in there being different values attached to different bands;
- incentives to increase prices post-trade owing to unilateral effects;
- incentives to coordinate;
- barriers to entry; and
- efficiencies arising from the trade.

Oxera envisages that the same factors would be considered in the Phase 2 assessment, but in more detail. Given the extended timetable under Phase 2, ComReg might be able to collect additional information and data (via a data request to the parties involved in the trade/third-party market operators, or via primary research of the market), and carry out extended analysis of these factors.

In light of what is likely to be a short timeframe for the first phase, the assessment at this stage may need to rely on more limited information, such as information supplied by the transacting parties (through the information request or interviews) or by third-party operators.

3.3.1 Trigger thresholds between phases of analysis

Trades resulting in a transfer or (long-term lease) of a sufficiently large amount of spectrum (ie, large enough to change market structure and competitive dynamics in the industry) may require more detailed analysis than that carried out at Phase 1, as these would be more likely to cause competition concerns. These trades therefore may need to be referred to a second phase.

A number of potential indicators could assist ComReg in identifying such situations; some examples are shown below.

- An indication that the trade would lead to the operator gaining significant cost advantages, which could put other operators at a competitive disadvantage and therefore allow the acquirer to behave more independently from competition. In line with the reasoning of section 2.1, what matters is the impact on the relevant wholesale and retail markets, and the post-trade portfolios of spectrum holdings of all spectrum bands used to provide these services. Competition authorities use the creation or strengthening of a dominant position as the relevant test, with dominance often defined with reference to certain market share thresholds.⁵⁷
- A trigger based on the amount of spectrum traded in a particular band—eg, a trade that affects more than a certain predetermined percentage of the spectrum in a particular band.
- An indication that the trade would lead to a significant weakening of the seller position in the spectrum market—this may be indicative of a decrease in the seller’s ability to compete effectively and therefore a potential reduction of competition in the market.
- An indication that the trade would lead to a substantial increase in market concentration—this may be indicative in the changes in the market structure following the trade, which may potentially distort competition. Both the absolute concentration in the market and the change in concentration resulting from the trade would be important here. Changes in concentration should also pick up the two effects described above.

⁵⁷ For example, in *AKZO* (1991), the General Court ruled that a company with a stable market share of more than 50% in the relevant market would be deemed dominant unless there were exceptional circumstances. The 40–50% dominance threshold also appeared in the 2004 Coca-Cola undertakings. Case C-62/86 *AKZO Chemie BV v EC Commission* [1991] ECR-I3359. Coca-Cola (Case COMP/A39.116/B2) [2005] Commission Decision of June 2005.

- An indication that the trade could increase the incentives or ability of companies in the market to coordinate—for example, by increasing transparency in the market, creating a credible retaliation mechanism, or exacerbating barriers to entry.

Typically, in merger analysis, thresholds are used for the above indicators. For example, market shares are often assessed against a threshold in the region of 40–50%. For the HHI, the US merger guidelines refer to a post-merger HHI of below 1,500 as resulting in merger clearance; whereas an HHI score above 1,500 would be considered to result in a change in concentration of more than 100 points, and is said often to ‘warrant scrutiny’; while a merger resulting in an HHI score above 2,500 with a change in market concentration of more than 200 points is presumed to be likely to enhance market power.⁵⁸ The Irish Competition Authority places mergers into three zones according to predefined HHI and change in market concentration thresholds, as shown in Table 3.2 below.

Table 3.2 The Competition Authority’s merger concentration zones

Zone	HHI	Delta	Comment
A	Less than 1,000	Any	These mergers are less likely to create a distortion of competition
	Between 1,000 and 1,800	Less than 100	
	Above 1,800	Less than 50	
B	Between 1,000 and 1,800	Greater than 100	Zone B mergers ‘may raise significant competitive concerns’
	Above 1,800	Between 50 and 100	
C	Above 1,800	Greater than 100	Mergers in zone C ‘occur in already highly concentrated markets and [will] more usually be those that raise competitive concerns’

Source: Based on Competition Authority (2002), op cit., p.11.

ComReg could use these (or similar) thresholds as indicators of where a trade might pose competition concerns worthy of further investigation, and would not be used as de facto evidence that a trade should not be cleared.

These thresholds may be informative for ComReg’s Phase 1 assessment, where a prompt decision needs to be made about whether the trade is likely to cause competition concerns and at what point a high-level assessment is appropriate. For example, the Competition Authority acknowledges that its thresholds are:

intended mainly to give initial guidance to the merging parties and practitioners, and thus provide a rule of thumb indicator of the likelihood of the deepening of an examination of competitive effects, and not a hard and fast rule to be applied in all cases.⁵⁹

Therefore, for example, if the operator initially holds a 5% share of a given spectrum band and the spectrum acquisition increases this by another 5%, ComReg may clear such a trade at Phase 1, on the basis that it is unlikely to lead to significant changes in the competitive conditions in the market.

These thresholds would be less appropriate for the Phase 2 assessment, however, for two reasons:

- spectrum with different properties may not be directly comparable for the purpose of market share calculations—if the distortion to competition test is conducted with

⁵⁸ Department of Justice and Federal Trade Commission (2010), ‘Horizontal Merger Guidelines’, August 19th, p. 19.

⁵⁹ Competition Authority(2002), op cit., p.10, para 3.9.

reference to several spectrum bands (ie, 800MHz and 2.6GHz), it might be more difficult to calculate exact market shares as x quantity of rights of use of 800MHz spectrum is not necessarily equivalent to x quantity of rights of use of 2.6GHz spectrum. It might be possible to apply a conversion measure to make holdings of different spectrum bands more comparable;

- greater concentration in spectrum holding does not necessarily translate into market power—as described in section 2.1, the link between spectrum concentration and market power is less well-defined. Hence, specific market share and concentration thresholds are less applicable for the competition assessment.

Conclusion on trigger thresholds

Hence, in Phase 2 of the assessment, it would be less appropriate for ComReg to rely on stringent market share and concentration thresholds. Instead, the analysis should take the form of a more holistic assessment, where ComReg would consider a variety of factors simultaneously to assess whether, in its judgement, the trade would be likely to have any anti-competitive effects. A more detailed analysis of ‘efficiencies’ and other ‘countervailing arguments’ is likely to play an important role. The burden of proof for any such efficiencies would be on the transacting parties.

4 Practical implementation

This section introduces further recommendations on the specific practical considerations that seem required, should the recommended ex ante framework for reviewing proposed spectrum trades be put in place. More specifically, guidance is provided on the following:

- implications for licence conditions;
- the appropriate timeline for each phase of the assessment process;
- the information required from the parties to the trade for each phase of the assessment;
- under what circumstances, and what remedies could be imposed on cleared trades.

These practical considerations build on the above economic framework, and are further informed by case precedents.

4.1 Implications for licence conditions

4.1.1 Legal framework

As noted in section 1, many of the spectrum licences in Ireland have coverage and/or roll-out conditions, and the relevant question is how to deal with these licence conditions when some or all of the spectrum right of use is traded to another party.

The licence conditions could remain exclusively with the party that is trading some amount of its spectrum right of use (the original licensee), or could transfer to the recipient of the traded spectrum right of use (by means of the licence granted to recipient). Importantly, the framework presented here covers only trading of some part of a licensee's total spectrum right of use, less than the total. In the case of a merger that is being assessed by the Competition Authority, competition aspects of the merger are not assessed by ComReg. In other cases involving a spectrum trade including mergers, not being assessed by the Competition Authority, ComReg will conduct a competition assessment. The framework presented in this document relates to the latter cases.

Oxera understands that ComReg is obliged to ensure that conditions attached to the rights of use of spectrum should remain in force following a trade, and that ComReg considers this to mean that the original licensee's conditions would continue to be applicable. This arises from obligations set out in the Framework Regulations at Regulation 19(2) which states:

the Regulator shall ensure that the conditions attached to individual rights to use radio frequencies shall continue to apply after the transfer or lease, unless the Regulator specifies otherwise.⁶⁰

More specifically, where a party involved in a trade wishes to propose a change to the licence conditions attached to the original licence, either to remove or lessen conditions on it, and/or to transfer rights of use of spectrum with lessened conditions, this would have to be assessed by ComReg as a separate matter to the trade, in accordance with Regulation 15 of the Authorisation Regulations (on 'Amending of rights and obligations'), S.I. No. 335 of 2001.

It is also necessary to respect international obligations, whether these are bilateral with neighbouring countries (eg, the UK), regional (within the EU and CEPT), or international (within the ITU). It would be important that ComReg ensures that these international

⁶⁰ The European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011 (S.I. No. 333 of 2011).

obligations are incumbent upon all licence holders (ie, initial owners and any new owners following trades).

The European Commission Framework Directive 2009 Article 9b(1) states:

Conditions attached to individual rights to use radio frequencies shall continue to apply after the transfer or lease, unless otherwise specified by the competent national authority.⁶¹

This leaves scope for NRAs to determine how licence conditions are treated in the spectrum trading regime. Rights of use of spectrum are vested in wireless telegraph licences (which have licence conditions). Some conditions are specific to the rights of use of spectrum in the band (eg, harmonisation technical details); other conditions are specific to the wireless telegraphy licence and derive from its term (eg, coverage and roll-out, which are decided upon having regard to the term duration).

As an example of an alternative approach, Box 4.1 provides an instructive case example from the UK context.

Box 4.1 Transfer of licence conditions—an example from the UK

In the UK, Ofcom has highlighted that spectrum trades could result in a division of obligations, an overlap of obligations, or a combination of division and overlap. Ofcom refers to four types of transfer trade that highlight the possible scope for handling the transfer of condition.⁶²

- outright total, in which all the rights and obligations are transferred to a third party;
- outright partial, in which only some of the rights and obligations are transferred to a third party, and the rest remain with the original holder
- concurrent total, in which all the rights and obligations are transferred to a third party while continuing at the same time to apply to the original holder;
- concurrent partial, in which some of the rights and obligations are transferred to a third party, while at the same time also applying to the original holder, and the rest of the rights and obligations remain with the original holder.

Only the 'outright total' trade types, such as a merger trade that acquires all assets of the transferor, seem relevant to a regime that automatically transfers all obligations to the transferee. The remaining trade types may require case-by-case analysis of the competitive and technical effects of the proposed allocation of licence conditions.

Thus, given the legal framework in Ireland, the license conditions are assessed legally separately from the spectrum trading framework. The following economic and technical considerations would nevertheless be relevant should ComReg exercise its discretions with regards to license conditions.

4.1.2 Economic framework

From a policy perspective, ComReg may want to ensure that the current policy (eg, population coverage) as enshrined in license conditions is maintained after a trade. However, there are circumstances under which it may not be proportionate to apply exactly the same license conditions on the new license holder and, on the other hand, a trade may have no impact on meeting a licence condition if the existing licence holder has spare capacity. In any event, the decision on whether license conditions travel can have implications for the valuation of spectrum, and the assessment of distortion to competition. The assessment, therefore, of whether licence conditions could be altered as a result of a spectrum trade depends on the following factors, for example:

⁶¹ European Commission (2009), 'Directive 2009/140/EC of the European Parliament and of the Council', *Official Journal of the European Union*, L337, /37, November 25th.

⁶² Ofcom (2010), 'Simplifying spectrum trading: interim statement', April 15th, <http://stakeholders.ofcom.org.uk/binaries/consultations/simplify/statement/statement.pdf>, accessed on June 7th 2012.

- The spectrum trade may put policy objectives embedded in licences (such as coverage and quality requirements) at risk if licence conditions are not transferred, partly or entirely, to the recipient of the spectrum right of use.
- Strict compliance requirements imposed on the acquiring operator may make spectrum trades less commercially attractive, and thus prevent an otherwise welfare-enhancing trade from taking place. There is an argument that the market will fix this problem, as the stricter licence conditions could be reflected in the price paid for the spectrum right of use that is traded. However, by way of an example, relatively small new entrants could have completely different business models to larger, incumbent MNOs. A new entrant might wish to target a niche geographic part of the market, and, as such, it may not be feasible for it to roll out a large network so as to comply with the original licence coverage conditions with the acquired amount of spectrum (which may be limited). Such spectrum trades could nevertheless increase competition in parts of the market. As such, to prohibit them on the basis that all the conditions in the original licence must be mirrored in the recipient operator's licence may not seem reasonable, given the regulatory objective to promote the efficient use of spectrum and competition in the market. Furthermore, if the trading parties were to offer commitments over and above their existing licence conditions, this could lead to further benefits to consumers. Thus, there is merit in allowing the seller and the buyer to identify the most commercially efficient manner for the licence conditions to be met, for example, remaining with the seller, or some or all of the obligations passing to the buyer. The buyer and seller would inform ComReg of the allocation of the obligation pre-trade in its notification. ComReg could then pause the transfer process and consider such proposals on a case-by-case basis, such that licence conditions may not need to be transferred in full to the new operator in the case that a proposed amendment to the licence conditions accords with ComReg's regulatory objectives, and its statutory objectives, functions and duties.
- Following such assessment, and if the original rights of use of radio frequencies can be amended ComReg could consider whether such trade would distort competition in line with the framework set out herein, by re-starting the timelines.
- Oxera notes that ComReg may need to consider whether its decision on the transferability of the license conditions could give an unfair or excessive competitive (dis)advantage to one of the trading parties relative to other operators in the market. As discussed in sections 2 and 3, the competition assessment depends crucially on the implications a trade has on operators' cost structure and capacity, which in turn depend on what the licenses require in terms of quality of service and coverage. Thus, were ComReg to allow changes to license conditions (for the purchasing party), this would have implications for the assessment of 'distortion to competition'.
- Whether the traded spectrum right of use is liberalised (ie, what it can be used for), and how that is reflected in the licences post-trade, has further implications for the value of the spectrum right of use and the likelihood of trades occurring.
- ComReg charges annual spectrum usage fees for its licences (which specify the spectrum right of use) and the value of a spectrum right of use at the time of the trade could depend on whether the same spectrum usage fee would apply post-trade, or on the way in which the spectrum usage fee may be split between the trading parties (ie, between the original holder of the spectrum right of use and the recipient). This comment notwithstanding, it would not be appropriate that the level of the spectrum usage fee could change post-trade, since this could put competitors with the same type of spectrum at a disadvantage. The responsibility for paying the same level of spectrum usage fee to ComReg could be a factor in the commercial negotiations between buyer and seller, but the obligation to pay the original spectrum usage fee would need to be unchanged.

Thus, from an economic perspective, the removal of certain licence conditions of traded spectrum may encourage trading and allow small-scale operators to purchase spectrum rights of use for niche services, without necessarily having to comply with the possibly burdensome original licence conditions. The potential disadvantages of ComReg examining the transferability of licence conditions on a case-by-case basis are that there would be a degree of uncertainty as to how it would approach individual trades, and the removal of certain licence conditions could be distortive and affect other existing licensees.

There is also a need to address some of the technical issues that may result from spectrum trades, in particular where the trade could result in a change of use, as examined next.

4.1.3 Technical considerations

Most network operators design their networks to provide the requisite level of performance in the known interference environment—ie, by having due regard to the services occupying the radio frequency bands that lie adjacent to those in which they operate. If this interference environment changes, it can have a substantial impact on the performance of an operator's network. For example, when an operator introduces UMTS into a band alongside existing GSM services, the interference produced by the UMTS base stations and handsets is different to that produced by GSM devices. Even a change in the noise levels of 1dB (~10%) can have a significant impact on network performance and quality of service.

The framing of licences in a technology-neutral way can, to some extent, overcome this problem. In these cases, the definition of the interference environment is not technology-specific and should thus remain constant, regardless of any changes in use of the assigned spectrum. Nonetheless, it is feasible that a change of the user of the assigned spectrum, following a spectrum trade, could have knock-on effects for neighbouring licensees that are not involved in the trade, even if there is no change in technology.

Block-edge masks are intended to provide a means to define the interference environment for an operator by defining the amount of in- and out-of-band interference to expect, as well as the amount that can be caused. In general, these masks are a reasonable means of preventing or minimising interference. This does not mean that a spectrum trade in which technical licence requirements have been defined by block-edge masks will maintain the original pre-trade interference environment; rather, any new interference environment that is generated by the trade should be within predefined limits. If the recipient of the spectrum right of use operates a different technology to the seller, the interference environment can still change and this may affect operators in adjacent bands. Nevertheless, provided that the necessary band masks are complied with, any changes to the interference environment should be within predictable and expectable limits.

It is important that licences are framed so as to permit the associated spectrum right of use to be traded. Rights of use that are defined in terms of the location of transmitters (as has been the case historically with PMR licence, for example) are tradable only if the new operator wishes to operate from the same site as the previous owner. To enable trading, spectrum rights of use should be defined in more general terms, such as the geographic area over which the licence is applicable, instead of by reference to exact transmitter site(s). With national licences (and indeed with localised 3.6 GHz licences), this is the de facto position. It is unlikely that, within the RSPP bands, there would be any licences the parameters of which are not suited to enable trading. However, it is important to ensure that there are no restrictive licence conditions that may unduly prevent or restrict spectrum trading.

The spectrum rights to be traded need to be meaningful. This is to say, the new owners should be able to use the spectrum in a relatively flexible way. A licence that heavily restricts technology options (for example, by setting a block-edge mask that was suited to only a limited range of technologies) could allow for the assigned spectrum right of use to be traded. However, the new owner could only offer a similar, or near identical, service to that provided by the former owner; the new owner may not have the option of providing a new and distinct

service because it would be tied to certain technologies. Flexibility of use is therefore desirable in order to make spectrum rights of use meaningful.

4.2 Information requirements

As part of the framework, ComReg needs to consider the categories of information which notifying parties should have to provide, in order to enable it to assess the impact of the proposed spectrum trade on competition. Information requirements would need to be in line with the mechanisms and measures to assess 'distortion to competition', as explained above.

The following broad categories seem relevant for the assessment:

- information about the parties—names and addresses of the parties, details of the contact persons, nature of business and description of the companies;
- description of the trade—including a description of the parties to the transfer, the nature of the transfer, the specific spectrum blocks traded, and the rationale for the trade;
- details of the trade—details on the financial position of the parties (such as turnover). Amount and frequencies of spectrum that the notifying parties currently hold, and the amount of spectrum and frequencies that the parties' subsidiaries hold in Ireland;
- supporting documentation—most recent annual reports/records, any analysis undertaken on the effect of the trade, board papers which discuss the trade, communication between the parties regarding the trade;
- market definition—in the context of mergers, parties have to make a submission on what the relevant markets are. In this context, an explanation on what are the relevant downstream markets that the spectrum would be used for would be key;
- information on affected markets—an estimate of the size of the market, an estimate of the market shares of the parties to the trade as well as competitors, information on recent entry, any potential entry, cost of entry, comment on minimum efficient scale and minimum spectrum requirements for a viable business case;
- efficiencies—an explanation of how these would come about, quantification of efficiencies, and the extent to which consumers would benefit from them;
- investment plans—network investment plans in relation to the relevant spectrum bands;
- information on the options considered as strategic alternatives to the trade—information on increasing network capacity through the re-farming of existing spectrum to different technologies, or targeting network or customer equipment upgrades;
- capacity constraints—an explanation about the current and post-trade capacity utilisation with the appropriate technical information, taking into account different technologies (ie, different technologies will deliver different results in the same amount of spectrum).

Box 4.2 below summarises examples from other countries.

Box 4.2 Examples from other countries

Information requirements are specified in several other countries. For example, in Spain, both the trader and purchaser need to provide the following, among other pieces of information:

- a copy of the legal instrument;
- dates of the start of legal operation;
- accreditation documentation confirming the status of the operator for the new holder;
- the spectrum frequency and geographic details;
- the technical characteristics of the service and networks;
- a declaration stating that the previous holder has communicated the technical conditions of the rights of use of the spectrum to the new holder;
- a further declaration that the new holder assumes and recognises the responsibility and usage of the spectrum;

In the context of Verizon Wireless's proposed acquisition of spectrum from Spectrum Co and Cox, the FCC has required Verizon Wireless to provide it with considerable strategic, financial and trade-specific information, including:

- a list of all spectrum licences involved in the trade, with information on geographic market, the spectrum band, the amount of spectrum, and any measures of spectrum utilisation and capacity models previously undertaken;
- all plans, analyses, and reports relating to:
 - actual and projected annual growth rates, and traffic estimates;
 - current and projected capacity and bandwidth requirements;
 - the amount and type of spectrum needed to meet these requirements;
 - (spectrum) deployment strategies—ie, how the spectrum would be used;
 - the efficiencies that would be realised as a result of the trade.
- information on the options considered as strategic alternatives to the trade—eg, increasing network capacity through utilisation of existing spectrum, re-farming existing spectrum to different technologies, or targeting network or customer equipment upgrades.

Source: Federal Communications Commission (2012), 'Information and Discovery Request for Verizon Wireless', March 8th.

4.3 Timelines for assessment

Table 3.1 above showed the timeline within which competition authorities carry out their Phase 1 and 2 assessments. The time for the Phase 1 assessment ranges between 25 and 40 days; and for Phase 2 between 30 days and six months.

The timetable for spectrum trading assessment could be more streamlined, as only a subset of assets is being transferred (relative to a full merger or acquisition). Against this background there is a case to introduce measures that would shorten the Phase 1 assessment.

While the specific timelines are not an economic question, ComReg could adopt indicative timelines that are consistent with the existing four-month timeline for merger analyses (one month for Phase 1 and three more months for Phase 2).

Box 4.3 provides an instructive example in this respect.

Box 4.3 Federal Communications Commission's informal assessment timeline

Since 2000, the FCC has implemented an informal timeline for reviews of transfer of control applications, which targets completion of the review within 180 days of the public notice being issued. The timeline is flexible, with routine applications decided before the 180-day deadline, and scope for more complex applications to take longer. The timeline is intended 'to promote transparency and predictability in the Commission's process'.

While the Commission seeks to meet the 180-day benchmark, its statutory obligation is to determine that the relevant trade or acquisition is in the public interest. This obligation takes precedence over completion of the assessment within the informal timeline.

The timeline outlines the following approximate dates.

- Day 0—issuance of a public notice containing the general nature of the application, a list of the licences to be transferred, and an outline of the procedures to be followed.
- Days 1–30—period for public comments and petitions to deny the trade to be filed with the FCC.
- Day 45—responses to the petitions to deny and the public comments are due within 15 days of said petitions and comments being filed.
- Day 52—responses to the oppositions.
- Day 90—FCC issues initial information request.
- Days 52–180—analysis of record and discussions with parties.
- Day 180—FCC issues Order granting applications (potentially with conditions) or designating applications for hearing.

The Commission may 'stop the clock' (ie, suspend its informal timeline) 'when [its] ability to process and review the merits of an application is impeded by justifiable delay, the parties' actions, or external events'—eg, the applicants do not respond to a request for information within a stated time period, or significant new information is received which requires additional analysis.

Source: <http://www.fcc.gov/encyclopedia/informal-timeline-consideration-applications-transfers-or-assignments-licenses-or-autho>, accessed on May 31st 2012.

4.4 Remedies imposed on cleared trades

If a spectrum trade is likely to lead to a distortion of competition, ComReg may, following full and proper analysis, decide that the trade may not be put into effect. In some instances, however, the regulator or the trading parties may be able to propose remedies which would appropriately address the competitive distortions, such that the spectrum trade may be put into effect, but subject to such conditions as ComReg may specify and which the trading parties must comply with. The imposition of such remedies is common practice in merger reviews.⁶³

The design of remedies will typically differ on a case-by-case basis, but, broadly speaking, they should:

- ensure that pre-trade competition is preserved with as much certainty as possible;
- not incur significant administrative costs (eg, the remedies should not require ongoing monitoring and/or enforcement by ComReg);
- minimise any loss of efficiencies stemming from the trade;
- ensure that any divested assets are reallocated in the most efficient way (ie, to the party that values the assets the most); and⁶⁴
- ensure that cost savings and other benefits are passed on to final consumers for their benefit.

⁶³ See, for example, Motta, M., Polo, M. and Vasconcelos, H. (2002), 'Merger Remedies in the European Union: An Overview', February 17th; Davies, S. and Lyons, B. (2007), *Mergers and Merger Remedies in the EU: Assessing the Consequences for Competition*, UK: Edward Elgar.

⁶⁴ See, for example, Parker, R.G. and Balto, D.A. (2000), 'The Evolving Approach to Merger Remedies', Antitrust Report, May; Leveque, F. and Shelanski (eds) (2003), *Merger Remedies in American and European Union Competition Law*, Edward Elgar.

Remedies can be behavioural (eg, imposing some form of regulation on the way in which the party purchasing the spectrum right of use is allowed to use that right) or structural (eg, requiring a divestment to alter the market structure). Structural remedies have tended to be more frequently applied by competition authorities in merger cases, partly because they require less ongoing monitoring by the authority.

In the case of spectrum trading, a structural remedy would take the form of a divestment of some amount of a spectrum right of use (potentially of a different frequency) or other asset. Such a divestment formed one of the conditions of the European Commission's decision to clear the proposed joint venture between France Télécom and Deutsche Telekom in 2010 (see Box 4.4).

Box 4.4 T-Mobile/Orange 1800MHz spectrum divestments

In January 2010, France Télécom and Deutsche Telekom notified the European Commission of the establishment of a joint venture, Everything Everywhere, under the EC Merger Regulation. The Commission determined that, without remedies, there was a significant potential for the merger to give rise to a distortion of competition. The Commission:

identified serious doubts as to the merger's compatibility with the common market in relation to the wholesale and retail telecommunications markets over the next few years as a result of the 1800MHz band spectrum concentration deriving from the merger.⁶⁵

Consequently, France Télécom and Deutsche Telekom committed to divesting 2x10MHz of 1800MHz spectrum within 30 months of the completion of the 800MHz and 2.6GHz spectrum auction, and no later than September 30th; and a further 2x5MHz of 1800MHz spectrum by September 30th 2015.

The European Commission determined that the remedies submitted by the parties were 'sufficient to remove the serious doubts raised by the concentration' and therefore decided to clear the proposed joint venture.

Source: European Commission (2010), 'Regulation (EC) No 139/2004 Merger Procedure—Case No COMP/M.5650, T-Mobile/Orange', March 1st.

There are clear benefits from such an approach in terms of allowing flexibility to clear as many trades as possible. However, for the divestment to lead to a more efficient outcome, it might be necessary to ensure that the spectrum is reallocated efficiently and that any social costs of the divestment do not outweigh the efficiencies generated by the spectrum trade.

Although they are less common, competition authorities have also applied behavioural remedies to overcome competitive concerns in merger cases. Behavioural remedies have been imposed in instances where divestiture is not feasible or would not be proportionate to the distortion of competition.⁶⁶ Possible behavioural remedies in the context of spectrum trades could include the following.

- **Provisions for third-party access** (eg, network sharing or roaming agreements)—ComReg could require the spectrum purchaser to make a proportion of its spectrum available to third parties. The aim of such a remedy would be to facilitate market entry (which might otherwise be impeded) by ensuring that potential entrants are able to access the spectrum necessary to compete.
- **Coverage obligations**—ComReg could attach a minimum coverage or network build requirement to the spectrum licence conditions. This could ensure that the purchasing

⁶⁵ European Commission (2010), 'Regulation (EC) No 139/2004 Merger Procedure—Case No COMP/M.5650, T-Mobile/Orange', March 1st, p. 25, para 138.

⁶⁶ See, for example, Competition Commission (2004), 'A report on the proposed acquisition by FirstGroup plc of the Scottish Passenger Rail Franchise currently operated by ScotRail Railways Limited', June.

party uses the spectrum in a way that is beneficial to end-users, thereby alleviating competition concerns (see discussion on licence conditions above).

As well as addressing immediate distortions to competition, ex ante remedies could play a role in ensuring that spectrum trading does not result in the hoarding of spectrum rights of use.⁶⁷ Indeed, the EU Common Regulatory Framework provides that:

The Regulator may, having regard to its objectives under section 12 of the Act of 2002 and Regulation 16 and its functions under the Specific Regulations, lay down rules in order to prevent spectrum hoarding, in particular by setting out strict deadlines for the effective exploitation of the rights of use by the holder of rights and by withdrawing the rights of use in cases of non-compliance with the deadlines. Any rules laid down under this paragraph shall be applied in a proportionate, non-discriminatory and transparent manner.

Ex ante remedies may thus be appropriate if ComReg determines that a spectrum transfer (or possibly even a long-term lease) could result in hoarding (ie, if the recipient operator does not intend to use these rights). The analytical framework to assess whether a trade is likely to facilitate spectrum hoarding would require ComReg to examine:

- whether the purchasing party has excess capacity (taking into account current and future technologies);
- the likelihood that the purchasing party will use the spectrum in the future;
- the willingness to pay of potential and existing competitors;
- the likely impact on competition of the purchasing party withholding spectrum in the future.

Only if the main driver of the purchasing party's decision not to use, sell or lease the spectrum immediately is the likely impact of increasing competition could a regulatory intervention be warranted. As well as the coverage obligations and use-it-or-lose-it conditions introduced above, specific tools to prevent hoarding in the first place include the following.

- **'Use it or lose it' clauses**—ComReg could specify thresholds (in the form of licence conditions) for the amount of spectrum which must be used, or the date by which it must be used. Failure to meet the licence conditions could result in some form of penalty, for example, the licensee being required to surrender the unused spectrum.
- **Spectrum caps.** Directly limiting the quantity of spectrum that can be acquired could address the problem of hoarding. In the trading context, this may include the potential of forced disposals of spectrum or leases of rights. A spectrum cap may not be capable of distinguishing a trade that may merely increase efficiency from one that may harm competition. Where the original spectrum was obtained by auction, a cap may reduce the efficiency of the mechanism of revealed valuation.
- **Spectrum pricing—for example, administrative incentive pricing (AIP).** AIP is a charge that reflects the opportunity cost of holding spectrum. In theory, this could raise the cost of hoarding, although it may not be high enough to outweigh the potential pay-off of hoarding while not introducing other distortions. In Ireland there are recurring charges for spectrum (spectrum usage fees) which, in ComReg's view, in combination with any relevant upfront fees at award, provide equivalent incentives for efficient use of spectrum based on the principle of opportunity costs.⁶⁸

⁶⁷ Spectrum hoarding could be a concern if spectrum is not traded in situations where the current rights holder has excess capacity but is unwilling to sell this capacity to a willing buyer, or where the holder is otherwise not using its spectrum allocation efficiently.

⁶⁸ See ComReg (2005), 'Review of fees applicable to Rights of Use for Radio Frequencies', consultation document no. 05/58, July 28th; and ComReg (2010), '800 MHz, 900 MHz & 1800 MHz spectrum release', consultation document no. 10/71, September 17th.

- **Downstream remedies**—ex ante intervention in downstream markets, such as access obligations to allow MVNOs to use the network, or via mandated national roaming on fair and reasonable terms.
- **Applying penalties.** The option of imposing financial penalties is only available to ComReg through the courts. It also has the option of withdrawing the rights of use to pre-empt inefficient hoarding.

4.5 Ex post monitoring

ComReg could also consider implementing a framework that would combine an ex ante ‘trade control’ process with ex post monitoring. Such retrospective monitoring would involve clearly defined rules as to the circumstances in which ComReg could intervene and possibly revoke, or adjust the conditions of, a trade that it had already approved, and which had occurred.

Such monitoring schemes are a common feature of ex ante regulation across sectors. For example, the EU Regulatory Framework for electronic communications builds on periodical reviews where regulators can revise the regulatory regime if market circumstances warrant it. Periodical reviews are also a common feature in utility sectors with respect to investment (CAPEX) allowances and pricing. In principle, introducing an ex post monitoring scheme on approved trades would build on a rationale similar to other forms of regulation—ComReg might observe that distortions to competition were underestimated at the time of the initial ex ante review and an intervention at a later stage could be warranted.

While such an ex post monitoring system could serve as a ‘safeguard’ mechanism to preserve competition, it may not be appropriate to introduce it as part of the framework for trades. This is because:

- the possibility of an ex post intervention could distort trades ex ante by increasing uncertainty (which is one of the main reasons why an ex ante framework is recommended in the first place—see section 2.1);
- if competition concerns were to emerge, there are other ways to intervene, possibly through SMP regulation, or through competition powers;⁶⁹
- one of the objectives here is to design a framework that minimises the regulatory burden to the extent possible. Introducing both an ex ante and an ex post monitoring system might not be consistent with this objective.

⁶⁹ Although it is noted that access to mobile networks and call origination is no longer part of the Commission’s recommendation on markets that are susceptible to ex ante regulation.

5 Hypothetical scenarios

To illustrate how the above ex ante framework would work in practice, hypothetical scenarios have been developed. These scenarios have been designed as realistic spectrum holdings and trades that could take place—that said, they are not based on the current spectrum allocations and should be interpreted as hypothetical examples. Thus, for the avoidance of doubt, they have no connection to the Irish market. More specifically, the scenarios presented below aim to illustrate:

- different amounts of spectrum traded, concentration of spectrum post-transaction and their implications for the threshold of intervention;
- high-level descriptions of analysis undertaken to assess ‘distortion to competition’;
- the distinction between requirements for a Phase 1 and Phase 2 trade;
- implications for licence conditions, and remedies and conditions imposed on transacting parties.

Figure 5.1 presents a purely hypothetical baseline spectrum allocation, which sets the basis for the scenarios.

Figure 5.1 Baseline scenario



Source: Oxera and Helios.

Three scenarios that in some way modify holdings are presented below.

5.1 Scenario 1: small trade to correct an anomaly

Scenario 1, shown in Figure 5.2, would reflect a simple consolidation of spectrum by an operator.

Figure 5.2 Scenario 1



Source: Oxera and Helios.

In this scenario, one of the operators wishes to improve contiguousness by swapping a channel. One operator receives a benefit in terms of technical efficiency, the other is left largely unaffected, and the trade takes place without any financial trade.

Notification—de minimis

All trades are notified to ComReg according to the framework proposed by Oxera. As reasoned in this report (section 3), even small changes in spectrum holdings can cause interference issues, and should hence be notified to ComReg.

Analysis of distortion to competition—Phase 1

ComReg may conclude that none of the factors assessed in Phase 1 (those listed in section 3.5) would give rise to concerns of distortion to competition. ComReg would have the flexibility to reach this conclusion without a burdensome information collection process, or indeed detailed economic analysis.

Conclusions and remedies

In this case, the trade is cleared immediately without remedies or implications for licence conditions. The operators need to ensure that they will comply with the technical quality requirements.

5.2 Scenario 2: new entrant buying spectrum

Scenario 2, shown in Figure 5.3, illustrates a trade where a new entrant company buys spectrum from Incumbents 1 and 2 (specifically, Entrant 4 purchasing spectrum from Incumbents 1 and 2). There are two variants of this scenario:

- a sub-scenario where the entrant is an existing network operator (eg, has registered as a telecoms operator and may have relevant operations in other countries);
- a sub-scenario where the buyer does not have any telecoms-related activities and is explicitly planning to purchase the spectrum and lease it onwards.

These variants are referred to as Scenarios 2a and 2b, respectively.

Figure 5.3 Scenario 2



Source: Oxera and Helios.

Scenario 2a

Notification—de minimis

All spectrum trades are notified and ComReg would consequently proceed to Phase 1 analysis.

Analysis of distortion to competition—Phase 1

ComReg would request information from the transacting parties (a) to understand why the seller is willing to engage in the trade, given its capacity requirements; and (b) to examine the business plan of the entrant purchasing the spectrum bands.

Having gained knowledge on the rationale of the parties and the credibility of the purchaser to actually use the spectrum to gain market share in the downstream market, ComReg would undertake a (predominantly qualitative) assessment of the competition implications.

ComReg’s assessment would follow the principles set out in section 3.5, ie, assess the impact of trade in terms of:

- concentration of spectrum holdings;
- incentives to increase prices post-trade owing to unilateral effects;
- incentives to coordinate;
- barriers to entry;
- efficiencies arising from the trade.

In this case, the trade would result in a more fragmented market structure. Post-trade, Incumbent 2 would hold a broadly symmetrical amount of spectrum with Incumbent 1, and hence unilateral market power seems unlikely. The fragmented market structure would be unlikely to give rise to coordinated effects either—the emergence of a new entrant with a likely aggressive pricing strategy would further undermine any collusion. Furthermore, the trade would not result in increased barriers to entry, on the contrary a new entrant would enter the market as a network operator. This pro-competitive impact may be reinforced by the fact that, going forward, virtual operators could arguably have more choice in the wholesale market for MVNO access.

Consumers would be expected to benefit from these developments.

Conclusion and remedies

Thus the trade would be cleared in Phase 1, based on a relatively straightforward analysis. No additional remedies would be required.

If ComReg were to require licence conditions to be met also by the receiver, the new entrant would have to comply with the coverage and other requirements specified in the licence. It would not seem proportionate to require that these conditions are met in the same timeframe as was required from the incumbent, and hence an appropriate timeline for network roll-out would need to be determined by ComReg. This is an example of a trade where discretion to consider the implications the trade has on licence conditions would be relevant.

Scenario 2b

Notification—de minimis

All spectrum trades are notified and ComReg would consequently proceed to Phase 1 analysis.

Analysis of distortion to competition—Phase 1

The assessment of distortion to competition would require a different approach because the purchasing party would not be an operator. First, ComReg would need to request information on the acquirer's intentions after the trade. In particular, the competition implications would depend on whether the acquirer has agreed to lease the acquired spectrum to a new third party in which case the implications could be similar to those identified in Scenario 2a.

In this scenario, the selling parties would both be incumbent operators (Incumbents 1 and 2). Thus it would be expected that the spectrum would be leased to one of the entrants, even if not the completely new entrant (Entrant 4). This would result in more fragmented spectrum holdings.

If an agreement about a lease existed, but the acquirer's intention were to lease the spectrum to the other incumbent licence holder (in this example, Incumbent 2), Incumbent 2 would become the largest spectrum holder of both 900MHz and 1800MHz bands, and would achieve 2 x 40MHz contiguous spectrum in the 1800MHz band. Consequently, there would be a case to proceed to Phase 2 and the analysis would follow the steps of the Scenario 3 below.

If the purchaser did not have an agreement to lease the spectrum in place, ComReg could be concerned about inefficient spectrum hoarding. Indeed, a potential concern is that the spectrum is purchased for speculative purposes with an aim to resell it at a higher price later. Given ComReg's objectives to promote efficient use of spectrum and competition in the Irish market, it may not be appropriate to approve such speculative trading of critical IMT/UMTS spectrum blocks. ComReg could still allow the trade, but impose strict use-it-or-lose it requirements and maintain the licence conditions and the associated coverage and quality of service requirements.

Conclusion and remedies

ComReg's conclusions may depend on how the spectrum would be used after the trade in the way described above. Understanding the intentions of the non-operator purchaser would thus be critical in this assessment.

5.3 Scenario 3: large operator buying up the spectrum of a weaker operator

Figure 5.4 shows how in Scenario 3 a large operator (Incumbent 1) purchases spectrum from a small operator (Entrant 1) and becomes the largest licence holder in both the 800MHz and 1800MHz bands. Correspondingly, Entrant 1 is left with the smallest holding.

Figure 5.4 Scenario 3



Source: Oxera and Helios.

De minimis

Significant amount of spectrum is traded and the de minimis thresholds are clearly met.

Analysis of distortion to competition—Phase 1

Incumbent 1 is already the largest holder of 900MHz spectrum, and would be the most significant holder of 800MHz and 1800MHz bands post-trade. ComReg would need to assess the implications that this increased concentration could have on the existing downstream markets. In the current generation (3G) services, Incumbent 1 would gain significantly from the acquisition of 1800MHz spectrum in terms of capacity and, over a longer time horizon, lower-density cell network and hence lower unit costs.

In Phase 1 ComReg would request information from Incumbent 1 on its investment appraisal, which should reveal the cost/capacity benefits the operator seeks to achieve.

Entrant 1's position would become constrained. ComReg's market data would, in this hypothetical case, indicate that the company has been gaining market share rapidly over recent years, and is already operating at an efficient scale. The company's growth potential, and therefore its disruptive role in the market, could be undermined as a result of the trade. In other words, by reducing its spectrum holdings, Entrant 1 would not have as strong incentives to cut prices (or otherwise compete to gain market shares) as increasing capacity (to cope with increased traffic) would be more costly with less spectrum.

Given this analysis (which in the real situation would be substantiated further), there are strong reasons to refer the trade to Phase 2.

Analysis of distortion to competition—Phase 2

ComReg would request further information at this stage from the transacting parties and possibly from other market players (although, as in merger cases, third parties would be likely to intervene and submit evidence voluntarily). While a high-level assessment of concentration would have already been undertaken in Phase 1, in Phase 2 ComReg would need further evidence from the transacting parties. In line with section 2, the parties would be required to provide further evidence on the implications that the trade would have on the costs and capacity over time. The investment appraisal underlying the trade would be informative in this respect.

ComReg may, however, decide to undertake further economic analysis to assess the extent to which cost advantages would translate into price changes and further to changes in market structure in the longer term.

As established in section 2, there is a degree of uncertainty surrounding the use of spectrum in the future. In addition to the implications for cost structures with current (3G) technology, ComReg would need to assess whether Incumbent 1's enhanced position with respect to almost all relevant LTE bands would give it an undue competitive advantage that would result in distortion to competition in the longer term. In this case, Incumbent 1 would not become the sole provider of LTE services, but the LTE spectrum would be almost entirely in the hands of the two biggest operators, which could give rise to coordinated effects.

Conclusions and remedies

Should ComReg's analysis (informed by the evidence submitted by transacting and intervening parties) suggest that competition could be distorted, ComReg could either block the trade or clear it with remedies.

Appropriate remedies imposed on Incumbent 1 could be to impose strict use-it-or-lose-it requirements to avoid inefficient accumulation of spectrum that could be used in a more pro-competitive manner by Entrant 1. If there was significant evidence to suggest that the increased concentration would indeed result in a significantly stronger position for Incumbent 1 in the downstream market, there could be a case to require Incumbent 1 to divest some of its other spectrum (eg, to create a more balanced allocation of 900MHz spectrum).

Incumbent 1 would have the same licence conditions as the original licence holder.

A1 Summary of case studies

The review of case studies focuses on the key issues that are relevant to inform the report and ComReg's consultation, and are based on information that is publicly available. The case studies are summarised in this appendix in terms of key characteristics that are relevant for ComReg—where relevant, the insights have been referred to in different parts of the main body of this report.

A1.1 Spectrum trading regimes in other countries

Case studies of spectrum trading regimes were undertaken to examine lessons from the experience in other countries. In addition to publicly available literature, Oxera and Helios reviewed cross-country survey results provided to ComReg. Countries were selected according to their relevance to the regulatory and legal framework in Ireland and the significance of their trading experience.

The case studies explore the critical aspects of individual NRA spectrum rights authorisation regimes that influence the market outcomes of trades and mitigate hoarding, such as:

- the level of aggregation (allocation, allotment, geo) of spectrum rights and trades (full, partial);
- the dimensions and parameters relevant to trading: frequency, (geo)spatial and duration;
- transfer of obligations;
- the retroactive application of trading authorisation to 'primary' spectrum allocation;
- the approval process and any specific rules (disclosure, duration, consultation, trade costs);
- clarity of property rights definitions in general.

Australia and New Zealand are considered 'pioneers' in spectrum trading, as both have had spectrum trading regimes in place for a relatively long time, although a limited number of significant trades have actually taken place.⁷⁰ The main lessons from these case studies relate to the factors hindering spectrum trading (even if legally possible) and how, if at all, regulators and governments have sought to resolve this problem.

The UK began spectrum trading in 2004, and has been a leader of spectrum liberalisation in Europe.⁷¹ The focus of the early reforms was on removing usage restrictions (ie, technology or service) and establishing a robust definition of users' rights. Following a 2011 consultation on spectrum trading, the Wireless Telegraphy Act was modified to allow certain spectrum to be traded without ex ante authorisation, and to assess competition effects for spectrum relating to public wireless networks (PWN) only.⁷² The modifications also define spectrum leasing, although it is uncertain whether leasing will apply to publicly auctioned 1800MHz and 2100MHz mobile spectrum. Ofcom has highlighted spectrum hoarding as a potential concern and has defined specific remedies (eg, AIP) as part of the trading framework.⁷³

⁷⁰ Analysys Consulting, DotEcon and Hogan & Hartson LLP (2004), 'Study on conditions and options in introducing secondary trading of radio spectrum in the European Community', report for European Commission, May.

⁷¹ London Economics (2008), 'Economic Impacts of Increased Flexibility and Liberalisation in European Spectrum Management', report for a group of European communications sector companies, April.

⁷² Ofcom (2011), 'Statement on proposal to make 900 MHz, 1800 MHz and 2100 MHz public wireless network licences tradable', statement, June 20th.

⁷³ Ofcom has promoted market-based schemes and trading for some time. See, for example, Ofcom (2004), 'Spectrum Framework Review', November; or, more recently, Ofcom (2006), 'Digital Dividend Review', December; and Ofcom (2011), 'Trading Guidance Notes', December.

Austria. Similar to the UK, Austria complies with the relevant EU Directives. The Austrian Telecommunications Act 2003 addresses some aspects of spectrum trading that could be instructive for the Irish context. The removal of an initial proposal binding trading to future allocations opens the possibility of trading on GSM and UMTS spectrum allocations retroactively.⁷⁴ This may be instructive in the Irish context with respect to IMT spectrum. The Austrian case does not explicitly provide for the transfer of obligations, but is likely to imply that primary allocation conditions are passed to the acquiring party. Furthermore the reform made clear what aspects are subject to trade, with explicit reference to usage rights rather than property ownership.

The **German** reform of 2003 highlights the role of the specific implementation rules: a lengthy consultation process prior to the release of spectrum designated as eligible for trading may be a barrier to the formation of a secondary market.⁷⁵

In **Italy**, the assessment procedure seems to differ if the frequency band is considered to be in 'limited quantity'. 'Limited' is not defined, but includes TV and radio broadcasting spectrum. For 'limited' spectrum, notice is given to the Minister for Communications and AGCOM and the Minister has the authority to approve the trade. Other spectrum may be traded as part of general authorisation and the Minister has 60 days to decide on transfer. The Minister consults the competition authority (AGCM) on competition issues, while AGCOM assesses technical matters.⁷⁶

In **Spain** there are detailed information requirements in place for transferor and transferee, covering the legal instruments, proof and status of existing licences, technical parameters and declaration of responsibilities. The spectrum management authority also monitors the prices of trades. Remedies include the ability to implement licence conditions in the case of failure, in the event of interference, or if the original licence (holder) is revoked.⁷⁷

In **Sweden** the trading framework permits spectrum leasing, although this is not distinct from transfers in the process. Spectrum efficiency is considered on case-by-case basis and there is an objective to limit excessive fragmentation of holdings. The market definition includes a proviso that assessments should be service-neutral. Market shares may be considered in the analysis, as well as the number of players, their holdings in the same band and their ability to compete. The assessment considers the substitutability between different types of spectrum and the quality of spectrum. The remedies available to the authority are spectrum caps⁷⁸ and the ability to issue new or amended licence conditions.⁷⁹

Overall, the case studies show a paucity of well-defined ex ante spectrum trading authorisation frameworks in comparator countries. In general, competition assessments are either not clearly defined or defer to a more general competition authority framework. Other than the USA, there is no implementation of a clear de minimis threshold for assessment. There is variety in the remit of the comparator country NRAs to apply remedies to trades, although most are able to reject or approve trades subject to some conditions. Technical implementation seems dependent on the specific legal⁸⁰ and regulatory regime⁸¹ for spectrum management. Perhaps due to the relatively recent implementation of spectrum trading reforms, there have been only a limited volume and scope of trades.

⁷⁴ Lichtenberger (2003), 'Spectrum trading in Germany, Austria and the UK', ITS Conference paper, August 23rd.

⁷⁵ Ibid.

⁷⁶ Information provided by ComReg.

⁷⁷ Ibid.

⁷⁸ Spectrum caps appear to be possible following an auction.

⁷⁹ Information provided by ComReg.

⁸⁰ In Italy, for example, the Minister for Communications approves transfers.

⁸¹ New Zealand has a management rights hierarchy; Australia has three types of licence with differing trading rules.

Table A1.1 below presents an overview of the spectrum trading practices in the selected countries. The Member States excluded from the table do not have explicit regimes implemented, or limited information is available in the public domain.

Table A1.1 Case study table

Country	Entity responsible for competition assessment	De minimis rule	Phases	Market definition	Competition test	Remedies	Implementation (notification, timeframe)	Ex post surveillance
Austria	SMA (RTR)	None	One	Not defined	Adverse effects on competition, not defined by legislation or case	Case: disposals		SMA responsible; competition law mechanisms
Germany	SMA (BNetzA)	n/a	n/a	No case law	Competition is not negatively affected Test is not further defined by legislation or precedent	Can approve subject to conditions. Not defined	Notification may not be required for bands already opened for trade (untested)	Competition authority responsible
France	SMA (ARCEP)	None	One	Not defined	Impediment of effective competition for access and use of spectrum. Not defined	SMA can refuse; remedies are remit of competition authority	Separate notification procedures for non-auctioned (ie, case-by-case-assigned) spectrum	No case law
Italy	Competition authority (AGCM)	None	Two, based on 90-day clock stop	n/a	n/a	Minister can reject or approve subject to conditions	Assessment procedure differs if frequency band is considered in 'limited quantity'. 'Limited' is not defined, but seems to include TV and radio broadcasting	None
The Netherlands	n/a. Minister, not SMA, approves trades	n/a	Not defined	Not defined	Not defined	Spectrum use and frequency plan conditions	n/a	Licence can be revoked if general conditions not met
Portugal	Competition authority (PCA)	n/a	Two, based on 45-day clock stop	Not defined	No distortion to competition specifically via accumulation of rights	Disposals	SMA (ANACOM) requests prior opinion of PCA	None

Country	Entity responsible for competition assessment	De minimis rule	Phases	Market definition	Competition test	Remedies	Implementation (notification, timeframe)	Ex post surveillance
Spain	n/a	n/a	n/a	n/a	Restriction of competition. Not defined	Revocation	Prices of trades are monitored	Authorisation can be revoked in case of failure to implement conditions, interference or if the original licence (holder) is revoked
Sweden	SMA (PTS)	None	One	Geographic and product types. Includes substitutability assessment, technology-neutral	Adverse impact on competition, refers to Swedish Competition Act for definition	Remedies permitted, but not defined. PTS suggests parties may consider transfers/disposals if rejection is possible	Assessment is mandatory. Fragmentation of spectrum is considered	Cannot revoke trade
USA	Federal Communications Commission (FCC)	Immediate approval procedures in place for leases that meet certain criteria (Form 608)	Not defined	Geographic (734 predefined cellular market areas) and product types	Applicants bear the burden of proving that the 'public interest, convenience, and necessity will be served' by the trade	Can approve subject to conditions. Not defined	Decision within 21 days for most leases or transfers. 180-day informal timeframe for complex cases	FCC
Australia	Competition authority (ACCC)	n/a	ACCC uses a two-stage process. Notification, statement of issues, further assessment	Geographic and product types	Significant reduction in competition	ACMA can: a) vary a spectrum licence by specifying in it as the licensee a different person from the person currently specified; b) vary the conditions of a spectrum licence by: (i) including one or more further conditions, or (ii) revoking or varying any conditions; c) issue one or more new spectrum licences; d) cancel one or more existing spectrum licences	Notification to ACMA required for spectrum trading. Fragmentation of spectrum is considered. Trades cannot consist of less than a 'standard trading unit'. Cannot trade if resulting allocation is less than a specified contiguous unit	Suspension or revocation

Country	Entity responsible for competition assessment	De minimis rule	Phases	Market definition	Competition test	Remedies	Implementation (notification, timeframe)	Ex post surveillance
New Zealand	Competition Authority (Commerce Commission)	None	One stage	Geographical and functional	A substantial lessening of competition test and/or misuse of dominant position	Competition authority responsible	Ten-day turnaround from notification, or timeframe that applicant agrees on. Analysis seems to be able to account for quality differences in spectrum (ie, <1GHz)	Competition authority responsible

Source: Based on information provided by ComReg.

A1.2 Other relevant case studies

In addition to looking at the implementation of spectrum trading regimes across EU and non-EU jurisdictions, there are valuable insights from competition and merger reviews where issues surrounding spectrum allocations have played an important role in the competition authority's analysis and determinations. The following case studies have been identified as being particularly relevant.

- **AT&T/T-Mobile—relevant since a considerable emphasis was placed on spectrum concentration.** In 2011, the FCC rejected a proposed horizontal merger between AT&T and T-Mobile, the second- and fourth-largest nationwide mobile operators respectively. In the justification of its decision, the FCC argued that the proposed merger would result in a significant lessening of competition in mobile wireless markets as a result of unilateral and coordinated effects. Emphasis was placed on market and spectrum concentration and specifically that:

the elimination of a firm that acts as a disruptive force in a highly concentrated market raises the likelihood of anticompetitive conduct

and that the merger:

would result in an increase in both subscriber and spectrum concentration unprecedented in its scale.⁸²

While the FCC acknowledged that concentration measures alone are not sufficient to determine a lessening of competition, it argued that they indicated the size and scope of the potential decline of competition. In measuring spectrum concentration, the FCC referred to its 'spectrum screen'. It found that the proposed merger triggered 'an unprecedented 274 CMAs...or 66 percent of the US population', and exceeded the screen by a significant amount (15MHz) on average.⁸³

- **Orange/T-Mobile.** In January 2010, France Télécom and Deutsche Telekom notified the European Commission of the establishment of a joint venture, Everything Everywhere. In assessing the merger, the Commission focused on the quantity (bandwidth), quality (propagation characteristics) and contiguity of the spectrum held by the joint venture in the context of deploying 4G mobile networks. The post-trade entity's 2 x 60MHz allocation was over 80% of the 2G, 1800GHz spectrum in total.⁸⁴ The Commission determined that, without remedies, there was a significant potential for the merger to give rise to a distortion of competition owing to the resulting spectrum concentration.

Consequently, France Télécom and Deutsche Telekom made commitments to divest 2x10MHz of 1800MHz spectrum within 30 months of the completion of the 800MHz and 2.6GHz spectrum auction, and no later than September 30th; and a further 2x5MHz of 1800MHz spectrum by September 30th 2015. The Commission determined that the remedies submitted by the parties were 'sufficient to remove the serious doubts raised by the concentration' and therefore decided to clear the proposed joint venture.

- **Ofcom's analysis of authorising LTE and WiMax use as part of Everything Everywhere's 1800MHz spectrum licences.** Following the Commission's decision to allow the joint venture between France Télécom and Deutsche Telekom, Ofcom looked into whether to amend the 1800MHz spectrum licences held by Everything Everywhere

⁸² Federal Communications Commission (2011), 'Staff analysis and findings in the Matter of Applications of AT&T Inc. and Deutsche Telekom AG for Consent to Assign or Transfer Control of Licences and Authorizations', 11-1955, November 29th.

⁸³ *ibid.*, p. 24, paras 46–7.

⁸⁴ European Commission (March 1st 2010), Case No COMP/M.5650- T-Mobile/Orange, 'Regulation (EC) No 139/2004 Merger Procedure', Article 6(1)(b) in conjunction with Art 6(2).

to authorise LTE and WiMAX use. Ofcom followed three steps in its assessment of the impact of such an amendment: it considered whether consumers and citizens would accrue benefits from the provision of LTE and WiMAX technologies; having established that LTE delivers benefits, it considered whether the amendment to the licence would give rise to a material risk of distortion of competition; and, if a material risk of distortion of competition were identified, Ofcom would determine whether remedies could be introduced to address the competitive distortion.

Ofcom first determined that an operator holding a combination of 800MHz and 2.6GHz spectrum would be able to compete with an operator holding 1800MHz spectrum in launching LTE services in future.⁸⁵ Subsequent analysis of distortion of competition focused on whether Everything Everywhere would benefit from a 'first mover' advantage, by having early access to LTE as a result of the amendment. Ofcom also looked at whether technical advantages associated with owning spectrum suitable for LTE grant significant commercial advantages, and whether such advantages accrue over a significant period of time. Ofcom provisionally concluded that there is no material risk of distortion of competition from Everything Everywhere's use of 1800MHz to deploy LTE and WiMAX technologies. In particular, this related to the fact that the advantages would not be accrued over a significant period of time, since winners of 800MHz and 2.6GHz spectrum in forthcoming auctions would be able to compete with Everything Everywhere.

- **The proposed deal between Verizon and SpectrumCo LLC for advanced wireless systems (AWS).** The FCC is currently investigating a proposed deal between Verizon and SpectrumCo LLC for AWS spectrum, which combines a spectrum transfer with a cross-selling agreement. Under such an agreement, Verizon and the cable companies transferring it spectrum would sell one another's products and the cable companies would, over time, acquire the option to sell Verizon's service on a wholesale basis. Distortion to competition could occur if these bundled offers were to restrict consumer choice or constitute a barrier to entry in adjacent markets. Spectrum trades conditional on horizontal agreements could add a further dimension of complexity in assessing the impacts on competition.

As part of its review, the FCC has implemented an informal timeline, which targets completion of the review within 180 days of public notice being issued. The timeline is intended 'to promote transparency and predictability in the Commission's process', but the Commission's statutory obligation to determine that the relevant trade or acquisition is in the public interest takes precedence over completion of the assessment within the informal timeline. The FCC chose to 'stop the clock' on the review, extending the review period by 21 days, owing to delays in receiving information requested from the parties.⁸⁶

- **Ofcom 900MHz.**⁸⁷ Ofcom consulted on the appropriate method for adopting the Radio Spectrum Committee Decision (the RSC Decision) in relation to the 900MHz and the 1800MHz bands. The RSC Decision implied the liberalisation of this spectrum for use in 3G and potentially other technologies. According to Ofcom's analysis, the greatest competition, efficiency and innovation benefits would have been likely to arise from securing a wider distribution of 900MHz spectrum, which was in the hands of only two MNOs (O2 and Vodafone). These benefits are largely derived from the cost savings that other operators (Orange, T-Mobile and H3G) can achieve from deploying a 3G network capable of providing high-quality mobile broadband services using 900MHz spectrum instead of through their existing holdings of 1800MHz and/or 2.1GHz spectrum.

⁸⁵ 800MHz and 2.6GHz spectrum is to be auctioned and will be ready for use throughout most of the UK by the end of 2013.

⁸⁶ Federal Communications Commission (2012), 'Letter Resetting 180-Day Clock', May 1st.

⁸⁷ Ofcom (2007), 'Application of Spectrum Liberalisation and Trading of the Mobile Sector', September.

In Ofcom's view, the mandatory release of two or three 2 x 5MHz blocks of 900MHz spectrum would have been required to achieve these benefits since market mechanisms alone cannot be relied upon to redistribute the spectrum away from O2 and Vodafone towards Orange, T-Mobile and/or H3G. This re-farming of spectrum was not implemented, but the process involved extensive economic analysis on the competitive implications of spectrum allocations.

- **Ofcom auction rules and spectrum caps.** In March 2011, Ofcom held a consultation on the auction process for 800MHz and 2.6GHz spectrum for mobile wireless services. Ofcom was concerned that, because of the existing concentration of spectrum, the smallest MNO (Hutchison 3G UK) would be unable to win sufficient allocation to deliver credible 4G wireless services. This threatened Ofcom's objective of maintaining a minimum of four national MNOs. Proposed remedies involved specific conditions in the auction process. The proposal included spectrum caps defined by allocation quantity (total and sub 1GHz separately) and the use of a reserved allocation for which any competitors except the three largest MNOs could bid. Further spectrum packaging proposals sought to deal with competition, technical and coverage constraints.

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