BERMUDA REGULATORY AUTHORITY

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ECA Section 78 Transitional Spectrum Investigation: Logic Communications Limited ("Logic")

Final Decision and Order

Final Decision and Order
Matter: SC-1222-2013
Date: 23 December 2014

Contents

NON-CONFIDENTIAL VERSION

A. INTRODUCTION AND BACKGROUND

1 Scope of this final decision and order

1. The Regulatory Authority (the "Authority" or "RA") hereby issues its Final Decision and Order pursuant to Section 78 of the Electronic Communications Act 2011 (the "ECA") concluding its investigation of the radio frequency spectrum provisionally licensed to Logic Communications Limited ("Logic") in association with the grant of Logic's Integrated Communications Operating Licence ("ICOL") on 29 April 2013. This Final Decision and Order relates to the Authority's investigation of Logic's spectrum assignments only. It addresses the evidence obtained during the Authority's investigation and is made subsequent to the comprehensive (non-confidential) Draft Final Decision and Order (the "Draft Decision")[1] that was published by the Authority on its website on 15 October 2014.

2. The relevant sections of the ECA that give rise to this investigation are set out in the Act's Transitional Provisions (Part 12). They constitute one of a series of measures that the RA was required to undertake in order to implement the new regulatory framework for electronic communications established by the ECA. Pursuant to ECA Section 73(2)(c)(i), the spectrum licences awarded to ICOL holders at the time of the initial grant were required to reflect each licence holder's spectrum assignments as at the date of commencement of the ECA. This same provision of the ECA specifies that each transitional spectrum licence should have a duration of 18 months, corresponding to the time period anticipated for the RA's transitional investigation of spectrum efficiency pursuant to ECA Section 78.

3. In combination, these transitional provisions of the ECA were meant to give the Authority sufficient time to examine the radio frequencies that had been made available to licensees on an essentially *ad hoc* basis under the Telecommunications Act 1986, in order to ensure that the spectrum assigned prior to the commencement of the ECA is not being used inefficiently. The transitional spectrum licences granted by the Authority to each of the relevant ICOL holders pursuant to ECA Section 73(2)(c) mirror the requirements of the ECA in relation to the conduct of this spectrum investigation. For example, Condition 7.4 of the transitional spectrum licences requires the licensee to cooperate fully with the Authority in the ECA Section 78 investigation, and to provide a detailed assessment of its spectrum usage in a format prescribed by the Authority no later than 6 months following grant of the spectrum licence.

4. As discussed in Section A.4 below, the "efficient use of spectrum" – which encompasses both economic and technical efficiency – is one of several objectives of spectrum management enumerated in Part 7 of the ECA (Section 37(1)(b)), which concerns the use of radio spectrum generally. "Efficient use" is a priority for spectrum policy makers and regulators not only in Bermuda but around the world for reasons that are highlighted in the ECA at Section 35(1). That provision recognizes "the importance of radio spectrum as a scarce national resource and a public good of social, cultural and economic value."

[1] In order to provide an overview of the preliminary results of its investigation to all interested stakeholders, the Authority published on its website a non-confidential version of the Draft Decision covering the Authority's investigation of all relevant ICOL holders. In addition to Logic, these include: Bermuda Digital Communications Limited ("BDC"), Digital Broadband Limited ("BDB") and Telecommunications (Bermuda & West Indies) Limited ("Digicel"), which are the subject of separate decisions by the Authority following the conclusion of its investigation. The spectrum assigned to World on Wireless Ltd. ("WOW") in the 700 MHz band is being dealt with in a separate proceeding to consider a proposal made by WOW to relinquish this spectrum. See: World on Wireless 700 MHz Spectrum Migration Proposal, Matter: SC-1501/2014, 31 January 2014.

5. Although ECA Section 37 identifies a number of spectrum management objectives, the focus of ECA Section 78 (a transitional provision set out in Part 12 of the ECA) is to ensure that appropriate measures are taken if the Authority concludes that spectrum awarded prior to the ECA's commencement is not being utilised inefficiently. The limited purpose of Section 78 is confirmed by ECA Section 72, which provides that the transitional provisions of Part 12 "apply notwithstanding any contrary provisions" in the ECA or the Regulatory Authority Act 2011 ("RAA").

6. In order to ensure the efficient use of spectrum that was assigned before the effective date of the ECA, Section 78 empowers the RA to decline to renew, or to modify, a spectrum licence if the RA concludes, following an investigation, that:

    a) the licensee is "inefficiently utilizing" some or all of the radio frequencies provisionally assigned to it pursuant to ECA Section 73(c);

    b) the licensee has failed to demonstrate a "reasonable need" for any frequencies that the RA has concluded are being used inefficiently; and

    c) it is necessary for the licensee to vacate some or all of these frequencies in order to ensure the "efficient use" of spectrum.

7. If the Authority decides to reclaim any spectrum thus identified, the spectrum will become available for re-assignment to other ICOL holders providing new or competing services that require its use.

8. The transitional spectrum licences issued by the Authority to Logic in association with its ICOL on 29 April 2013 were valid until 29 October 2014 in accordance with ECA Section 73(2)(c)(i). Upon the expiry of these licences, the Authority issued two new spectrum licences to Logic, each of which became effective on 30 October 2014.[2] These licences reflect preliminary conclusions set out in the Authority's Draft Decision. One of them covers a Logic spectrum assignment that has been the focus of the Authority's investigation over the past 14 months, and which is the subject of this Final Decision and Order. The two spectrum licences in question include the following:

    - A 10 year Spectrum Licence (expiry on 29 October 2024) for Fixed Wireless Access Services (015-FWA-01). This Licence, which covers assigned spectrum for which there was no *prima facie* case for reclamation under ECA Section 78, reassigns all of Logic's 3500 MHz spectrum (see Section B below).

    - A 10 year Spectrum Licence (expiry on 29 October 2024) for Microwave Point-to-Point Services (015-MPP-01). This Licence reassigns to Logic frequencies in a non-High Demand Spectrum band which were not the subject of the current proceeding (see Section A.3 below).

2 Summary of the Authority's conclusions

9. The Authority preliminarily identified certain gaps in the use by Logic of its spectrum assignments in the 3500 MHz band, as well as relatively low levels of frequency re-use. This led the Authority to the tentative conclusion that, given the way its network is dimensioned, Logic could provide the same service with the use of less spectrum.

10. However, Logic has provided the Authority with a legitimate explanation for the apparent gaps in the use of its spectrum assignments in the 3500 MHz band, and the low levels of

[2] These Licences may be modified further as necessary to implement this Final Decision and Order.

frequency re-use originally identified. The Authority has accepted this explanation, and has reached the conclusion that this operator is, in fact, making reasonably "efficient use" of its spectrum assignments in the 3500 MHz band for the purposes of ECA Section 78.

11. The Authority has therefore decided to grant Logic a Spectrum Licence for a 10 year term for Fixed Wireless Access Services.

3 Overview of the Authority's investigation

12. The Authority's investigation commenced in September 2013. As a first step, the RA retained LS Telcom, a well-regarded international consultancy based in Europe with substantial expertise in spectrum management.[3] LS Telcom was asked by the Authority to assist it in: (1) identifying the criteria that should be applied in determining whether spectrum is being used efficiently; and (2) carrying out a technical evaluation necessary to determine whether any of the radio frequencies provisionally licensed to Logic (and, likewise, to other ICOL holders) are being used inefficiently, and thus subject to reclamation for refarming to other licensees.[4]

13. A Final Report was submitted by LS Telcom to the Authority in March 2014 ("LS Telcom Report"), a confidential version of which is attached to this Final Decision and Order as Annex A.[5] The Authority also requested LS Telcom to prepare a supplement to its initial report in December 2014 ("LS Telcom Supplementary Report"), which is attached to this Final Decision and Order as Annex B.[6]

14. The Authority determined, from the outset, that it would be reasonable and proportionate[7] to focus its investigation on the "high value" frequencies or "High Demand Spectrum" ("HDS"), where the potential for demand to exceed supply is strong and there is a clear need to ensure efficient spectrum assignments.[8]

15. Accordingly, on 7 October 2013, the Authority issued a Notice and Information Request ("Notice") requiring ICOL holders with associated Spectrum Licences for Wireless Cable Spectrum, Commercial Mobile Radio Service Spectrum, and/or a Fixed Wireless Access Spectrum[9] to submit:

> *a report approved by the Licensee's Board of the Directors containing a detailed analysis of spectrum usage by the Licensee, in the format prescribed by the Authority, in relation to services that were provided*

[3] http://www.lstelcom.com/
[4] LS Telcom was also requested to address migration planning for spectrum found to be inefficiently used.
[5] Final Report, Assessment of spectrum efficiency of wireless service providers in Bermuda, RAB Bermuda, LS Telcom, March 25 2014. The LS Telcom Report covered the spectrum efficiency of multiple ICOL holders. The information relevant to Logic was made available to Logic in the form of the confidential draft "SEUSA Analysis" issued to Logic in April 2014, as discussed in Section A.3.
[6] Supplementary Report, Assessment of spectrum efficiency of wireless service providers in Bermuda, RAB Bermuda, LS Telcom, December 23 2014.
[7] These principles are set out in Sections 2 and 16(d) of the ECA.
[8] See paragraph ("par.") 22 of ECA Section 78 Transitional Spectrum Investigation, Spectrum Efficiency and Self-Usage Assessments, Notice and Information Request, SC-1222/2013, dated 7 October 2013.
[9] Excluded from the scope of this investigation were non-HDS spectrum assignments associated with Other Mobile Radio Service Spectrum Licences and Point-to-Point Microwave Spectrum Licences.

using the Assigned Frequencies for the Authorized Uses as at the date of the commencement of Part 12 of the ECA.[10]

16. These submissions are referred to as Spectrum Efficiency and Usage Self-Assessments ("SEUSAs").

17. On 29 October 2013, Logic submitted its SEUSA analysis in accordance with the RA's Information Request. On 14 April 2014, after having considering the evidence submitted by Logic and the results of its own assessment, the Authority furnished Logic with a confidential SEUSA report containing its efficiency analysis and identifying the frequencies earmarked for recovery.[11] Logic submitted comments on the Authority's confidential SEUSA report on 9 May 2014. On 21 May 2014, representatives of the Authority met with Logic to discuss the spectrum in the 3500 MHz band that had been identified for recovery.

18. On 8 July 2014, the Authority provided Logic with a confidential draft of the proposed final decision relating to Logic's own spectrum holdings. On 1 October 2014, the Authority provided Logic with a public disclosure review version of the Draft Decision. On 7 October 2014, the Authority received confirmation from Logic that it did not consider anything in the public disclosure review version of the Draft Decision to be confidential. On 15 October 2014, the Authority published on its website a document entitled "ECA Section 78 Transitional Spectrum Investigation - Draft Final Decision and Order" (the Draft Decision referred to above). This non-confidential draft of the final decision addressed the spectrum assignments of all relevant ICOL holders and summarised the overall findings of the RA's investigation. The Authority invited comments from interested parties concerning the Draft Decision. Logic did not submit any comments to date.

4 Spectrum characteristics and "efficient use"

19. Radio spectrum is a scarce national resource that is required for the provision of wireless electronic communications services, including fixed wireless access.

20. As noted above, ECA Section 37 imposes a set of objectives for the management of spectrum. Among other things, spectrum must be managed in a manner that is both technically and economically efficient (ECA Section 37(1)(b)). These two aspects of efficiency are symbiotic insofar as the technically efficient use of spectrum is critical to ensuring the economically efficient use of this scarce resource. If a licensee is using spectrum that is in high demand in a technically inefficient way, there is a substantial opportunity cost if actual or potential competitors are, as a result, denied the ability to use this valuable resource to serve their own customers.

21. The inefficient use of spectrum can also impact a competitor's cost of providing service (by necessitating a more expensive network configuration than that used by a licensee that is inefficiently spreading its service across more frequencies, but using fewer base stations, than are reasonably required to provide the service. It also can impair the quality of service that competitors are able to offer consumers (slower speeds, dropped calls, etc.). The cost and quality of service issues associated with rivals' inability to access spectrum can therefore have a harmful impact on competition and, ultimately, on consumers.

[10] ECA Section 78 Transitional Spectrum Investigation, Spectrum Efficiency and Self-Usage Assessments, Notice and Information Request, SC-1222/2013, dated 7 October 2013.
[11] ECA Section 78 Transitional Spectrum Investigation - Logic Confidential Draft SEUSA Analysis; Notice Matter: SC-1222/2013, dated 14 April 2014.

22. Ensuring the technical and economic efficiency of spectrum is a priority of spectrum authorities and governments around the world.[12] The efficiency requirement of ECA Section 78, viewed from a technical perspective, has a well understood meaning in terms of spectrum management, and there are generally accepted ways of measuring the efficiency of spectrum utilisation, as discussed in greater detail in Section B.1 below.

23. Any stand-alone calculation of spectrum efficiency involves a ratio in which the amount of traffic (voice or data) that is being carried by a network is the key factor determining the value of the numerator, whereas the denominator reflects the amount of spectrum assigned for the particular use. There is a *prima facie* case for concluding that, for the purpose of ECA Section 78, scarce, high-demand spectrum that is not being used *at all* by an operator to which it is assigned is "inefficient". In such cases, no traffic is being carried over the assigned spectrum, which means that the numerator of the spectrum efficiency ratio would be zero. The efficiency measure for spectrum that is unused would therefore also be zero. In addition to being technically inefficient, spectrum that is unused means that it is unavailable to other operators to use. There is thus a high opportunity cost to unused spectrum, particularly in the sub-1 GHz bands, making it both economically and technically inefficient.[13]

24. The efficiency measurement is not quite as simple in situations where a licensee is using the spectrum in question but has elected to spread the operation of its network over many more frequencies than a reasonably efficient operator would need in order to deliver the same services of the same quality to the same number of people. Where no fees are imposed for the use of spectrum (as has historically been the case in Bermuda), an operator has no incentive to utilise spectrum efficiently. The operator may, without financial penalty, spread its traffic over an unusually wide range of frequencies in order to save money on equipment costs (because fewer base stations are required). It may also do this as a way of keeping valuable spectrum out of the hands of its competitors (so-called "spectrum hoarding").

B. LOGIC'S SPECTRUM ASSIGNMENT IN THE 3500 MHZ BAND

1 Logic's efficient use of the 3500 MHz band

1.1 Efficiency investigation process

25. As discussed above, the Authority commissioned LS Telcom to undertake an independent technical assessment of the efficiency of high-demand spectrum use in Bermuda. LS Telcom carried out its technical assessment of Logic's spectrum holdings on the basis of the self-assessment (SEUSA Analysis) and supporting documentation submitted by Logic in October 2013.

26. The LS Telcom Report addressed all of Logic's spectrum assignment in the 3500 MHz band. The conclusions of the LS Telcom Report relating to Logic's use of its spectrum

[12] For example, in the EU, the Framework and Authorisation Directives (Directives 2002/21/EC and 2002/20/EC respectively) require that spectrum is used "effectively" and "efficiently" and in pursuit of consumer benefits such as economies of scale and the interoperability of services. These Directives also establish specific principles aimed at ensuring that spectrum is used in a manner that is pro-competitive and prevents the hoarding of valuable spectrum by a single (or limited number of) network operator(s) under so-called "*use it or lose it*" principles (see: Articles ("Arts.") 9 and 5(6) of Framework and Authorisation Directives, respectively and Recital (15) and Article ("Art.") 5 of the EU Radio Spectrum Policy Programme Decision (Decision 243/2012/EU)).

[13] The efficiency value of unused spectrum is also addressed in Section 3 of the LS Telcom Supplementary Report (Annex B).

assignments in the 3500 MHz band in general are reflected in the Authority's assessment of this band as set out in Logic's Confidential Draft SEUSA Analysis dated 14 April 2014, a confidential version of which is set out at Annex C.[14] A description of the technical assessment undertaken by LS Telcom, together with its conclusions, are set out below.

(a) Technical investigation

27. The measurement of spectrum efficiency can be undertaken in several different ways. Based on the recommendations of LS Telcom, the Authority has relied on the following metrics for the purpose of assessing whether Logic is making "efficient use" of its spectrum assignments from a technical perspective:

- the extent to which the network design follows engineering best practice for an efficient operator; and
- a comparison of the relative reliance of a network on spectrum versus infrastructure in delivering the service.

28. These metrics are discussed in greater detail in the LS Telcom Report and the Confidential Draft SEUSA Analysis (the Authority provided the latter to Logic on 14 April 2014).

(i) Engineering best practice

29. For a network operator using spectrum efficiently, certain engineering parameters should be evident. In particular, the use of the spectrum should be such that no frequency is used to excess whilst others are rarely used. The distribution of cell sites should also closely follow the density of subscribers.

30. When evaluating spectrum efficiency, the design and dimensioning of a fixed wireless access network is taken into account. Accordingly, when undertaking its technical assessment of Logic's spectrum usage, LS Telcom sought to determine whether Logic's Wi-Max based fixed wireless network is:

- designed in a way that makes effective use of the spectrum available to them (i.e., that they are not wasteful in their use of spectrum); and
- correctly dimensioned to deal with traffic they carry (i.e., there is neither significant unused capacity, nor are the sites too heavily loaded which would reduce service quality).[15]

(ii) Infrastructure versus spectrum reuse

31. The degree to which each network operator is efficiently reusing its spectrum is an indicator of how efficiently it is using that spectrum in comparison with selected benchmark countries.

32. Generally speaking, additional capacity on a wireless network can be created in two ways: (1) by increasing the amount of spectrum used by the network (for a given number of cell sites); or (2) by increasing the number of cell sites (for a given assignment of spectrum). The latter approach is referred to as *spectrum reuse*. In practice, spectrum

[14] ECA Section 78 Transitional Spectrum Investigation, Logic Confidential Draft SEUSA Analysis, SC-1222/2013, 14 April 2014.
[15] LS Telcom Report, pages ("pp.") 3 – 6.

reuse is achieved by employing identical frequencies (or channels) in multiple cell locations, but ensuring that the cells using these identical frequencies are geographically separated in order to reduce (or eliminate) harmful interference between identical cells.

33. From an efficiency perspective, spectrum reuse is an important consideration because it enables a wireless network operator to significantly increase the number of customers that can be served, and the amount of information that can be transmitted using a fixed amount of spectrum. Therefore, the greater the spectrum reuse that can be observed for a particular wireless network and spectrum assignment, the more efficiently the wireless network operator is using the spectrum in question.

(b) Results of the technical assessment

34. [✂]

(c) Reasons for apparent usage gaps and low frequency reuse in Logic's network

35. [✂]

1.2 Conclusions of the Authority's efficiency investigation

36. [✂]

2 Logic is not required to establish a "reasonable need" for all of its spectrum assignments

37. [✂]

3 It is not necessary to recover Logic's 3500 MHz spectrum to ensure its efficient use

38. [✂]

C. COMPATIBILITY OF ECA SECTION 78 INVESTIGATION WITH THE MINISTER'S SPECTRUM POLICY STATEMENT

39. Section 35 of the ECA requires the Minister responsible for telecommunication to make general policies and, as necessary, regulations for the electronic communications sector with respect to the management and allocation of spectrum and procedure to be followed by the Authority when assigning spectrum.

40. On 22 September 2014, the Minister for Education and Economic Development published a Policy Statement (the "Statement") that sets out the spectrum management policies to be implemented by the Authority with respect to spectrum allocations, spectrum assignments, and spectrum related fees.[16] The effective date of the policies contained in the Statement is 22 September 2014.

[16] Spectrum Policy Statement by Dr. the Hon. E. Grant Gibbons, JP, MP, Minister of Education and Economic Development, 22 September 2014 (the "Statement");
http://www.gov.bm/portal/server..pt/disclaimer.html/skin/ggambo62...n_hi_userid=2/gateway/PTARGS_0_2_6079_330_1813_43/http%3B/ptpublisher.gov.bm%3B7087/publishedcontent/publish/min__telecom__and_e_commerce/telecommunications/dept___telcom___press_releases/spectrum_policy_statement_0.pdf

41. The Statement addresses a number of fundamental spectrum management issues, including those set out below.

    a) The definition of the HDS bands.[17] These frequencies are those whose propagation characteristics make them particularly valuable for mobile voice and broadband services and, as a result, the potential for which is likely to exceed supply. For these frequencies, the policy set out in the Statement is designed to ensure efficient use in keeping with the ECA's objectives, and in consideration of the importance of radio spectrum as a scarce national resource and a public good.

    b) The establishment of a spectrum cap on all HDS assignments such that no firm, or affiliates (as defined in the ECA or the RAA can be permitted to hold more than 50 percent of any HDS band, subject to the limited exceptions described by the Minister.[18]

    c) The establishment, for the HDS frequencies, of a Bermuda frequency allocation table ("FAT") and a Bermuda band plan ("BBP") based on the frequency allocations and band plans adopted by the FCC.[19]

    d) The establishment of a hybrid first-come-first-served ("FCFS")-Comparative Selection assignment process for all HDS frequencies.[20]

    e) The establishment of an administered incentive pricing ("AIP") scheme with the goal of incentivising efficient use of spectrum for all HDS bands.[21]

42. The Statement establishes a spectrum cap on all HDS assignments such that no firm, or affiliate (as defined in the ECA or RAA) is permitted to hold more than 50 percent of any HDS band, subject to the limited exceptions described by the Minister.[22] The Minister considered that the establishment of a 50 percent cap in this manner is sufficient to permit at least two licensees to operate network in each band, and that the cap is consistent with the spectrum management objectives set out under ECA Section 37.[23]

43. Logic is currently assigned 50 percent of the 3500 MHz band spectrum. The Authority's decision following its ECA Section 78 investigation is therefore compatible with the policy set by the Minister.

D. FINAL DECISION AND ORDERING CLAUSES

1. Based on the results of the investigation undertaken pursuant to ECA Section 78, the Authority concludes that Logic is currently making reasonably efficient use of its assigned frequencies in the 3500 MHz band and, further, is not required to demonstrate a "reasonable need" for this spectrum.

2. The Authority has determined that it is not necessary to reclaim the assigned frequencies in the 3500 MHz band so that they can be made available for use by other licensees in order to ensure the efficient use of spectrum in conformity with ECA Section 78.

[17] *Ibid*, Section 3.1.
[18] *Ibid*, Section 3.3.1.3.
[19] *Ibid*, Section 3.2.
[20] *Ibid*, Section 3.3.
[21] *Ibid*, Section 3.4.
[22] *Ibid*, Section 3.3.1.3.
[23] *Ibid*, par. 143.

ORDERING CLAUSES

3. The Authority has issued and hereby affirms the continued validity of the following spectrum licence which reassigns all of Logic's 3500 MHz spectrum for which there was no *prima facie* case for reclamation under ECA Section 78: a Spectrum Licence for Wireless Access Services (015-FWA-01) to Logic for a ten year term with an expiry date of 29 October 2024.

NON-CONFIDENTIAL VERSION

Annex A

LS Telcom Report (25 March 2014)

[✂]

NON-CONFIDENTIAL VERSION

Annex B

LS Telcom Supplementary Report (23 December 2014)

[✂]

NON-CONFIDENTIAL VERSION

Annex C

Logic's Confidential Draft SEUSA Analysis (14 April 2014)

[✂]