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Independent Communications Authority of South Africa
Pinmill Farm
Block B
164 Katherine Street,
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Attention: Mr Manyaapelo Richard Makgotlho

By email: rmakgotlho@icasa.org.za

20 October 2017

Dear Sirs

SUBMISSION IN RESPECT OF THE SECOND DRAFT RADIO FREQUENCY SPECTRUM ASSIGNMENT PLAN FOR THE FREQUENCY BAND 825 TO 830 MHZ AND 870 TO 875 MHZ

We refer to the above published as Notice 648 of 2017 in Government Gazette no 41082 on 1 September 2017.

The written response of Liquid Telecom to the above is attached to this letter.

We confirm our availability and indeed request that you include us, to participate in public hearings in regard to this consultation, should the Authority elect to hold same following the receipt of the written responses.

Kindly acknowledge receipt of this submission.

Yours faithfully

LIQUID TELECOM

Per: Mike Silber
General Counsel

Submission to The Independent Communications Authority of South Africa ("ICASA")

by

Liquid Telecom

on

Second Draft Radio Frequency Spectrum Assignment Plan for the Frequency Band 825 to 830 MHz and 870 to 875 MHz

INTRODUCTION

1. Liquid Telecommunications South Africa ("**Liquid Telecom**") extends its appreciation to the Independent Communications Authority of South Africa ("**the Authority" / "ICASA**") for the opportunity to comment on the second draft radio frequency spectrum assignment plan (the "**Draft RFSAP**") for the frequency band 825 to 830 MHz and 870 to 875 MHz, published as Notice 648 of 2017 (the "**Notice**") in Government Gazette no 41082 on 1 September 2017.
2. ICASA has invited interested persons to submit written comments on the Draft RFSAP, which comments follow.
3. To avoid confusion, Liquid Telecom notes that it previously operated under the name "Neotel", which name has been changed to Liquid Telecom. The necessary amendments have been filed with the Authority. Historical references to Neotel in this submission are to the same company, however reflect the situation prior to the change of name.
4. Liquid Telecom supports a consultative and responsive manner of engagement on this critical issue and notes that the Notice does not provide for the possibility of hearings or an opportunity to make oral submissions. Liquid Telecom requests the Authority to hold hearings on this matter and if there is insufficient interest, then to at least afford Liquid Telecom the opportunity to make oral submissions to the Authority, in an open forum which can be attended by the public (even if they chose not to make presentations).
5. The issue of the 850 MHz spectrum allocation and assignment has been a lengthy saga and Liquid Telecom provides some background on this issue in Part A. Part B of this submission will offer a number of general comments, followed by specific comments and responses in Part C
6. Since its inception, Liquid Telecom has been compelled to operate under severe spectrum restraints in the 850 MHz band due to interference from high power analogue television transmitters that are on-air. Furthermore, Liquid Telecom has been unable to roll out certain services in some cities and towns throughout South Africa, as a result

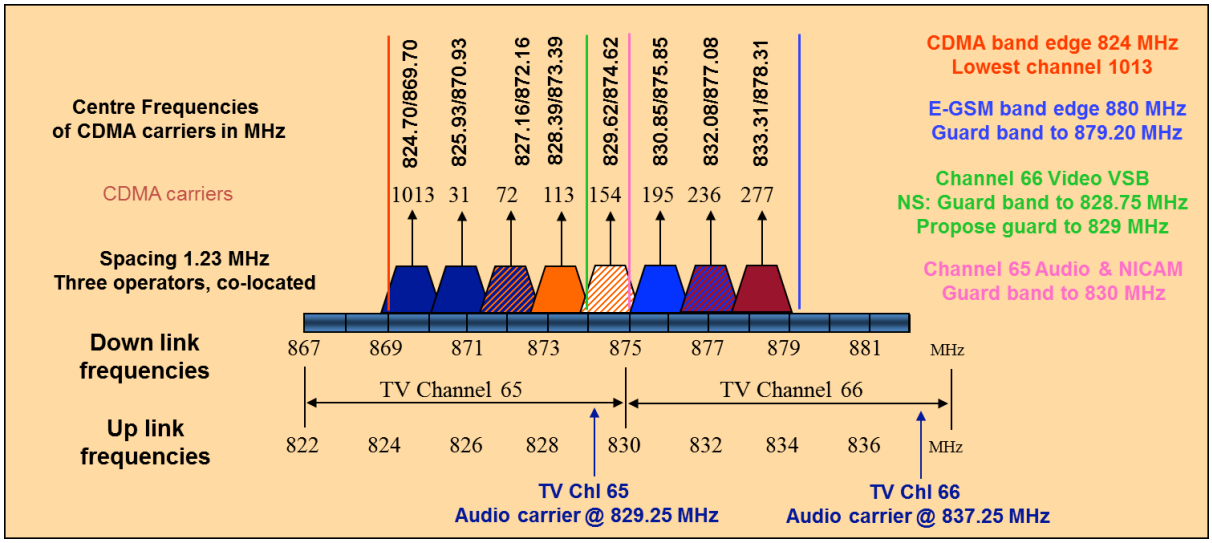
of severe interference from analogue transmitters in these areas. This fact has been brought to the attention of the Authority multiple times in the past, however we believe it is worth reminding the Authority that nothing has been done to mitigate this issue.

PART A: BACKGROUND

7. Liquid Telecom is of the view that it will be useful to set out below the background that has led to the current situation to give context to our general and specific comments below.
8. The initial use of the CDMA was initiated by Transtel (the telecommunications division of Transnet), as a future shareholder in the Second National Operator (an event which did not eventuate). Having regard to previous failures in using non-standard wireless technologies, Transtel concluded that Qualcomm's CDMA technology, which was one of the two mainstream wireless technologies globally, and in widespread use for both mobile and fixed wireless access, would be the right basis for a rollout of fixed voice and data access in order to achieve the objective of the Second National Operator in competing with Telkom. Transtel initiated a strategy in 2002 to obtain spectrum for CDMA2000, the 3G iteration of this technology.
9. CDMA was used in North America (ITU Radio Region 2) and the Far East (ITU Radio Region 3) in the 850 MHz band (824 to 835 MHz uplink paired with 869 to 880 MHz uplink). In South Africa (in Radio Region 1), the lower leg of this was TV broadcasting spectrum, while the upper leg was largely unused apart from a few links.
10. In 2003, Transtel worked with Qualcomm to undertake a study for ICASA, supporting the dual use of the lower leg of the 850 MHz band in South Africa for broadcasting and telecommunication services. This was in line with the ITU's plans for digital migration – moving from inefficient analogue TV to efficient digital TV broadcasting, and re-purposing the large amounts of spectrum freed up to mobile telecommunications, which had rapidly growing demand.
11. ICASA subsequently carried out its own inquiry into sharing of 850 MHz spectrum between broadcasting and telecoms, and published its findings in February 2004. The outcome of this inquiry was a decision to conduct research to formulate possible sharing criteria between broadcasting and telecommunication services in the band.
12. On 30 March 2004, the SA Table of Frequency Allocations was published, including National Footnote 27, which confirmed the requirement for research on sharing to be done.
13. A field trial was undertaken in February 2005 by Transtel, Esitel (Eskom), Ericsson and Qualcomm, to assist ICASA with regard to a sharing criteria. In August 2005, a co-existence study was submitted to ICASA.
14. On 31 October 2006, ICASA published the outcome of its research as General Notice 1528 in Government Gazette 29345, indicating that non-broadcasting services would be licensed in TV Channels 65 and 66 (822 – 838 MHz) on a secondary basis. This opened the way for network operators to apply for assignments in the 850 MHz

band, on the basis of sharing with broadcasters. It also emphasised "that there will be no further assignments of broadcasting services on both channels 65 (822-830 MHz) and 66 (830-838 MHz)".

15. The band-plan for the use of the band – specifically for CDMA2000 or technologies using the same band plan – provides for eight 1.23 MHz uplink channels within TV Channels 65 and 66, with a total bandwidth, including guard bands, of a little over 10 MHz. The matching downlink channels are above the TV band, adjacent to the E-GSM band. This can be seen below:



16. The SNO obtained its PSTS licence in December 2005, which included the right to deploy wireless technologies for "fixed mobile" services. The SNO (renamed and launched as Neotel in August 2006), applied in December 2006 for an assignment for CDMA2000 rollout in the 850 MHz band. On 28 March 2007, ICASA assigned 850 MHz spectrum to Neotel, nationally, on a secondary basis, as follows: The 4.92 MHz block from 827.775 MHz to 832.695 MHz (Uplink), and the matching 4.92 MHz block 872.775 MHz to 877.695 MHz (Downlink).
17. In April 2008, Neotel applied for an additional assignment in the 850 MHz band, to support more bandwidth to enable both voice services, and data services on CDMA2000 1x EV-DO. On 16 February 2009, Neotel obtained the additional assignment, which covered a total of 5 x 1.23 MHz paired channels across various geographies, expanding the total block size assigned to Neotel from 2 x 4.92 MHz to 2 x 6.15 MHz.
18. The entire 800 MHz digital dividend band (790- 862 MHz) was allocated to MOBILE services on a primary basis by the ITU in Radio Region 1 in 2008, in preparation for digital migration. A new draft South Africa Frequency Band Plan was published in Government Gazette 31264 on 22 July 2008. In this Band Plan, National Footnote 17 ("NF17") stated that "No further assignments will be made in band 790-854 MHz until the migration to digital television is complete".

19. In December 2011, ICASA published a "Draft Spectrum Assignment Plan for the combined licensing of the 800 MHz and 2.6 GHz Bands" and the "Draft Invitation to Apply for Radio Frequency Spectrum Licence to provide broadband wireless access for urban and rural areas using the Complementary Bands, 800 MHz and 2.6 GHz" as General Notices 911 and 912 in Government Gazette 34872.
20. The Draft Spectrum Migration Plan contained a proposed new channel arrangement in 800 MHz, supporting LTE Band 20. In this notice, ICASA proposed assigning to Neotel 2x10 MHz (791-801 MHz paired with 832-842 MHz) and a further 2x1.2 MHz (830.8-832 MHz paired with 875.8-877 MHz) in the 800 MHz band. This was specifically to allow for International Mobile Telecommunications ("**IMT**") services.
21. The Draft Spectrum Migration Plan was developed in consultation with licensees and dealt with specific concerns raised previously by Neotel during the course of such consultations. We have set out Section 8.9 in full below:

    8.9. The following is a proposed Neotel in-band migration

    8.9.1. The Authority proposes that Neotel should be migrated to occupy the first 2 x 10 MHz in the 800 MHz band.

    8.9.2. The proposal affords Neotel an increased and technically acceptable amount of radio frequency spectrum for future deployment of IMT technologies in the 800 MHz band.

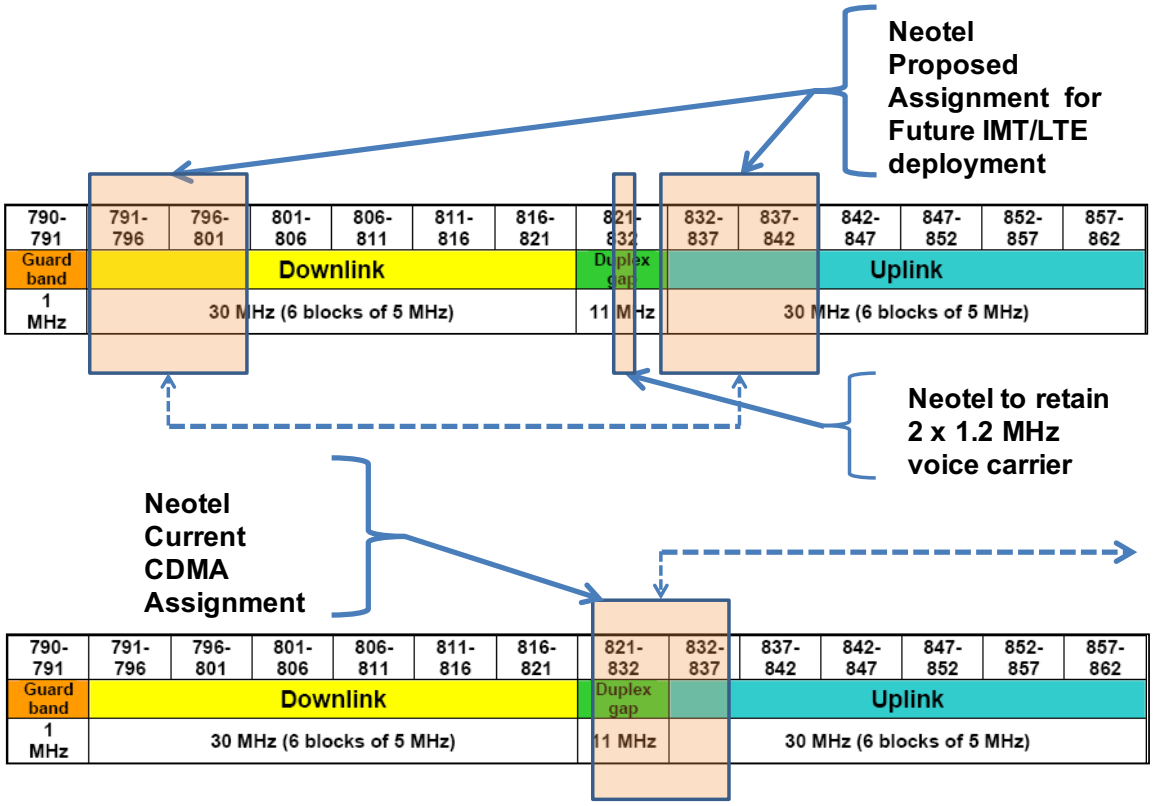
    8.9.3. During the consultative process, Neotel, raised concerns that IMT technologies are not currently geared towards voice services and their current deployment of CDMA2000 is suitable for voice and could still have a life cycle of about 10 years.

    8.9.4. For this reason the Authority proposes that Neotel is allowed to keep 2 x 1.2 MHz for CDMA200 in the band.

    8.9.5. In order to mitigate any possible technical issues, the Authority should oblige Neotel to keep the 2 x 1.2 MHz assignment as close as practically possible to their 2 x 10 MHz proposed assignment and ensures that no interference is caused to other services in the band.

22. Neotel supported this proposal and there was no significant objection to the proposal in any of the responses that were publically available.
23. In August 2012, ICASA published Notice 606 in Government Gazette 35598: Draft Frequency Migration Regulation and Frequency Migration Plan, which referred to the above Assignment Plan in respect of the 800 MHz band.

24. This can be seen below:



25. In April 2013, ICASA published Notices 352 and 353 in Government Gazette 36344: the final Frequency Migration Regulation and Frequency Migration Plan, which made no reference to the above Assignment Plan, but instead simply stated that "A Radio Frequency Spectrum Plan will be developed in parallel with the migration process and take into account ITU-R studies on the appropriate channel plan for the 700 MHz / 800 MHz frequency bands for Region 1", in essence reversing the earlier migration plan without consultation or reasons being provided.
26. A new SA Frequency Band Plan was published in Government Gazette 36336 on 28 June 2013, with National Footnote 9, Note 4 (ii): "Although the international 850 MHz band (also known as CDMA-2000 or GSM850 band plan) has 2 x 25 MHz total bandwidth, the assignable spectrum in South Africa is much less due to this band overlapping GSM 900 MHz and due to the use of analogue broadcasting in the UHF band. In South Africa, the use of the 800 MHz band will take precedence over the use of the 850 MHz; no new assignments will therefore be made according to the 850 MHz channel plan.
27. In 2015, in the absence of a migration plan from ICASA, Neotel submitted an application for migration from the 850 MHz band to the 800 MHz band (LTE Band 20), in line with ICASA's proposal of August 2012. Neotel indicated

that it intended to use the requested 800 MHz spectrum for the deployment of LTE for data services while maintaining voice services over CDMA 2000.

28. This application was rejected by the Authority without any reasons being provided and notwithstanding such reasons being specifically requested.

PART B: GENERAL COMMENTS

The IMT Roadmap 2014

29. Liquid Telecom acknowledges that Draft RFSAP sets out the proposed rules for services operating in the frequency band 825 to 830 MHz and 870 to 875 MHZ for IMT 850.
30. Liquid Telecom notes that the Authority has undertaken this consultation as stipulated "in terms sections 2(d), (e) and 4, read with section 30, 31(4), and 33 of the Electronic Communications Act (Act No. 36 of 2005) ("**ECA**") and read with Regulation 3 of the Radio Frequency Spectrum Regulations 2011 and read with the IMT Roadmap 2014".
31. The Authority published its IMT Roadmap 2014 as Notice 1009 in Government Gazette 38213 on 14 November 2014, albeit that it is still designated as a "Final (Draft)". It is evident from the Authority's Draft RFSAP that the Authority also took the IMT Roadmap 2014 into consideration.
32. **In this regard, Liquid Telecom once again seeks to draw the Authority's attention to the various specific concerns raised with the Authority on the IMT Roadmap 2014, during its preparation and thereafter, which concerns appear to have been overlooked. As such, and with great concern, Liquid Telecom notes the conclusion drawn in the Final IMT Roadmap 2014 with respect to matters affecting Liquid Telecom and which then flow through into the Draft RFSAP.**
33. In this respect, Liquid Telecom reserves its legal rights but prefers to take the necessary steps to engage the Authority and the relevant stakeholders to address the issues that have a direct and potentially discriminatory impact, uniquely on Liquid Telecom as a licensee.
34. Moreover, Liquid Telecom has made numerous submissions and written letters to the Authority raising a number of pertinent issues including, amongst others, in respect of the following:

34.1. The 800 MHz migration proposal in respect of Neotel (as Liquid Telecom was then named);

34.2. The GSM900-R proposed assignment to PRASA;

34.3. Interference with Short Range Devices (SRDs); and

34.4. Liquid Telecom's deemed rights for access to the 3G (2100 MHz) band.

35. Liquid Telecom has made additional input on the specific draft radio frequency spectrum assignment plans which materially affect the matters mentioned in paragraph 34 above.
36. Liquid Telecom hereby respectfully requests – in line with repeated, previous requests in the past, urgent and further engagement with the Authority to discuss these important matters. We remain firmly of the view that these can be concerns are capable of amicable resolution.
37. In the present submissions, Liquid Telecom has once again raised these matters with respect to the Draft RFSAP, in the context of the IMT Roadmap 2014.

Sufficiency of Spectrum and Interference

38. Liquid Telecom notes that the Draft RFSAP (at clause 10.1) proposes the following:

    10.1 Specific Procedure

    10.1.1 As an immediate measure, the CDMA assignment of Neotel is to be shifted by 2 MHz to 825-830 MHz // 870-875 MHz. This is Consideration 1b in Figure 2:

    10.1.2 The coexistence solution of CDMA850 to GSM-R2 is to introduce a guard band of ~4.05 MHz and to reduce the CDMA850 band to 2×3.75 MHz in areas where there will be potential interference to GSM-R. In these areas, reduction to 2×3.75 MHz allows the partial usage of current CDMA850 at least for voice and wideband packet services. In areas where there is no interference to GSM-R, Neotel may use its existing CDMA850 assignment.

39. In reality the CDMA band sub-allocation as provided in the National Radio Frequency Plan (NRFP) 2013 is 2 x 11 MHz (Government Gazette, 36336, Note 4(ii) NRFP 2013, p.146).
40. It was the Authority's intention for Liquid Telecom to have access to more channels in the 2 x 11 MHz of 850 MHz band but unfortunately no further assignments could be made due to the presence of analogue broadcasting services on channels 65 (822 – 830 MHz) and 66 (830 – 838 MHz).
41. While Liquid Telecom does not in principle have a significant problem operating its CDMA850 voice only service on the specified reduced ~2 x 3.75 MHz assignment in the IMT850 band as per the IMT Roadmap 2014 (GG 38213, p.25), the spectrum is certainly not sufficient for an effective data service. Nevertheless, the Authority is well aware of the technical limitations in operating in this band as:

41.1. Liquid Telecom is also operating a data as well as a voice service with an already limited spectrum capacity on the current ~2x5 MHz assignment;

41.2. in addition Liquid Telecom is currently sharing the spectrum with the analogue broadcasting assignments;

41.3. there will be harmful interference with Short Range Devices (SRDs) which holds dire safety of life and security consequences in respect vehicle alarm systems and other remote control devices; and

41.4. there will be harmful interference to and from mission critical GSM-R systems.

Repetition of Defined Terms

42. Liquid Telecom notes that there are many instances where terms defined in Section 1 are then used in full elsewhere in the Draft RFSAP. This causes confusion as it is unclear if the use thereof follows the defined term or has a different meaning. Examples include "Radio Frequency Spectrum Assignment Plan", defined as the "RFSAP" in the definitions but then repeated as a term in clauses 2.1, 2.2 and 3.1 or "National Radio Frequency Plan" defined as the NRFP but used in full in clauses 2.1, 5.5 and footnote 1 on page 12.
43. Liquid Telecom would appreciate the Draft RFSAP being carefully edited to avoid these inconsistencies.

Like for Like Transfer

44. Liquid Telecom notes that different technologies have different spectral efficiencies. Spectral efficiency refers to the information rate that can be transmitted over a given bandwidth in a specific communication system. It is a measure of how efficiently a limited frequency spectrum is utilized. We refer the Authority to Rec. ITU-R SM.1046-3 in this regard.
45. Liquid Telecom notes that its predecessors selected CDMA as a technology because of its spectral efficiency. In migrating spectrum and specifying technologies that must, or may not, be used the Authority must have regard to the spectral efficiency of the technologies in the relevant band.
46. In any migration it is not sufficient to match 1 MHz of spectrum in one band with 1 MHz in another band, but regard must be had to what can be accomplished by that 1 MHz of spectrum in one band using a technology already in use and match it to the spectrum needed to achieve the same results using a different technology and in a different band. Accordingly, Liquid Telecom requests the Authority to provide it with the studies (if any) conducted by the Authority regarding the relative spectrum efficiency (RSE) of Liquid Telecom's current utilisation compared to the proposed utilisation post-migration.

PART B: SPECIFIC COMMENTS

Re: Definitions

47. Liquid Telecom notes an incongruity in the definition of "LTE" and suggests that the definition be replaced as follows: "means Long Term Evolution, a standard for wireless communication of high-speed data for mobile phones and data terminals based on the GSM/EDGE and UMTS/HSPA network technologies".
48. Liquid Telecom notes the NRFP references the 2013 plan and given that the amendment thereof is imminent, it may be worthwhile providing for any amendment, replacement or update thereof.

Re: Section 2: Purpose

49. Liquid Telecom supports clause 2.2 as it is line with the ITU Radio Regulations and Liquid Telecom supports the concept of orderly frequency management aimed at ensuring that licenced services can operate on licenced spectrum without experiencing any harmful interference.
50. The ITU resolution in the Final Acts of the ITU WRC-06 covering the band 790 to 862 MHz states that this band will be reserved for IMT services. Similarly the ITU WRC-12 resolution in the Final Acts for the band 694 to 790 MHz states that this band will also be reserved for IMT services. South Africa was a signatory to both of these international treaties that reserve the entire band 694 to 862 MHz for IMT services. This is reflected in the 2017 (draft) South African NRFP. To this point Liquid Telecom does not understand the logic of ICASA singling out the band 825 to 830 MHz paired with 870 to 875 MHz, at this point in time.
51. With regards clause 2.3, Liquid Telecom notes that the International Telecommunications Union of IMT is broader than described in the Draft RFSAP. Liquid Telecom would appreciate the inclusion of the following two sentences from Clause 1 of Rec. ITU-R M.1224-1 that immediate follow the ITU reference quoted in clause 2.3: "IMT systems support low to high mobility applications and a wide range of data rates in accordance with user and service demands in multiple user environments. IMT also has capabilities for high quality multimedia applications within a wide range of services and platforms, providing a significant improvement in performance and quality of service."

Re: Section 3: General

52. Liquid Telecom notes that although CDMA is not listed as a possible technology to provide IMT850, ICASA does not limit the use of the band to the listed technologies. However, in clause 10.2 ICASA states that in the long term, Neotel (now Liquid Telecom) must cease using this new proposed band for CDMA.
53. With regards clause 3.5, Liquid Telecom is not aware of any other frequency bands assigned for IMT850 in South Africa and is accordingly not certain that the use of the term "include" is factually correct?

54. In clause 3.6, there term “Mobile” is capitalised without apparent reason. Liquid Telecom is not certain that the term “likely” is correct here, given the use has been designated for IMT?
55. Liquid Telecom noted the inclusion of and “end of life” technology, namely WiMAX, in the list.

Re: Section 4: Channelling Plan

56. In clause 4.1 the Draft RFSAP provides that the frequency band 825 to 830 MHz paired with 870 to 875 MHz provides a total bandwidth of 2 x 5 MHz FDD for IMT850.
57. In the event that CDMA ceases in this band, Liquid Telecom would most likely require the assignment to be increased to 2 x 10 MHZ, as competing technologies are less spectrum efficient as compared to CDMA (see at 44 *et sec* above). Liquid Telecom needs to ensure that the quality of service of its offering is not compromised, to the detriment of its subscribers.
58. In this regard Liquid Telecom notes that the propagation characteristics of CDMA in IMT 850 have been useful in achieving coverage in both urban as well as peri-urban areas. Current coverage in the Western Cape Government Provincial Broadband roll-out is set out below. This roll-out makes extensive use of CDMA in IMT 850:

	Metro (City of Cape Town municipality)	Rural (24 Western Cape municipalities outside of CoCT)
Schools	804	675
Clinics	2	149
Libraries	2	152

Re: Section 5: Requirements for usage of radio frequency spectrum

59. Liquid Telecom notes and supports provisions of clause 5.2 and recommends that this be extended to the entire band 694 to 862 MHz.
60. Liquid Telecom likewise supports clauses 5.3 - 5.8 as well as the criteria and guidelines for interference mitigation described in appendix D of the Draft RFSAP.

Re: Section 6: Implementation

61. Section 6 of the Draft RFSAP deals with implementation issues and stipulates that the RFSAP comes into effect upon publication in the Government Gazette. In order to abide by this stipulation services would be required to migrate during the performance period with a high probability of experiencing interference as more fully set out below in respect of Section 9 below.

Re: Section 8: Assignment

62. The Draft RFSAP proposes that new assignment be allowed in this band in line with regulations developed in terms of Section 31(3) of the ECA. This flies in the face of the purpose of the proposed migration and Liquid Telecom recommends that a statement rather be inserted to the effect that no new assignments will be allowed in this band until analogue to digital broadcast migration has been completed and thereafter new assignments may be allowed, having due regard to Liquid Telecom's existing rights.

Re: Section 9: Amendment

63. Clause 9.1 of provides that "The authority resolved the following transitional arrangements for the right of spectrum use in this frequency band." We note this sentence is ambiguous and should be edited for clarity.
64. Although it is stipulated that broadcasters must migrate all their present assignments to below 694 MHz there is no reference to the phases required to do so. Liquid Telecom's view is that the first phase required is for broadcasters to switch off all their present analogue transmitters across South Africa. As the digital assignments are presently on-air, the next phase would be to complete a digital to digital migration to ensure that there are no digital broadcast assignments on-air above 694 MHz. Both digital dividends, being digital dividend 1 (790 MHz to 854 MHz) and digital dividend 2 (694 to 790 MHz), and would only at this point become available for interference free IMT services on a national basis.
65. Furthermore in this Section 9 it is stated that all analogue frequencies will be phased out during the performance period, which is not defined.
66. In clause 9.4 the Authority proposes that the radio frequency assignment for CDMA850 services (a term which is not defined) within the band 827.775 to 832.695 paired with 872.775 to 877.695 in the affected areas migrate systematically to the destination band 825 to 830 MHz paired with 870 to 875 MHz coordinated with adjacent and existing assignments during the performance period. Then in 9.6 reference is made to minimising and or preventing harmful interference during the "***transitional arrangement period***" to ensure a seamless transition. It this appears that the intent is for the transitional arrangement period to take place during the performance period.
67. Liquid Telecom is of the opinion that this is not feasible as the frequencies above 694 MHz cannot be used on a national basis until all the analogue television frequencies have been switched off and the digital to digital migration has been completed. Liquid Telecom are already experiencing difficulties using its present assignments on a national basis since interference from existing services is being experienced in certain areas of the country. Hence an electronic communications network service licensee can only conceivably use the 800 MHz band without interference at the end of the performance period. This holds true to any IMT assignment above 694 MHz. Due to

this fact Liquid Telecom is of the opinion that the transitional arrangement period can only commence at the end of the performance period.

68. In clause 9.4 ICASA stipulates that the radio frequency spectrum assignment for CDMA850 services within the band 827.775-832.695 MHz paired with 872.775-877.695 MHz in the affected areas migrate these services systematically to the destination band 825-830 MHz paired with 870-875 MHZ coordinated with adjacent and existing assignments during the performance period. The performance period is a period of dual illumination for television broadcasts which commenced with the publication of a gazette by the Minister of Communications for the start of the dual illumination period and will end when all the analogue television transmitters are switched off and digital to digital migration of the DTT frequencies has been completed. During this period all poor households will be issued with a Government subsidised Set Top Box (STB) and all the other households would have to purchase one in retail, and have it installed.

69. In order to estimate the realistic time that would be required for the completion of this digital migration of television broadcasts an analysis was done on the updated ICASA terrestrial broadcasting frequency plan 2013, published as Notice 298, in Government Gazette no 36321, reference was made to the following annexures in this published frequency plan:

69.1. Annexure E. Analogue television frequency assignments 2013

69.2. Annexure F. Television self-help frequency assignments 2013

69.3. Annexure G. Digital terrestrial television frequency networks 2013

69.4. Annexure H. Digital mobile television frequency networks 2013

69.5. Annexure I. VHF digital terrestrial networks post 2015

69.6. Annexure J. Digital terrestrial television SFN networks post 2015.

70. From an analysis of these annexures, Liquid Telecom has concluded that that in order to release both digital dividends the following would have to be completed:

70.1. <u>Digital dividend 1 (790-854 MHz)</u>

A total of 195 terrestrial television frequencies presently on-air would have to be migrated out of this band to clear it for IMT services, made up 69 analogue; 97 analogue self-help; and 29 digital.

70.2. <u>Digital dividend 2 (694-790 MHz)</u>

A total of 564 terrestrial television frequencies presently on-air would have to be migrated out of this band to clear it for IMT services, made up of 209 analogue; 241 analogue self-help; 111 digital; and 3 digital mobile.

To complete the switch off all the analogue television transmitters a total of 1852 transmitters need to be switched off at 724 transmitter sites across the country. Additionally, a total of 376 DTT frequencies that are presently on-air as per the GE-06 frequency plan need to be migrated to below 694 MHz, to release digital dividends 1 and 2 for the introduction of IMT services in this vacated band. Only 9 of the original GE-06 digital

frequencies do not have to change. This can only commence once all the analogue television transmitters have been switched off. In order to start switching off the analogue transmitters each television household in South Africa would either have to be issued with a government subsidised set top box (STB), if they qualify or purchase one in retail, and have them installed. Because of all this outstanding work that must be completed, it is estimated that this would most likely not be completed in under 2 years.

Re: Section 10: Radio Frequency Migration

71. Liquid Telecom rejects the provisions of this Section.
72. Liquid Telecom has addressed this issues multiple times before the Authority, but for the sake of completeness it does so here again.

The Original 800 MHz Migration Proposal

73. The initial design of the migration and channel arrangements in the 800 MHz band is contained in Government Gazette 34872, General Notices 911 and 912. These Notices capture the "draft Spectrum Assignment Plan for the combined licensing of the 800 MHz and 2.6 GHz Bands" and the "draft Invitation-to-Apply (ITA) for radio frequency spectrum license to provide broadband wireless access for urban and rural areas using the complementary bands, 800 MHz and 2.6 GHz".
74. Liquid Telecom has from the outset supported the Authority's proposed design of the frequency channel arrangements for the 800 MHz (790-862 MHz) band, in line with the harmonisation in ITU Region 1 and the relevant ITU-R recommendations. Liquid Telecom further believes that the channel arrangement in the band has been concluded and is ready for implementation.
75. Additionally in GG 34872, the Authority proposed to assign 2 x 10 MHz (791 - 801 MHz paired with 832 - 842 MHz) and a further 2 x 1.23 MHz (830.8 - 832 MHz paired with 875.8 - 877 MHz) in the 800 MHz band to Liquid Telecom. Liquid Telecom fully supports this approach to the in-band migration.
76. Liquid Telecom has been assigned spectrum in the 800 MHz band (now defined as the IMT850 band), which it uses to deliver consumer and SME voice and data services. The Authority concurred that Liquid Telecom has been assigned ~2 x 4.92 MHz in the band spread throughout the frequency range 827.775-832.695 MHz paired with 872.775-877.695 MHz.
77. the Authority is well aware that Liquid Telecom has formally endorsed the Authority's 800 MHz in-band migration and the draft Radio Frequency Spectrum Assignment Plan (RFSAP) developed by ICASA. The Authority recognises the fact that Liquid Telecom has made substantial infrastructure investments in the 800 MHz frequency band awarded to Liquid Telecom. Liquid Telecom further has informed the Authority that it is in the process of

finalising plans for an in-band migration and is also developing network rollout plans constructed on ICASA's initial migration proposal and RFSAP for the 800 MHz band.

78. Liquid Telecom further informed the Authority that it will further incur substantial cost in the region of hundreds of millions of Rand due to the migration and the technology change that is necessitated to harmonise the band in order to enjoy the associated economies of scale and scope. It should also be noted that Liquid Telecom is currently sharing radio frequency channels with analogue broadcasting services in certain geographic areas and has limited access to the 800 MHz radio frequency channels.
79. In this regard, it is Liquid Telecoms view that whatever migration process is to be followed, that it can only be implemented once the analogue broadcasting services have fully vacated the 700/800 MHz band. Due to the limited scope for deploying an effective broadband mobile data service on the limited spectrum Liquid Telecoms currently has in the 850 MHz band, it is Liquid Telecom's view that it must be accommodated with spectrum as per the initial proposal in the IMT 800 MHz band.
80. Liquid Telecom is not the only entity to have made these submissions. One of Liquid Telecom's competitors made the following submission to the Authority:

    Vodacom's position is that IMT 850 is not a feasible band in a harmonized Region 1 IMT band planning environment. The interference issues of having an uplink and downlink block less than 3 MHz apart is of significant concern and this would require radio co-ordination to mitigate interference. In addition, Vodacom's view is that it would be preferable for Neotel [as it then was] to migrate to a harmonized IMT 800 LTE assignment as this seems to be the only practical option for ensuring unobstructed national deployment.

Sufficiency of Spectrum

81. The Authority is well aware that the limited spectrum of 2 x 5 MHz is not sufficient to achieve the capacity requirements in "SA Connect" (the national broadband policy and the associated strategy and plan). This is a view that has been express by various commentators and radio frequency management experts on numerous fora.
82. Furthermore the reduction of spectrum available to Liquid Telecom in the 850 MHz band is contrary to the advancement of an effective and efficient operator. Industry experts and ICASA's own admission has advocated that to enjoy the full capacity and benefits of the disruptive technologies such as LTE, a minimum of 2 x 10 MHz is required.
83. Liquid Telecom's 850 MHz assignment complies with America regions CDMA band plan which operates from 824-849 MHz, paired with 869-894 MHz. In South Africa the usable spectrum in this band is only located on the lower segments due to GSM frequencies truncating the usable spectrum to below 880 MHz. Liquid Telecom also shares this usable spectrum on a secondary basis with the South African television broadcasters. As a result of this

sharing, in some areas only two channels of 1.23 MHz are available. Currently, all allocations are used for voice and data services for Liquid Telecom's consumer market consisting of over 120 000 customers.

Effects of a potential deployment of LTE in the current 850 MHz band

84. Although LTE can be deployed at a minimum of 1.4 MHz wide spectrum allocations, this spectrum allocation allows for 10 Mb/s peak capacities which is far below the current market offerings of 42 Mb/s offered by competitors on GSM 3rd generation wireless technology. As a minimum it is recommended that a 5 MHz wide channel with 36.5 Mb/s peak capacity allocations be offered to compete with GSM 3rd generation equipment. LTE becomes a significant technology market leader when 10 MHz with 73 Mb/s peak capacity allocations and beyond is utilised.
85. Further to the effects of a potential deployment of LTE in the current 850 MHz band. Neotel currently has an allocation of 12 MHz spectrum in the 1800 MHz band (Band 3). As per the ITU allocation. LTE Band 20 (800 MHz) and LTE Band 3 (1800 MHz) are proposed to be used in the same World region (EU Region). However, the use of LTE Band 5 (850 MHz) and LTE Band 20 (800 MHz) does not exist in the EU region allocation. This implies that, from a device development perspective that a high volume of devices will be manufactured to operate in both LTE Band 20 and LTE Band 3 however only high-end, expensive CPE may be developed to operate in both LTE Band 3 and LTE Band 5.
86. Furthermore, Liquid Telecom has been unable to identify any radio transmission equipment that would be capable of carrier aggregation in the 850 MHz band and the 1800 MHz band. This creates significant inefficiency and reduces Liquid Telecom's ability to increase its coverage as radio equipment needs to be duplicated in most instances.
87. Liquid Telecom therefore wishes to submit that the following text be captured in the final RFSAP:
    "Neotel shall be assigned 2 x 10 MHz or an equivalent assignment in the IMT 800 band (791-821 MHz paired with 832-862 MHz) while retaining a 2 x 1.23 MHz in the IMT 850 band (825 to 830 MHz paired with 870 - 875 MHz) to continue to operate its voice service".

CONCLUSION

88. Liquid re-iterates its appreciation to ICASA for the consultative way in which it is approaching these important issues.
89. It is not feasible to migrate Liquid telecom's spectrum now, due to interference problems prior to the completion of the performance period. However new spectrum can be assigned to Liquid Telecom in the 800 MHz band: migration of the present assignment to the new 800 MHz assignment would only take place at the end of the

performance period. Although Liquid Telecom together with all the other ECNS licensees in the country would desperately like to get interference free access to spectrum above 694 MHz, Liquid Telecom accepts that this can only occur at the end of the performance period, which we estimate could take between 18 to 24 months.