

COMMENTS ON THE DRAFT IMT ROADMAP 2018

submitted by

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1 EXECUTIVE SUMMARY

- 1.1 Liquid Telecom submits its comments on ICASA’s Draft IMT Roadmap 2018.
- 1.2 Liquid Telecom strongly supports ICASA moving forward with making MT-2020 spectrum available and taking this first step by publishing the Draft IMT Roadmap.
- 1.3 Our comments are very much focused on those frequency bands that ICASA discusses in the context of IMT-2020 and for which Liquid Telecom is licensed, or for which it may be licensed in the near future. The bands of importance for Liquid Telecom are the IMT700 band, the IMT800 band, the 850 MHz band, the 1800 MHz band, the 3.5 GHz band, the 26 GHz band, the 38 GHz band, the 42 GHz band and the E-band.
- 1.4 However, Liquid Telecom has specific concerns regarding the so-called 850 MHz band and again notes its previous submissions that this band is not feasible for use as currently suggested.
- 1.5 In addition, Liquid Telecom notes its concern in respect of the 3.5 GHz band, where the Draft IMT Roadmap indicates that consideration is being given to be given to possibly mandating FDD and the ITU frequency arrangement F2 for this band. In our view this would be a step backwards and ignoring the progressive regulations and an RFSAP already published by ICASA for this band (3400-3600 MHz) and which mandate TDD and the F1 frequency arrangement.
- 1.6 In our view ICASA has made great strides in making progress towards IMT-2020 spectrum. We are confident that it is an important step in promoting resources for the broadband as envisaged in the SA Connect policy.

2 DEFINITIONS AND ABBREVIATIONS

In this submission:

- 2.1 symbols used are SI symbols.
- 2.2 Unless the context indicates a contrary intention, the following abbreviations and terms bear the meanings assigned to them below and cognate expressions bear corresponding meanings:

Abbreviation/term	Meaning
1800 MHz band	the frequency band 1710-1880 MHz
26 GHz band	the frequency band 24.25-27.5 GHz
3.5 GHz band	the band 3.4-3.6 GHz (also sometimes designated as the band 3400-3600 MHz or the IMT3500 band)
3400-3600 MHz band	the band 3.4-3.6 GHz (also sometimes designated as the band IMT3500 band or the 3.5 GHz band)
38 GHz band	the frequency band 37-40.5 GHz
42 GHz band	the frequency band 40.5-43.5 GHz

450 MHz band	the band 450-470 MHz, also referred to as the IMT450 MHz band
5G	Fifth Generation, used for referring to telecommunications technology that is in line with IMT-2020
ARPU	Average Revenue Per User
CRASA	Communication Regulators' Association of Southern Africa
E-band	The frequency band 71-76 / 81-86 GHz
ECA	Electronic Communications Act of 2005, as amended (Act No 36 of 2005)
ECNS	electronic communications network service
ECS	electronic communications service
FDD	frequency division duplex
GHz	gigahertz
ICASA / the Authority	Independent Communications Authority of South Africa
IECNS	individual electronic communications network service
IECS	individual electronic communications service
IMT	International Mobile Telecommunications
IMT-2020	The vision of the ITU for IMT, spectrum and technology-wise, from 2020 onwards (In industry this is commonly associated with 5G technology)
IMT3500 band	the band 3.4-3.6 GHz (also sometimes designated as the band 3400-3600 MHz or the 3.5 GHz band)
IMT450 band	the band 450-470 MHz band, also referred to as the 450 MHz band
IMT700 band	the frequency band 694-790 MHz
IMT800 band	the frequency band 791-862 MHz
ITU	International Telecommunications Union
ITU-R	ITU Radiocommunication Sector
Liquid Telecom	Liquid Telecommunications South Africa Proprietary Limited
LTE	Long Term Evolution (a standard for wireless communication)
MHz	megahertz
ms	millisecond
NRFP	National Radio Frequency Plan (a plan containing the table of frequency allocations and updated approximately every four years)
PSTN	public switched telecommunication network
PSTS	public switched telecommunication service
RF	radio frequency
RFSAP	Radio Frequency Spectrum Assignment plan, a plan used by ICASA as part of a frequency migration plan
SA Connect	South Africa Connect: Creating Opportunities, Ensuring Inclusion; South Africa's Broadband Policy; 20 November 2013
TDD	time division duplex
Telecommunications Act	Telecommunications Act of 1996 (Act No 103 of 1996)
WRC	World Radio Conference of the ITU
WRC-15	World Radio Conference of the ITU held in 2015
WRC-19	World Radio Conference of the ITU to be held in 2019

3 INTRODUCTION

- 3.1 Liquid Telecom herewith submits its comments on the Draft IMT Roadmap 2018, published by ICASA on 9 November 2018 in Government Gazette No 42021.
- 3.2 Liquid Telecom expresses its appreciation for the opportunity to make comments on the Draft IMT Roadmap.
- 3.3 This submission mainly focuses on those aspects, and therefore the frequency bands, more pertinent to Liquid Telecom's immediate future.

- 3.4 The main frequency bands of concern are the:
 - 3.4.1 850 MHz band, aspects of which are interrelated to the IMT700 and IMT800 bands (the latter also separately discussed); and
 - 3.4.2 3400-3600 MHz band.
- 3.5 As for the structure of the document:
 - 3.5.1 In Section 4 we have provided ICASA as much insight as possible into Liquid Telecom's background and the history of all its spectrum and service licences;
 - 3.5.2 Sections 5 to 9 set out the scope that Liquid Telecom's current licences afford and details the current and future use of that spectrum for IMT, to date.
 - 3.5.3 Section 10 sets out Liquid Telecom's proposals in relation to the Draft IMT Roadmap, hoping that these will receive serious consideration before the Roadmap is finalised.
 - 3.5.4 Section 11 sets out some general comments, while section 12 is devoted to a short Summary and Conclusion.

4 **BACKGROUND AND HISTORY**

- 4.1 The Liquid Telecom group is the leading independent data, voice and IP provider in eastern, central and southern Africa. It supplies fibre optic, satellite and international carrier services to Africa's largest mobile network operators, ISPs and businesses of all sizes. It also provides award winning data storage and communication solutions to businesses across Africa and beyond.
- 4.2 Liquid Telecom South Africa started as the Second National Operator (SNO) in 2005 and was later renamed Neotel. The name was changed again to Liquid Telecom South Africa, following the acquisition Neotel by Royal Bafokeng Holdings and the Liquid Telecom group, indicating the emergence of a revitalised operator.
- 4.3 Liquid Telecom has a legacy of various licences, in the names of the SNO, Neotel and now Liquid Telecom, since the first licence was issued to it in 2005.

The SNO's PSTS Licence Issued in 2005

- 4.4 Liquid Telecom's predecessor, SNO Telecommunications (Pty) Ltd, was licenced in 2005 to become the so-called second national operator (SNO), in terms of Telecommunications Act of 1996 (Act No 103 of 1996).
- 4.5 The concept of the second national operator came about through a policy of "managed liberalisation" of the erstwhile Department of Communications. The purpose of introducing the SNO was to promote competition to the PSTN operator at the time, more specifically

Telkom. The SNO was meant to compete with Telkom, but was not intended to compete, at least not directly, with the mobile cellular service licensees. It therefore was not allowed to provide mobile cellular services.

- 4.6 There were three mobile cellular operators at the time – Cell C, MTN and Vodacom.
- 4.7 The SNO was licensed by ICASA for the purpose of providing a public switched telecommunication service (PSTS). These were services essentially provided through a public switched telecommunication network (PSTN), such as the network of Telkom at the time. The PSTS licence was issued to the SNO on 9 December 2005. A copy of this PSTS licence is provided in Appendix 2.
- 4.8 The PSTS licence, granted by ICASA in terms of Section 32B of the Telecommunications Act gave the SNO the right to provide national long-distance and international telecommunication services; and (ii) local access telecommunication services and public pay-telephone services (Section 36(1)(a) of the Telecommunications Act). The SNO was also designated to receive and was entitled to use, amongst others, certain radio frequency spectrum for providing the service. Section 32B(1) of the Telecommunications Act provides that the SNO “shall be granted a public switched telecommunication service licence on no less favourable terms and conditions than those of the licence held by Telkom”.
- 4.9 Section 4 of the abovementioned PSTN licence therefore referred to “radio frequency spectrum”. It was stipulated that use of the radio frequency spectrum licences by the Licensee shall be determined by the Authority. No further details of spectrum were given in the PSTS licence.

Converted Service Licences

- 4.10 The abovementioned service licences were converted to electronic communication service (ECS) and electronic communication network service (ECNS) licences in 2009 in terms of the ECA, specifically:
- 4.10.1 IECS licence 004/IECS/JAN/2009
- 4.10.2 IECS licence 004/IECNS/JAN/ 2009
- 4.11 The restriction on providing mobile services that had applied in terms of the Telecommunications Act, fell away on commencement of the ECA or at the time of the conversion of the licences in terms of the ECA. Liquid Telecom has been free to provide mobile services, including broadband mobile services, in any of the frequency bands regulated for mobile services by ICASA since at least 2009. The use of the frequency bands must be in line with the ITU Region 1 Table of Frequency Allocations and Recommendations and the National Radio Frequency Plan.

Liquid Telecom's Spectrum Licences

4.12 Two spectrum licences were issued by ICASA shortly after the PSTS licence mentioned above was issued. These are discussed below:

4.13 Spectrum licence for point-to-point and point-to-multipoint systems

- On 12 April 2006 a spectrum licence was granted to the SNO. The licence specified a point-to-point and point-to-multipoint system. It stipulated that the system shall be used for providing various telecommunication services, without specifying of what these services should consist. However, we submit that it is a reasonable assumption that these were to be fixed services in view of the PSTS licence.
- The above licence included spectrum in the 3.4-3.6 GHz band, which we will henceforth refer to as the 3.5 GHz band.
- In addition, in this licence, spectrum in various other frequency bands – from the 10 GHz band to the 38 GHz band – were included. These bands were mainly for point to point links, more specifically microwave links.
- This spectrum licence became known as a “bulk licence” when ICASA, in later years, dealt with a licence conversion process required by the ECA.

This “bulk” spectrum licence provided the SNO with various capabilities:

4.13.1 Backbone and backhaul network

By using the frequency bands of 7 GHz and above, the SNO was able to deploy a fixed backbone network making use of a combination of microwave links and fibre-optic cables. Links using microwave frequencies in many instances obviated the need for trenched fibre-optic cables and could provide connectivity more quickly and at much lower cost, though with attendant limitations.

4.13.2 Fixed access using the 3.5 GHz band

- The 3.5 GHz spectrum provided the SNO with a capability to provide fixed access at relatively high broadband speeds to enterprises (businesses) and residential end-users who could afford high-speed broadband.
- Although the 3.5 GHz spectrum was useful for high broadband speeds, it was not economical for wide-area coverage as there was no economically viable technology operating in the 3.5 GHz band at the time that would allow such wide-area coverage. It was accordingly not suitable for wide-area last-mile connectivity.

4.14 800 MHz licence

- On 29 April 2009, soon after the granting of the abovementioned bulk licence, an 800 MHz spectrum licence was granted to the Neotel (the new name for the SNO at this point in time). The 800 MHz spectrum for which Liquid Telecom was licensed for access effectively comprised $2 \times 4.92 = 9.84$ MHz of RF bandwidth. The band is sometimes referred to as the 850 MHz band, in essence nomenclature used in the Americas (ITU Region 2).
- The 800 MHz licence was the result of a very lengthy process of 'finding' spectrum for Neotel by ICASA at the time.
- It is likely that granting the 800 MHz licence was the only way that ICASA could make available economically viable spectrum to Neotel for fixed use, in order to serve businesses and residential users. Relatively modern technology for the time (CDMA2000), albeit cellular mobile technology, was available for using the 800 MHz spectrum. However, Liquid Telecom (then Neotel) was not allowed to use it for mobile services.
- The CDMA2000 technology, was originally developed in North America (ITU Region 2) and operated in the North American 850 MHz band, amongst others as a mobile technology. The 850 MHz band was a band that fitted into frequency plans of ITU Region 2 and to some extent, in ITU Region 3. While the band fitted into ITU Regions 2 and 3, it did not fit into the majority of the European band plans (plans devised for ITU Region 1). As South Africa falls in ITU Region 1, the band was an odd one to use in South Africa.
- It appears that given the pressure to provide regulatory scope to Neotel to become an effective second national PSTN operator, ICASA permitted the use of 800 MHz spectrum by Neotel. It appears that ICASA was willing to find a solution for Neotel's requirement for spectrum below 1 GHz. Based on testing that had commenced even before the SNO was licensed, it appears that the Authority was prepared to deviate from the National Frequency Band Plan at the time, in order to ensure that Neotel received an assignment of suitable spectrum.
- The 800 MHz spectrum was made available to Neotel based on extensive research and planning by ICASA, followed by a public process. It resulted in the abovementioned spectrum at 800 MHz, already in use by TV broadcasting at the time, to be made available to Neotel. It was possible to work around some of the TV transmissions, mainly channels 65 and 66, in the TV broadcasting band 470-854 MHz. However, the spectrum was not fully clear; Neotel could use certain CDMA2000 channels in certain areas, but had to use other channels in other areas. ICASA required Neotel to produce the site coordinates with a plan of which channels to use. ICASA, having made its own investigation as to the prevention of harmful interference and doing some coordination, authorised specific CDMA channels for use on a location (site) specific basis.

- The spectrum at 800 MHz granted for CDMA2000 was because there was no other suitable access spectrum available at the time. Neotel at the time had spectrum in the 3.5 GHz band that could be used for access, but that was not economical for voice services and lower capacity data users. Neotel was in desperate need of spectrum below 1 GHz.
- Operating at frequencies below 1 GHz is normally much more suitable for area coverage because of favourable propagation conditions. This is because technologies using spectrum below 1 GHz can provide area coverage with fewer base stations than in higher frequency bands. It enabled Neotel to roll out area coverage at lower cost than at higher frequency bands.
- In terms of its service licence Neotel could only provide PSTN services. Although CDMA2000 was a mobile technology, Neotel was licensed to only provide a fixed-line service. It could accordingly not make full use of the technology and could not provide hand-portable and vehicle-based devices or mobility. Only fixed-line type communication could be provided for home and business use.
- The key positive result of access to 800 MHz spectrum was that Neotel could use CDMA2000 technology as the last-mile technology for access to small businesses and residential users at much lower cost than the point-to-multipoint technology operating in the 3.5 GHz band.
- Neotel invested heavily in wireless fixed-line services since its licences were issued. It even went to the trouble of getting a manufacturer to develop a fixed-line desk phone that made use of the 800 MHz network. Neotel was able to provide good alternative PSTN services using its 800 MHz network over the years. Despite all the problems with 800 MHz, it was reasonably cost-effective for Neotel to deploy CDMA2000 technology for its fixed-line services – voice and data services – addressing the lower ARPU market category, such as residences and small businesses and specifically for voice services.

4.15 **Converted spectrum licences**

During the process of converting licences issued in terms of the Telecommunications Act to licences under the ECA in 2010, the aforementioned bulk spectrum licence was split into licences for each frequency band.

5 **DELIVERING IMT-2020 MOBILE BROADBAND WITH CURRENT LICENCES**

Liquid Telecom's licences allow it to deploy wired and wireless electronic communications networks across the country and deploy electronic communications services over those networks (and third-party networks).

Some of the licences are for spectrum in frequency bands already allocated for IMT or identified for IMT.

The impact of the IMT-2020 Roadmap on these various licences is discussed below.

6 **800 MHZ LICENCE FOR MOBILE BROADBAND SERVICES**

6.1 Liquid Telecom has made a number of submissions regarding the current 800 MHz spectrum and indicated that this spectrum is not suitable for mobile high-speed broadband access, especially for urban use. From that point of view, we believe the spectrum is not suitable for IMT in South Africa.

6.2 Although the converted IECNS licence allowed Neotel to provide mobile services, the 800 MHz spectrum is not suitable for mobile services. It simply is not feasible for the delivery of mobile high-speed broadband services and, therefore IMT. What is more, it has become increasingly less feasible for broadband and IMT as time progressed.

The reasons why the 800 MHz spectrum is unsuitable for mobile broadband mobile services and, therefore, IMT include:

6.3 **Too little spectrum for broadband**

- The spectrum assigned to Liquid Telecom in the 800 MHz band is only 2 x 4.92 MHz. However, in terms of ICASA's draft Radio Frequency Spectrum Assignment Plan published in GG 41082 on 1 September 2017, this may be extended minimally to 2 x 5 MHz in places where there is no mutual interference with broadcasting. This amount of spectrum is not enough for the upgraded CDMA2000 version (EV-DO). Should this technology be used, Liquid Telecom will not be able to provide market-related levels of broadband capacity in this band.
- The extent of 800 MHz spectrum assigned to Liquid Telecom is also not sufficient for the deployment of alternative broadband technologies, such as LTE – a technology that in this band is primarily manufactured for ITU Regions 2 and 3. It is well-known that too little spectrum could lead to sluggish behaviour (e.g. with web browsing), stalls (e.g. when watching video), complete failure (the application/system has to be restarted) and communications protocols behaving erratically (e.g. transmission control protocol).
- The demands for broadband capacity today are such that this 2 x 5 MHz of spectrum will simply not suffice for a market competitive service and may not even meet the requirements of a broadband service in terms of SA Connect. Simply put, this amount of spectrum is not adequate for IMT, other than in perhaps the deepest of rural areas.

6.4 **Market too small for equipment vendors**

- Liquid Telecom currently experiences a problem of “network economics” in the 800 MHz band, in that it does not make economic sense to procure technologies in Africa that operate in frequency bands not conventional in ITU Region 1 (common to the whole of

Africa and Europe). Although Liquid Telecom had little choice in 2008, when it wanted to start rolling out an access network, it now has had experience of using an odd frequency band not common to ITU Region 1 and that experience has not been favourable.

- Over the years that Liquid Telecom has been using CDMA2000 technology, it is clear that there are no economy-of-scale advantages for manufacturers (primarily international manufacturers) and lack of scale impacts Liquid Telecom as a purchaser. A one-operator market is simply too small for manufacturers to set up marketing, sales and maintenance infrastructure in South Africa.
- The poor support, as a result of only sporadic use of CDMA2000 technology in SADC countries, has led to the dismantling of CDMA networks in these countries. In the few cases where this has not yet happened, it will not be long before they will shut down. The networks are usually replaced by GSM or LTE technology, the latter only where sufficient spectrum is available for broadband use.
- Because of the poor future outlook for CDMA2000 in ITU Region 1, Liquid Telecom stopped investing in its network eight years ago, due largely to the lack of availability of new equipment. Even second-hand equipment is becoming scarce and shipping costs are high and subject to lengthy delays. Liquid Telecom currently maintains the service for existing customers and Liquid Telecom will have no option but to shut down the CDMA2000 network soon.
- Because of the size of the market for equipment in this non-European and non-ITU-Region 1 frequency band, Liquid Telecom is of the opinion that using this band for IMT will not be success.

6.5 **SADC band planning is focused on ITU Region 1 harmonisation**

Frequency band planning within CRASA and the regulators of the SADC region has also seen a move to IMT spectrum that is in line with ITU Region 1. A strong consideration is for the SADC to align its frequency allocations with European frequency allocations, so as to get the benefits of harmonisation and economies of scale. Harmonisation leads to easier cross-border coordination and less harmful interference. Economy of scale advantages come about through harmonisation effectively enlarging the market of the SADC region. In summary, there is nothing in the planning of SADC that benefits the continuation of using this frequency band for IMT.

6.6 **Marketing services using odd technology requires odd user devices**

- Liquid Telecom has experienced serious problems marketing the CDMA2000 service. Those problems will be exacerbated if Liquid Telecom were to try marketing a mobile broadband service based on a North American (ITU Region 2) standard and technology.

- Liquid Telecom could be the only operator in SADC and the rest of Africa that requires mobile phones and devices that conform to a North American (ITU Region 2) standard as part of the suite of standards with which the device must conform. Because of relatively low volumes as compared to the total device market in South Africa, SADC and Africa, the devices are likely to not be competitively priced. Prices of devices operating in the common Region 1 frequency bands such as 900 MHz, 1800 MHz, 2100 MHz, 2.6 GHz and 3.5 GHz – all Region 1 IMT frequency bands – will far outweigh the prices of odd, Region 2 devices.

6.7 **Defeating one of the purposes of number portability**

For or a person buying a phone or device that only meets the Region 2 standard, there would be no option to switch to another operator while retaining that device. That would be contrary to the purpose of the ICASA Number Portability Regulations (both the 2005 Regulations as well as the 2018 Regulations which are yet to come into effect). It will be a severe impediment to porting if a person is allowed to retain his/her number when switching to another operator, yet cannot use their handset. This is likely to reduce possible inbound porting to Liquid Telecom from existing mobile broadband operators.

6.8 **ICASA's draft RFSAP for 850 MHz**

- ICASA published a draft RFSAP for the 800 MHz band in GG 41082 on 1 September 2017. The draft RFSAP proposes that Liquid Telecom's assignment be adjusted to 2 x 5 MHz of spectrum that could be used by Liquid Telecom's network using CDMA2000 1X and EV-DO. Should Liquid Telecom prefer, it will also be possible to use any other technology – such as LTE – capable of operating in this band.
- This plan, however, does not solve the problems referred to above. The solution proposed by the RFSAP is not suitable for rolling out an IMT-2020-based network for mobile high-speed broadband access, especially in urban areas.
- Admittedly, ICASA's proposed solution will allow Liquid Telecom to retain its CDMA-based voice services for the next few years. Liquid Telecom certainly needs a way to keep on providing voice services to its current roughly 200 000 users of the CDMA2000 network operating in the 800 MHz band. Liquid Telecom therefore hopes it would be able to use at least one RF CDMA channel of 1.23 MHz until such time as Liquid Telecom could deploy voice services in IMT800 spectrum (should Liquid Telecom be able to get access to this spectrum). Fortunately, the use of this one CDMA channel is not dependent on migrating to the new position in the band. And because of the great cost and great inconvenience that will be caused to Liquid Telecom's consumers during migration, as well as the risk of unknown technologies deployed in the licence exempt portion of the 800 MHz band – which could possibly result in radio-frequency interference – Liquid Telecom would prefer the migration to not take place in the manner proposed in the RFSAP.

- Liquid Telecom has provided a submission in respect of the RFSAP as well as an extensive post-hearing submission, dated 18 September 2018. Liquid Telecom encourages the Authority to refer to these submissions in the context of making decisions on IMT (including IMT-2020) in respect of the so-called 850 MHz band. Here we will only restate the conclusions from the post-hearing submission in the context of their relevance to IMT (including IMT-2020).

6.9 **Summary of Responses to the Draft RFSAP**

- The notion of moving Liquid Telecom's CDMA2000 network down by 2 MHz from the current spectrum position hails from the IMT Roadmap 2014, published as Notice 1009 of 2014 in GG 38213 on 14 November 2014. Neotel (as Liquid Telecom was known at the time) made various submissions in respect of the IMT Roadmap of 2014. It should be kept in mind this publication and Liquid Telecom's inputs occurred more than four years ago, when CDMA2000 equipment was still within its usable lifetime expectancy. Now, four years later and with the equipment essentially obsolete, the situation for Liquid Telecom has deteriorated dramatically. As can be seen from the preceding sections there are huge problems facing Liquid Telecom if it is forced to migrate to the frequency ranges proposed by the Draft RFSAP.
- CDMA2000 technology has served Liquid Telecom well over the past 10 years. ICASA should be lauded for finding 800 MHz spectrum for Liquid Telecom's predecessor (Neotel). Liquid Telecom at that time had a great need for sub-gigahertz spectrum for its fixed services. However, the time now has come to look at phasing out CDMA technology and to bring in LTE or LTE-Advanced to serve the established customer base. New, high-speed broadband services must be offered, however not in the so-called 850 MHz frequency band. Liquid Telecom does not consider this frequency band a viable IMT band for ITU Region 1.
- With LTE on Liquid Telecom's horizon, Liquid Telecom believes the time has arrived for ICASA to abandon the legacy non-ITU-Region 1 use of the spectrum as soon as possible. This is spectrum that has served its purpose. Continuing the odd, non-Region 1, use of this spectrum should be terminated rather than perpetuated. It is not suitable as IMT spectrum for South Africa. Fortunately for ICASA, the Radio Frequency Migration Regulations and Radio Frequency Migration Plan of Notice No 352 of 2013, published on 3 April 2013 in GG 36334, puts no obligation on ICASA to proceed with publishing an RFSAP.
- Liquid Telecom will, at most, need the CDMA2000 spectrum for the next two years, in order to maintain its services that are primarily voice services, while deploying a new network. For the deployment of new technology, it's essential for Liquid Telecom to acquire new sub-gigahertz spectrum – which essentially needs to IMT spectrum. The sooner Liquid

Telecom could have suitable IMT spectrum, the sooner it could make the switch to the new network and switch off the old CDMA2000 network.

- Migrating the CDMA2000 technology to the band proposed in the Draft RFSAP is out of the question for Liquid Telecom. The age of the technology and the great cost of migrating militates against such migration. The cost will be such that it will result in serious losses to Liquid Telecom.
- Liquid Telecom is of the view that the 800 MHz frequency ranges 827.775-832.695 / 872.775-877.695 MHz, currently occupied by Liquid Telecom, should be cleared from this use of dedicated access spectrum. It will allow ICASA to get the full benefit of harmonising the regime for licence-exempt short-range devices (SRDs) with the regime of Europe (as per CEPT Rec. 70-03). ICASA could bring into the spectrum currently occupied by Liquid Telecom, those SRD bands that cannot be used now because of the CDMA2000 network. These are frequency bands that have a high profile in Europe because of 5G (IM2020). Likewise, ICASA could also make provision for extended spectrum for GSM-R. These benefits could only be obtained should Liquid Telecom vacate the band pair it is currently occupying while not moving to the band pair proposed by the Draft RFSAP. There will be no “wastage” of spectrum in the so-called 850 MHz band should Liquid Telecom rather than migrate to the proposed band, eventually entirely vacate the band. The spectrum would be used effectively and efficiently and most of it will be contributing to making IMT a success.
- Better harmonisation will benefit not only the current users of short-range devices – by removing existing and potential interference. It will also open new opportunities for operators, including Liquid Telecom, to make use of technologies such as LoRaWAN and Sigfox, as well as other technologies important for the success of 5G.
- The band proposed in the Draft RFSAP, being a band foreign to ITU Region I, also does not fit into the SADC band plan and is also not good for harmonisation in the SADC region.
- There is a lot to be gained by getting Liquid Telecom to vacate the band currently used and not to re-occupy it with an LTE technology. The spectrum would be used effectively and efficiently and most of it will be contributing to making IMT a success.

6.10 **Conclusion regarding 800 MHz for mobile use and IMT**

- From the above it is evident why Liquid Telecom has been unable to invest in 800 MHz for mobile broadband services. It has not been commercially viable for Liquid Telecom (and its predecessor Neotel) to make any major investments at 800 MHz since approximately 2010.
- We submit that Liquid Telecom made the correct decision not to invest in mobile broadband technology using the current spectrum licensed to it at 800 MHz and to not make further

investments in its fixed-line network at these frequencies. Similarly, we believe that Liquid Telecom will not be commercially successful in making investments in an IMT (including IMT-2020) technology in the so-called 850 MHz frequency band.

- We believe ICASA should not try to “artificially” force the so-called 850 MHz band spectrum to try and become IMT spectrum. Liquid Telecom believes that it will only benefit from migration if ICASA should focus on frequency bands that are squarely within ITU Region 1 – bands that are common to a large leading market, such as Europe.
- Liquid Telecom will much rather invest, for its sub-gigahertz spectrum needs, in IMT700 and IMT800 spectrum. This is spectrum that squarely fits into an IMT regime for South Africa, SADC, the rest of Africa and Europe.

7 1800 MHZ LICENCE ACCOMMODATES A FIXED NETWORK

7.1 On 18 December 2010 a spectrum licence for 1800 MHz was granted to Neotel for 2 x 12 MHz of spectrum (Appendix 5).

7.2 Liquid Telecom has been rolling out a fixed-line network, making use of LTE technology, in the 1800 MHz band since early 2013.

7.3 It should be noted that the focus of Liquid Telecom’s business since the PSTS licence was issued on 9 December 2005 (Appendix 2), was fixed-line access – as required by the PSTS licence. It was difficult to service all fixed-line applications using CDMA2000 technology in the 800 MHz band at the time. Some users required greater broadband speeds than the CDMA technology could provide. It was therefore important to apply to ICASA for 1800 MHz spectrum for this purpose. Fortunately, an 1800 MHz spectrum licence was granted.

7.4 The 1800 MHz spectrum is currently deployed in a fixed mode, using LTE technology. It typically serves residential and small business users. This is deployed using either an indoor or outdoor antenna (as coverage requires) and the package includes a WiFi router as part of the CPE to allow WiFi coverage on the site. Currently there are roughly 3500 customers who enjoy a broadband service by means of the 1800 MHz LTE technology.

7.5 Liquid Telecom is already at an advanced stage in the planning of deploying a wholesale open access network using this spectrum. Given the market demand for mobile broadband services, Liquid Telecom is having to re-plan its use of this spectrum band to allow for mobile broadband access.

8 THE 3.5 GHZ LICENCE CURRENTLY PROVIDES FOR A FIXED FDD NETWORK

We set out below the status of Liquid Telecom’s 3.5 GHz licence and the current and prospects of future use of that spectrum for IMT-2020-based broadband services.

8.1 Point-to-multipoint network

- ICASA's authorisation for Liquid Telecom to use the 3.4-3.6 GHz band (commonly called the 3.5 GHz band) was first granted on 12 April 2006. The authorisation was given in the spectrum "bulk licence" that comprised various frequency bands. The licence was for point-to-point and point-to-multipoint systems. The latter type of system was relevant to the 3.5 GHz band.
- The 3.5 GHz portion of the "bulk licence" was converted to a 3.5 GHz spectrum licence dated 25 April 2014. In terms of the channel plan specified, the licence continues to provide for point-to-multipoint systems.
- Since the licence of 2006 was issued, Liquid Telecom has been using the 3.5 GHz band for point-to-multipoint systems. Currently Liquid Telecom has WiMAX point-to-multipoint systems deployed in the band for fixed services.
- There are 99 main nodes (sites) countrywide, with point-to-multipoint networks branching out from these nodes. A large proportion of the point-to-multipoint networks are WiMAX-based. In addition to WiMAX, Liquid Telecom also utilises a TDMA-based point to multipoint system in certain areas.

8.2 Problems in continuing with WiMAX

It is not economically feasible for Liquid Telecom to make further investments in WiMAX, for two reasons: (a) the technology having reached end of life and (b) as a result of a changed regulatory situation.

8.2.1 Obsolescence

- Although the WiMAX technology has served Liquid Telecom well over the years since it was first introduced, this is no longer the case. Approximately 10 years ago WiMAX was considered as a potential competitor to LTE. However, that promise did not transpire, and the WiMAX standard has not achieved a sustainable level of adoption. The LTE standard has emerged as the preferred standard for deployment globally.
- As a result, WiMAX has come to the end of its life. It is no longer well supported by vendors, including Liquid Telecom's vendor.
- As a result, it is becoming increasingly difficult to maintain quality of the WiMAX service in the 3.5 GHz band.
- Liquid Telecom is also finding it increasingly difficult – and with escalating costs – to increase its market penetration.

- Another very important consideration is that the WiMAX technology deployed by Liquid Telecom is not capable of providing a mobile service. Liquid Telecom is of the view that it needs to move into the sphere of mobile use, in order to meet user requirements, achieve national policy objectives as well as commercial imperatives.

8.2.2 Changed regulatory environment

- The Authority has indicated, through various migration plans and regulations and by means of the National Radio Frequency Assignment Plan of 2018, that it has a preference for TDD spectrum use in the 3.5 GHz band. ICASA has indicated that there will need to be a migration to mobile IMT, more specifically TDD. From a regulatory perspective it would be highly inadvisable for Liquid Telecom to make further investments in its version of WiMAX and from an economic perspective further investment in Liquid Telecom's current system will be wasteful. Making further investment in WiMAX would also aggravate the difficulty of migration. It would thus be contrary to the intentions of ICASA's RFSAP for the 3.5 GHz band.
- Liquid Telecom welcomed the changes that ICASA is initiating through the migration plans and regulations, especially the RFSAP for the 3.5 GHz band.

8.2.3 Liquid Telecom's plans in the 3.5 GHz band

In the light of the regulatory changes referenced above, Liquid Telecom recently applied for an amendment of its spectrum licence to have the two blocks of FDD spectrum consolidated into a single block of 56 MHz of spectrum. Should the amendment be granted Liquid Telecom will be able to invest in IMT-2020 technology.

9 **USE BY LIQUID TELECOM OF CURRENT SPECTRUM FOR IMT-2020**

- 9.1 Both the market and national policy imperatives are driving Liquid Telecom to deploy IMT-2020 based high-speed broadband access for mobile use and fixed access. As a result, Liquid Telecom is in urgent need of spectrum for IMT-2020 based high-speed broadband access for mobile use and fixed access. At present Liquid Telecom has no suitable spectrum for that purpose.
- 9.2 Liquid Telecom's current 800 MHz band assignment is, for the reasons given above, not suitable; unfortunately the revised 800 MHz spectrum assignment proposed in the draft RFSAP is likewise not suitable.
- 9.3 The 1800 MHz band is current occupied by a fixed network and fundamentally also does not have enough spectrum for a modern IMT-2020 type network.
- 9.4 The only possibility Liquid Telecom has been able to identify is in the 3.5 GHz band and accordingly Liquid Telecom has applied for an amendment of its 3.5 GHz licence, so that

the spectrum is converted from 2 x 28 MHz of FDD spectrum to 56 MHz of IMT TDD spectrum.

- 9.5 Due to the favourable propagation conditions of the 800 MHz band, as compared to higher frequency bands, it will be much more cost-effective to deploy IMT800 spectrum for IMT-2020 applications for rural areas than it would be to deploy spectrum in the higher frequency bands in rural areas. IMT800 spectrum for IMT-2020 will require fewer base-station sites to cover an area, as compared to higher frequency bands. On average, a doubling of the frequency leads to a fourfold increase in the number of base stations required.
- 9.6 There is a significant cost penalty in deploying networks in higher frequency bands and it will not be cost-effective to deploy 3.5 GHz IMT-2020 technologies in deep rural areas. However, it may be of use in smaller cities and larger towns, including areas where there are dense concentrations of people, especially people who are hungry for the services that need high broadband capacity.

10 LIQUID TELECOM'S PROPOSALS IN RELATION TO IMT-2020

In what follows Liquid Telecom comments on certain additional frequency bands in which it currently has an interest:

10.1 450-470 MHz (450 MHz band)

- 10.1.1 Under normal circumstances Liquid Telecom may have been interested in this spectrum. However, it is too little spectrum for IMT-2020 for more than one operator, other than in perhaps the deepest rural areas.
- 10.1.2 There are other concerns with this band. Currently there are thousands of two-way radios operating in this band. We are of the opinion that unless these users can relatively easily be migrated to other parts of the 400 MHz band, it's unlikely for the band to be cleared totally of these radios in many years to come. If not cleared, there could be serious harmful interference between the radios and any IMT-2020 systems deployed in the band.
- 10.1.3 In view of the situation that has existed over the past few years, where some two-way radio users in the band could not be migrated to another position in the 400 MHz band – which technically would have been possible – because of the tunability of the radios, a problem is likely to arise. There is desperation on the part of two-way radio users to be able to carry on communicating. We would therefore not be surprised if many of these radios, the licences of which have been terminated, are being used illegally. That presents an even greater challenge to ICASA to clear the band. It effectively means that, as no record of the radios now exist with ICASA, the only knowledge of their existence would have to come from physically monitoring the frequency band – by means of ICASA's fixed and mobile monitoring stations. It might be a great challenge, especially because by nature of the use

of two-way radios some might only be on the air for a few minutes per day or a few minutes per week.

10.1.4 Unless ICASA can convincingly find a way of migrating the two-way radio users, Liquid Telecom would be very sceptical to use any of this spectrum for IMT-2020.

10.2 **IMT700 and IMT800 MHz bands**

10.2.1 Liquid Telecom yet has no licences for spectrum in any of these two bands.

10.2.2 Liquid Telecom would like ICASA to take account of the fact that there is no other possibility for Liquid Telecom to provide, in future, any IMT-2020 services in a sub-gigahertz band – something that is imperative for Liquid Telecom – with spectrum other than in one of the IMT700 and IMT800 bands.

10.2.3 Liquid Telecom has pointed out in Section 5.4.6 that it is neither in the interests of Liquid Telecom, ICASA and the country, to try and deploy IMT-2020 spectrum in the so-called 850 MHz band, it being a band that does not belong in ITU Region 1.

10.2.4 Liquid Telecom, in the submission of made to ICASA on the Draft Frequency Migration Plan of Notice 494 of GG 41854, in Part A and Part B argued for the importance of a set-aside, specifically for Liquid Telecom, of 2x5 MHz of either IMT700 or IMT800 spectrum

10.2.5 Liquid Telecom proposes that the above is seriously considered for the finalisation of the IMT Roadmap.

10.3 **850 MHz band**

10.3.1 Referring to the conclusions on this band, defined as the frequency ranges 825-830 MHz, paired with 870-875 MHz, in relation to Liquid Telecom (previously Neotel) on page 71 of the Draft Roadmap, please note that we do not agree with this approach.

10.3.2 Liquid Telecom's discussion of this subject above and in its various submissions, explains why Liquid Telecom considers it infeasible to persist with plans to consider the spectrum as suitable for IMT2010.

10.3.3 Liquid Telecom has also made an extensive submission on this band after the public hearings on the RFSAP for 850 MHz –dated 18 September 2018.

10.3.4 Liquid Telecom recommends that ICASA once and for all discards this essentially ITU Region 2 frequency band from any frequency planning for IMT (including IMT-2020).

10.3.5 There is no doubt that Liquid Telecom cannot do without sub-gigahertz spectrum, as that is needed for economic and cost-effective rural rollout.

- 10.3.6 We propose ICASA that considers other equivalent sub-gigahertz spectrum for Liquid Telecom, such as IMT700 and IMT800 spectrum (see Section 6.2)
- 10.4 **1710-1785 / 1805-1880 MHz (1800 MHz band)**
- 10.4.1 Liquid Telecom is licensed – per spectrum licence No 00-523-655-6 – to use spectrum in the paired bands 1710-1785 / 1805-1880 MHz.
- 10.4.2 The above band has already been allocated to IMT by ICASA – in fact it has been in the National Radio Frequency Plan for many years. ICASA’s allocation is perfectly in line with the SADC band plan and the band plans used in Europe. We propose that it remains to be IMT spectrum, in order to get the benefits of being harmonised with SADC and Europe.
- 10.4.3 The frequency ranges for which Liquid Telecom is licensed is 1710.3-1722.3 / 1805.3-1817.3 MHz. Liquid Telecom currently uses these frequency ranges to provide fixed broadband services to some of its customers, mainly business customers. ICASA has correctly represented the current assignment in Fig. xx
- 10.4.4 Liquid Telecom will be expanding its services to also provide wholesale services – therefore services to resellers.
- 10.4.5 Liquid Telecom needs to provide the services as described above in this band for the foreseeable future. Liquid Telecom requests that ICASA, in its IMT Roadmap, makes provision for this use. Liquid Telecom further requests that ICASA retains the current assignment of spectrum to Liquid Telecom in this band.
- 10.5 **3400-3600 MHz band (IMT3500)**
- 10.5.1 The allocation of this band in the National Radio Frequency Plan 2018 to, amongst others, the MOBILE service – as per Section 7.4.2 of the IMT Roadmap – is supported.
- 10.5.2 Furthermore, the indication in the National Radio Frequency Plan – as per Section 7.4.2 – that as far as MOBILE is concerned, a typical application is IMT in the TDD duplex mode, is supported.
- 10.5.3 Liquid Telecom also supports the choice of the F1 frequency arrangement – for TDD only – as per Section 4.2 of the Radio Frequency Spectrum Assignment Plan of GG 38640.
- 10.5.4 Liquid Telecom has also noted that reference is made to the abovementioned Radio Frequency Spectrum Assignment Plan in the National Radio Frequency Plan 2018, published in GG 41650 on 25 May 2018. In addition, the National Radio Frequency Plan 2018 mentions F1, in Footnote 9. The NRFP therefore clearly endorses the F1 frequency arrangement. Liquid Telecom considered this to be very significant, as the preceding 2013 National Radio Frequency Plan did not provide for TDD use of the 3.5 GHz band. It therefore precluded the use of the F1 frequency arrangement. The fact that the National

Radio Frequency Plan of 2018 is now fully in agreement with the RFSAP for the band, including TDD use, allowed Liquid Telecom to plan for the amendment of its spectrum licence. The original licence was for two blocks of FDD spectrum, whereas Liquid Telecom requires one block of TDD spectrum, aligned with the F1 frequency arrangement. The result was that Liquid Telecom has submitted an application to ICASA for the technical amendment of the licence from two FDD blocks of 28 MHz of spectrum each to one TDD block of 56 MHz of spectrum

- 10.5.5 Liquid Telecom notes that the progression from the IMT Roadmap of 2014 (GG 38213 of 14 November 2014), where the frequency arrangement F2 was also an option, to one of only F1, is supported. The 200 MHz of the band 3400-3600 MHz will not be enough, in employed as FDD spectrum, to cater for IMT-2020 requirements in the longer term. The fact that many manufacturers have become focused on developing TDD equipment, makes it imperative to prescribe the use of TDD and the F1 frequency arrangement.
- 10.5.6 Based on the abovementioned points Liquid Telecom is of the view that the following text in Note 8 of Section 3.2 (p. 27/183) is out of place: “Considering that the current SA plan using Tx-Rx of 100 MHz, option F2 is recommended for SA. Refarming of current licensees may be required to align with this option.” This may be a legacy of thoughts at the time of producing the IMT Roadmap of 2014. It is clear from the RFSAP and the National Radio Frequency Plan that ICASA has advanced beyond the point of considering the F2 frequency arrangement a viable option. Liquid Telecom is fully in agreement with RFSAP and National Radio Frequency Plan in having decided on F1 as the only viable option for South Africa.
- 10.6 **24.25-27.5 GHz (26 GHz band)**
- 10.6.1 Liquid Telecom notes that this band, already allocated to MOBILE, will be studied with a view to an IMT-2020 identification.
- 10.6.2 Liquid Telecom would like ICASA to note that Liquid Telecom has been licensed – in terms of licence No 525-955-7 – for fixed links in this band.
- 10.6.3 Liquid Telecom has five frequencies of an RF channel width of 28 MHz. Centre frequencies are 25179/26187 MHz; 25207/26215 MHz; 25235/26243 MHz; 25263/26271 MHz and 25291/26327 MHz. These frequencies span a total range of 25165-25305 / 26173-26313 MHz. This is equivalent to 2 x 140 MHz.
- 10.6.4 There is a possibility that Liquid Telecom may in future need another channel, more specifically the channel 25319/26327 MHz.
- 10.6.5 Liquid Telecom has several fixed links operating in this band.

- 10.6.6 Liquid Telecom does not have any objection to ICASA allocating this band to IMT, provided adequate notice is given of ICASA's plans for allocating the band to IMT and ultimately, should a migration process be required, to give reasonable time for that.
- 10.6.7 Liquid Telecom recommends that ICASA engage with Liquid Telecom, should ICASA require more details about the use of spectrum in this band by Liquid Telecom, for the purpose of allocating the occupied band, or any part of the occupied band, to IMT.
- 10.7 **37-40.5 GHz (38 GHz band)**
- 10.7.1 Liquid Telecom notes that this band, already allocated to MOBILE, will be studied with a view to an IMT-2020 identification.
- 10.7.2 Liquid Telecom would like ICASA to note that Liquid Telecom has been licensed nationally – in terms of licence No 00-540-036-4 – for fixed links in this band, more particularly links occupying the frequency ranges 37407-37562 / 38794-38822 MHz. Centre frequencies are 37534 / 38794 MHz and the channel bandwidth is 56 MHz.
- 10.7.3 Liquid Telecom would like to draw the attention of ICASA to the fact that the channel bandwidth that has been assigned to Liquid Telecom is not 28 MHz, as stated in Section 7.5.5 on p. 105. The assignment has been done in line with channel 9 of subband A of the chart given in Appendix D on p. 139. The channel bandwidth for this subband is 56 MHz.
- 10.7.4 Liquid Telecom has several fixed links operating in this band.
- 10.7.5 Liquid Telecom does not have any objection to ICASA allocating this band to IMT, provided adequate notice is given of ICASA's plans for allocating the band to IMT and ultimately, should a migration process be required, to give reasonable time for that.
- 10.7.6 Liquid Telecom recommends that ICASA should approach Liquid Telecom, should ICASA require more details about the use of spectrum in this band by Liquid Telecom, for the purpose of allocating the occupied band, or any part of the occupied band, to IMT.
- 10.8 **40.5-42.5 GHz (part of the 42 GHz band)**
- 10.8.1 Liquid Telecom notes that this band, not yet allocated to MOBILE, will be studied with a view to IMT-2020 identification.
- 10.8.2 Liquid Telecom notes from section 7.5.6 that ICASA is of the opinion that there are no licensees in this band. However, Liquid Telecom has been licensed nationally, in terms of licence No 00-553-184-3, for fixed links in this band, more particularly links occupying the frequency range 40998-41110 / 42498-42610 MHz. The centre frequency for the links are 41054 / 42554 MHz and the channel bandwidth is 112 MHz.

- 10.8.3 Liquid Telecom would like to point out that the occupied portions of the abovementioned assignment to Liquid Telecom that falls within this band are 40998-41110 MHz and 42498-42500 MHz. The very top occupied portion assigned to Liquid Telecom, viz. 42500-42610 MHz, falls outside of the band.
- 10.8.4 Liquid Telecom has several fixed links operating in this band.
- 10.8.5 Liquid Telecom does not have any objection to ICASA allocating this band to IMT, provided adequate notice is given of ICASA's plans for allocating the band to IMT and ultimately, should a migration process be required, to give reasonable time for that.
- 10.8.6 Liquid Telecom recommends that ICASA should approach Liquid Telecom, should ICASA require more details about the use of spectrum in this band by Liquid Telecom, for the purpose of allocating the occupied band, or any part of the occupied band, to IMT.
- 10.9 **42.5-43.5 GHz (part of the 42 GHz band)**
- 10.9.1 Liquid Telecom notes that this band, already allocated to MOBILE, will be studied with a view to an IMT-2020 identification.
- 10.9.2 Liquid Telecom has been licensed nationally, in terms of licence No 00-553-184-3, for fixed links in this band, more particularly links occupying the frequency range 40998-41110 / 42498-42610 MHz. The centre frequency for the links are 41054 / 42554 MHz and the channel bandwidth is 112 MHz.
- 10.9.3 Of the occupied spectrum of the above assigned spectrum to Telecom, the portion 42500-42610 MHz falls inside this band.
- 10.9.4 Liquid Telecom has several fixed links operating in this band.
- 10.9.5 Liquid Telecom does not have any objection to ICASA allocating this band to IMT, provided adequate notice is given of ICASA's plans for allocating the band to IMT and ultimately, should a migration process be required, to give reasonable time for that.
- 10.9.6 Liquid Telecom recommends that ICASA should approach Liquid Telecom, should ICASA require more details about the use of spectrum in this band by Liquid Telecom, for the purpose of allocating the occupied band, or any part of the occupied band, to IMT.
- 10.10 **71-76 / 81-86 GHz (E-band)**
- 10.10.1 Liquid Telecom notes that this band, already allocated to MOBILE, will be studied with a view to an IMT-2020 identification.
- 10.10.2 Liquid Telecom would like ICASA to note that Liquid Telecom is a user of this self-coordinated band. ICASA has acknowledged that in Section 7.5.12.

- 10.10.3 Liquid Telecom does not have any objection to ICASA allocating this band to IMT, provided adequate notice is given of ICASA's plans for allocating the band to IMT and ultimately, should a migration process be required, to give reasonable time for that.
- 10.10.4 Liquid Telecom does not have any objection to ICASA allocating this band to IMT, provided adequate notice is given of ICASA's plans for allocating the band to IMT and ultimately, should a migration process be required, to give reasonable time for that.
- 10.10.5 Liquid Telecom recommends that ICASA should approach Liquid Telecom, should ICASA require more details about the use of spectrum in this band by Liquid Telecom, for the purpose of allocating the occupied band, or any part of the occupied band, to IMT.

11 GENERAL

- 11.1 Liquid Telecom supports ICASA's attempts to provide more IMT spectrum to licensees for the provision of broadband services. Liquid Telecom commends the professional way ICASA has approached the subject of IMT.
- 11.2 There is no doubt that making available more IMT spectrum is going to be very important for 4G and 5G, in South Africa, as in the rest of the world.
- 11.3 Liquid Telecom has the highest levels of trust in the work ICASA does within the ITU, especially the Study Groups and Working Parties that deal with the issues around IMT. Liquid Telecom is aware of ICASA's participation in these groups and welcome that ongoing engagement and trusts that it will continue to have a positive effect on the South African market. Liquid Telecom has great confidence on ICASA building its plans for IMT-2020 on ITU Regulations and Recommendations – as it is currently doing. Liquid Telecom welcomes the fact that ICASA is actively engaged in preparations for WRC-19 and that ICASA seems intent on actively participating in this very important event.
- 11.4 Liquid Telecom fully supports ICASA's endeavours to align itself with the SA Connect broadband policy. Liquid Telecom believes it should play its role in supporting this policy in the manner it conducts its business – also in relation to the use of frequency spectrum and going forward into the world of 5G (IMT-2020).
- 11.5 Liquid Telecom is aware of the contents of the referenced ITU publications, such as ITU R M.2083-0. As far as Liquid Telecom's planning for IMT-2020 is concerned, Liquid Telecom adheres to ITU R M.2083-0 in every respect.
- 11.6 Liquid Telecom welcomes ICASA's participation at the SADC regional level and the attempts to provide greater harmonisation in the use of IMT spectrum across the region.
- 11.7 Noting that ICASA has referred to a 2010 version of the SADC Frequency Allocation Plan (band plan), Liquid Telecom would like to draw ICASA's attention to the fact that there is also a 2016 version of the plan.

12 CONCLUSION

12.1 Our comments have been focused on certain frequency bands, these being the 450 MHz band, the IMT700 band and IMT800 band, the (undesirable) 850 MHz band, the 1800 MHz band, the 3.5 GHz band, the 26 GHz band, the 38 GHz band, the 42 GHz band and the E-band.

12.2 Liquid Telecom is concerned that any IMT Roadmap to result from ICASA's enquiry – and for that matter associated processes – may create a dilemma for Liquid Telecom. In this regard the issues are:

12.2.1 800 MHz spectrum (mainly for rural coverage)

The Draft IMT Roadmap suggests that the so-called 850 MHz band, a band that Liquid Telecom has used for fixed-line communication since its inception (as Neotel) should be designated as an IMT band. This spectrum is highly problematic, since it is essential spectrum used in ITU Region 2 (the Americas) and not Region 1. The spectrum is not enough for IMT-2020 and there are serious problems regarding certainty of equipment supplies, cost of equipment, harmonisation with other SADC countries and potential domestic interference problems. As an alternative, to solve the problem, we propose that a set-aside of either IMT700 or IMT800 be considered for Liquid Telecom.

12.2.2 3.5 GHz TDD spectrum

A major concern of Liquid Telecom has been the suggestion regarding the 3.5 GHz band as set out in the Draft IMT Roadmap, that consideration is to be given to possibly mandating FDD and the ITU frequency arrangement F2 in this band. This would be moving back on regulations and an RFSAP already published by ICASA for this band (3400-3600 MHz) – which mandate TDD and the F1 frequency arrangement. For Liquid Telecom an immediate problem could be that an application for an amendment to its 3.5 GHz spectrum licence made in November 2018 – in order to migrate to TDD – could be derailed. We believe that the true intention might not be what appears in the Draft Roadmap and it is perhaps wording from another document that was erroneously copied and pasted. Liquid Telecom has set out as Appendix 1, a summary of various ICASA publications that indicate that the only option for the band would be TDD and F1.

12.2.3 450 MHz band

Although Liquid Telecom is not using the 450 MHz band, we have sounded a note of caution on this band because of the difficulty of migration two-way radios out of the band.

12.3 In our view ICASA has made great strides in making progress towards IMT-2020 spectrum. We are confident that it is an important step in promoting resources for the broadband as envisaged in the SA Connect policy.

Appendix A: Documents mandating TDD and F1 for the 3.5 GHz band

1. Introduction

Liquid Telecom is of the view that it will be helpful to the Authority if it addresses the sections of the Radio Frequency Migration Regulations and the Radio Frequency Migration Plan relevant to the duplex mode and the frequency arrangement for the 3.5 GHz band. Liquid Telecom is of the view that there is no room for any other use than TDD and F1. Liquid Telecom's concern and comments on this matter comes from the reference to FDD and the F2 frequency arrangement. By responding to parts of relevant documents, in italics, below, Liquid Telecom hopes to convincingly remove any doubt on ICASA's part that its earlier decision to adopt only TDD and F1 has been the correct one. Our responses to the relevant documents are indicated in italics below each applicable extract and/or discussion of the applicable regulations of the Frequency Migration Regulations and the applicable sections of the Radio Frequency Migration Plan.

2. Frequency Migration Regulations (GG 36334)

Of note, in the Radio Frequency Migration Regulations, are principles (in Regulation 3) and the process for radio frequency migration (in Regulation 4) and the process for the preparation of a Radio Frequency Assignment Plan (Regulation 5). We will refer to each of these.

Principles (Regulation 3)

- (a) Regulation 3(1) Radio frequency spectrum migration must be in accordance with the Radio Frequency Migration Plan.

Liquid Telecom believes ICASA has been planning migration in line with the Radio Frequency Migration Plan.

- (b) Regulation 3(2) Radio frequency spectrum migration must be consistent with the National Radio Frequency Plan.

Liquid Telecom submits that IMT TDD and F1 are consistent with the National Radio Frequency Plan of 2018, published in GG 41650 on 25 May 2018.

- (c) Regulation 3(3). The National Radio Frequency Plan itself must be consistent with the International Telecommunications Union (ITU) Radio Regulations as updated by WRC and with the SADC FAP (Frequency Allocation Plan).

Liquid Telecom is confident that the band plan has been updated in line with the ITU Radio Regulations resulting from the update of WRC-15 and is in line with the latest SADC Frequency Allocation Plan, being the plan of July 2016.

- (d) Regulation 3(4). Allocations and assignments of radio frequency spectrum that are no longer in line with the National Radio Frequency Plan will be migrated.

Licensees who have a licence for spectrum in the 3.5 GHz band, have made plans to migrate to TDD and F1 spectrum use.

Process for radio frequency migration (Regulation 4)

The Radio Frequency Migration Regulations indicate that the Authority shall initiate a process of radio frequency migration in certain circumstances. The regulation then lists the circumstances as being:

- (a) As specified in the Frequency Migration Plan. (This plan refers to an upcoming RFSAP.)

Liquid Telecom notes that this was the plan that was published in GG 38640 (3.5 GHz RFSAP) and GG 38755 (3.5 GHz RFSAP amendment).

- (b) Where a change in the use of the radio frequency band is required to bring the National Radio Frequency Plan in line with the ITU's Radio Regulations or the Final Acts of the latest WRC.

Liquid Telecom notes the change in the 3.4-3.6 GHz band in the National Radio Frequency Plan of 2018 (from paired frequency ranges for FDD use to IMT TDD use) has already brought the band in line with the ITU's Radio Regulations (the outcome of WRC-15).

- (c) Where a change in use of a radio frequency band is required for harmonisation with the National Radio Frequency Plan.

Liquid Telecom notes that the changes regarding the 3.4-3.6 GHz band set out in the National Radio Frequency Plan of 2018 (GG 41650) has also ensured harmonisation with the SADC Frequency Allocation Plan of 2016 – to the extent that the SADC plan also allocates the band to IMT use.

- (d) Where the Authority has determined that a change in use of the frequency is necessary for the efficient utilisation of the radio frequency spectrum and to otherwise meet the objectives of the Act.

Liquid Telecom's view is that by reallocating the band to TDD IMT use, ICASA has already made the principled decision that this approach will lead to much more effective use of the spectrum. This is borne out by many studies that show that TDD is less wasteful of spectrum than FDD and specifically that IMT-2020 technologies will be able to provide very spectrum-efficient services as compared to older technologies. IMT-2020 technologies will allow ECNS licensees to provide broadband services far more

cost-effectively. In using a more spectrum-efficient and more cost-effective technology will assist in meeting several of the objectives of the ECA.

- (e) Where the Authority has determined that a change in a radio frequency spectrum licence holder's assignment within a radio frequency band is required to enable more efficient use of the radio frequency spectrum (in-band migration).

A spectrum utilisation efficiency increase will be brought about by deploying TDD IMT-2020 technology. Given that spectrum that is not used is essentially wasted – for so long as it is not used, because of the time dimension of spectrum – we submit that this circumstance is one of the very compelling reasons why ICASA has decided upon the F1 frequency arrangement.

Preparation of a Radio Frequency Assignment Plan (Regulation 5)

- (a) Regulation 5(3) stipulates that the Radio Frequency Assignment Plan shall be subject to public consultation. This is followed by the normal description of how a public consultation should take place.

The defined process as described in Regulation 5(3) was followed and a Radio Frequency Assignment Plan (RFSAP) for the 3.4-3.6 GHz band was published as Notice 278 in GG 38640, followed by an amendment in Regulation 8.2 of GG 38755. This prescribed the use of TDD and the F1 frequency arrangement.

3. Radio Frequency Migration Plan (GG 36334)

That part of the Radio Frequency Migration Plan of GG 36334 relevant to the 3.4-3.6 GHz band in Section 3.1.25, ICASA states its intention to develop a Radio Frequency Assignment Plan (RFSAP) with consideration to:

- (a) Allocate for mobile service on a primary basis and use for mobile IMT; this would also result in a harmonised Mobile IMT band across the entire SADC region.

Liquid Telecom submits that spectrum licences in line with TDD use and F1 will be in line with this requirement. The SADC band plan specifies IMT and there is hardly a way of managing that without an F1 frequency arrangement.

- (b) Migrate users out of the band.

Liquid Telecom is of the view that request for the amendment of the licences of current holders of spectrum in the band will have to be granted if current use is changed from one based on the unwanted FDD. ICASA would necessarily have to consider accommodating the users with an amended licence if the user is prepared to migrate to TDD and F1 use in the band.

4. The 3.5 GHz RFSAP - GG 38640 (3.5 GHz RFSAP) and GG 38755 (3.5 GHz RFSAP amendment)

The Authority published a Radio Frequency Assignment Plan (RFSAP) for the 3.4-3.6 GHz band on pp. 159-178 of GG 38640, on 30 March 2015. This was followed by an amendment containing an erratum in GG 38755, pp 25-27, published on 4 May 2015. The latter completed the process of establishing a valid final RFSAP for the 3.5 GHz band, in line with the Frequency Migration Regulations and Frequency Migration Plan of GG 36334

Section 4 (Channelling plan)

Liquid Telecom notes that ICASA has opted for channelling arrangements in the RFSAP that accord with the ITU plan denoted as F1 and which result in 200 MHz of IMT3500 TDD spectrum.

Section 5 (Requirements for usage of radio frequency spectrum)

Section 5.5

Reference is made to the National Radio Frequency Plan, which at the point in time GG 38640 was published still had to be updated to come in line with the RFSAP (and, naturally, the ITU Radio Regulations). Liquid Telecom has noted that the National Radio Frequency Plan published in GG 41650 on 25 May 2018, has been updated and is now aligned with the RFSAP; whereas the National Radio Frequency Plan of 2103 was not so aligned. National Radio Frequency Plan now clearly refers to only TDD use and the F1 frequency arrangement.

Section 6 (Implementation)

Section 6.2

Liquid Telecom notes that the National Radio Frequency Plan of 2013 has been amended, as per the National Radio Frequency Plan of 2018, to contain TDD as a typical application. (The superseded National Radio Frequency Plan of 2013 did not contain a TDD application.)

5. National Radio Frequency Plan (GG 41650)

Liquid Telecom notes that the National Radio Frequency Plan, published in GG 41650 on 25 May 2018, indicates (on p. 370), in respect of the 3.4-3.6 GHz band, that the frequency allocation is FIXED and MOBILE. Footnotes 5.430A and NF9 apply. Apart from a reference to only TDD in the column Typical Applications, F1 is mentioned as the only frequency arrangement in NF9. There is no reference to F2 at all.

6. Summary and conclusion

Liquid Telecom submits that the use of TDD and the F1 frequency arrangement, are mandated by ICASA, directly and indirectly, for the 3.4-3.6 GHz band. All relevant documents read together, specifically the Frequency Migration Regulations, the Radio Frequency Migration Plan for the 3.5 GHz band, the Radio Frequency Assignment Plan for the 3.5 GHz band (including the amendment thereof) and the National Radio Frequency Plan and the Radio Frequency Spectrum Regulations require of users of the band to use TDD and F1. None of these documents provide any support for FDD and F2. TDD and F1 are therefore the only options to be considered for the 3.5 GHz for any future IMT Roadmap.