12 October 2018

Independent Communications Authority of South Africa
Pinmill Farm Block A
164 Katherine Street
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By email: rmakgotlho@icasa.org.za
Att: Mr Manyaapelo Richard Makgotlho

Number of pages: 15

Dear Mr Makgotlho

COMMENTS ON DRAFT RADIO FREQUENCY MIGRATION PLAN 2018

Introduction

1 MultiChoice, M-Net and Orbicom thank the Authority for the opportunity to comment on the draft Radio Frequency Migration Plan 2018 gazetted by the Authority on 24 August 2018[1] ("the draft Plan").

2 We have confined our comments to the draft Plan in respect of the 3600 – 4200MHz band (C-Band) and the 10700 – 11700 MHz band (Ku-Band).

[4.10.31] 3600 – 4200 MHz

3 Our first set of comments relates to the draft Plan's proposals in respect of the migration of VSAT systems from the C-Band (3600 – 4200 MHz) in order to introduce Broadband Fixed Wireless Access (BFWA) into the 3600 – 3800 MHz sub band.

4 The draft Plan states:

4.1 *"The sub-band 3600 – 3800 Mhz could be used for BFWA where frequency sharing with FS PTP and/or FSS is feasible*. …"

4.2 "*The Authority has decided that: VSAT systems should be migrated to the Ku-band…*";[2] and

1 Notice inviting comments regarding the draft Radio Frequency Migration Plan 2018 published under Government Gazette number 41854, 24 August 2018

2 [4.10.31] 3600 – 4200 MHz (Page 57/198)

4.3 "*VSAT links should be migrated into [the Ku-Band (10700 – 11700 MHz) band as per SADC proposed common sub-allocation/utilization*[3].

5 MultiChoice, M-Net and Orbicom have consistently objected to the introduction of BFWA into the C-band.[4]

6 The C-band has been a cornerstone of many satellite services for decades. In addition to its key function in providing connectivity within and to areas of high rainfall, where other available bands are inappropriate, the C-band is used for a number of critical functions across Africa. The satellite industry depends on continued access to the 3600 – 4200 MHz spectrum for future satellite deployments due to continued demand by incumbent and new services.

7 Satellite users, including broadcasters, made numerous submissions, at national and regional preparatory meetings at which the Authority was in attendance, on the importance of this band and the reliance on it by satellite services in South Africa, SADC and beyond.

8 This band is critically relied upon for telecommunications and broadcasting services requiring high availability not impacted by weather and atmospheric conditions. Submissions included, amongst others, the use cases of the band for banking, government services and broadcasting. In addition, the submissions included interference case studies highlighting the incompatibility of BFWA services and satellite services in the same geographical area. These submissions, including previous studies done by the CSIR/Meraka Institute, highlighted the reliance by satellite services on this band as well as the prohibitive costs of any alternatives across South Africa and beyond. Satellite operators rely heavily on the C-band because it has a number of advantages over other frequency bands. These advantages include:

8.1 Reach: The large geographic coverage area of C-band satellite beams allows for whole regions or continents to be connected – resulting in a very cost-effective communications network.

8.2 Resilience: C-band is resistant to rain fade. While services in higher frequencies sometimes experience degradation of their signal, services provided in C-band offer extremely high reliability, even during heavy rain.

9 We reiterate our prior submission that the Authority's proposal does not reflect the South African Country position nor the SADC position on the band as approved by the respective preparatory working groups and Cabinet of South Africa. The position ahead of WRC-15 was one of "No Change" in the allocation of the 3600 – 4200 MHz band. This position was upheld at WRC-15 as reflected in the WRC-15 Final Acts.

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3 [4.10.36] 10700 - 11700 MHz (page 59/198)

4 For example, as part of M-Net and Orbicom's submission on the Draft National Radio Frequency Plan (submission dated 3 February 2017), we objected to the inclusion of BFWA under Typical Applications and Notes and Comments in this band

10 During the 2015 World Radio Conference (WRC-15) it was unambiguously decided to maintain the FSS primary allocation in all frequency bands between 3600 and 4200 GHz. The African Telecommunication Union (ATU) decision not to have a primary mobile allocation in the band 3600 – 4200 MHz, whereby ICASA aligned their position with other ATU countries, contributed to this ITU decision. The "No Change" decision both for South Africa and SADC recognized the importance of the band, and this decision was carried at WRC-15.

11 We reiterate our concern and objection to the Authority proposing to migrate VSAT in the sub-band 3600 – 3800 MHz to the Ku-Band for purposes of accommodating BFWA.

12 South African citizens benefit from live news reporting from around the world, which often uses satellite communication; from weather forecasts that are informed by satellite observations taken outside South Africa; and when travelling on aircraft that provide in-flight broadband connectivity and with future autonomous vehicles all rely on satellite communications. Further, a single satellite usually provides services to a wide geographic area, rarely just the South Africa. Despite these clear benefits, the Authority has not provided any rationale for the proposal to migrate VSAT systems out of this critical band. There is no comparison of the benefits of BFWA over existing VSAT systems, which would at least provide some reasoning for the Authority's decision.

13 We also would like to outline that, in practice, migration would not be feasible for the following reasons:

13.1 Migration to other bands would require existing satellite service providers to revisit long-term commercial arrangements with Earth Station operators.

13.2 Migration to other bands could require extensive renegotiation between service providers and satellite operators.

13.3 Earth Station operators currently using frequencies in the 3600 – 4200 MHz band have limited scope to transition to other bands, as many other bands are already extensively used by other services.

13.4 There are no guarantees that this time-consuming and costly process will identify alternative C-Band capacity, which may result in lapses in, or full termination of, services to customers in South Africa and beyond.

14 We therefore oppose the introduction of BFWA in the C-Band or the migration of VSAT systems to the Ku-band.

[4.10.36] 10700 – 11700 MHz

15 Our second set of comments relates to the 10700 – 11700 MHz band (Ku-Band).

16 The draft Plan proposes migrating VSAT links into the Ku-band.[5]

[5] [4.10.36] 10700 – 11700 MHz (Page 59/198)

17 As per the National Radio Frequency Plan (NRFP 2018), in line with ITU Region 1 allocations, this band is allocated to "FIXED", "FIXED-SATELLITE" and "MOBILE except aeronautical mobile." Note 4 of the NRFP 2018 further states:

> "*This band is used on a national basis for fixed services links under the fixed service. The bands 10.95 – 11.2 GHz and 11.45 – 11.7 GHz are also shared with FSS (space-to-Earth) systems (typically VSAT/SNG and PTP links). The sub-bands 10.95 – 11.2 GHz and 11.45 – 11.7 GHz is also used for DTH satellite broadcasting services on a secondary basis to the FS and FSS services*."

18 The DTH service was introduced in this band in 1998 as a secondary service. In view of the potential interference between fixed links and the DTH service at the time,[6] telecommunications operators were made subject to an obligation to communicate their planned roll-out of FS to broadcasters at least quarterly. At the time, FS was mainly operated by Telkom, which cooperated with Orbicom and Sentech on a feasibility study to determine possible implications of FS on DTH services. This study came up with a number of technical criteria that had to be adhered to, to ensure co-existence in the band.

19 Three key DTH services operate in this band within the country, provided through the IS20 satellite system. These services are DStv, OpenView HD and the DTT Gap Filler, which when combined, provide audio-visual services to almost 9 Million households.

20 Recently, the Authority has licensed a number of FS operators in this band, who have deployed fixed links, mainly in urban areas, and have thus caused interference to the above DTH services. These links were deployed with no consideration to DTH services that exist in the band, leading subscribers to lose some channels, due to interference with transponder frequencies.

21 Three interference cases were reported to the Authority in 2017, which include Bloemfontein, Kwa-Mhlanga and Randburg. As recently as July 2018, there were also other cases of interference in Cape Town and Emalahleni.

21.1 Bloemfontein: DStv subscribers experienced service losses on five packages. The interference impacted four Ku-Band downlink transponders on both vertical and horizontal polarities. 65 TV channels and 25 Radio channels were affected by this interference. Orbicom and ICASA conducted joint studies in the area, with some issues resolved technically and others still not yet resolved. Disruptive high-level Ku-Band interference links at 11075 MHz and 11565 MHz caused interference on four of the downlink transponders (IS-20 at 68.5 degrees east) in use by Orbicom. The impacted downlink transponder frequencies were 11050 MHz, 11090 MHz, 11554 MHz and 11594 MHz.

21.2 Kwa-Mhlanga: In Kwa-Mhlanga, 15 channels are impacted on five packages. A disruptive high-level Ku-Band interference link at 11565

[6] Government Gazette number 19343 of 9 October 1998

MHz caused interference on one of the downlink transponders (IS-20 at 68.5 degrees east) in use by Orbicom. The impacted downlink transponder frequency is 11554 MHz on both vertical and horizontal polarities.

21.3 Randburg: Service losses were experienced impacting 39 channels across five packages. A disruptive high-level Ku-Band interference link at 11075 MHz caused interference on two of the downlink transponders (IS-20 at 68.5 degrees east) in use by Orbicom. The impacted downlink transponder frequencies are 11050 MHz and 11090 MHz.

22 Figure 1 below provides an example of FS interference against DTH services in this band.

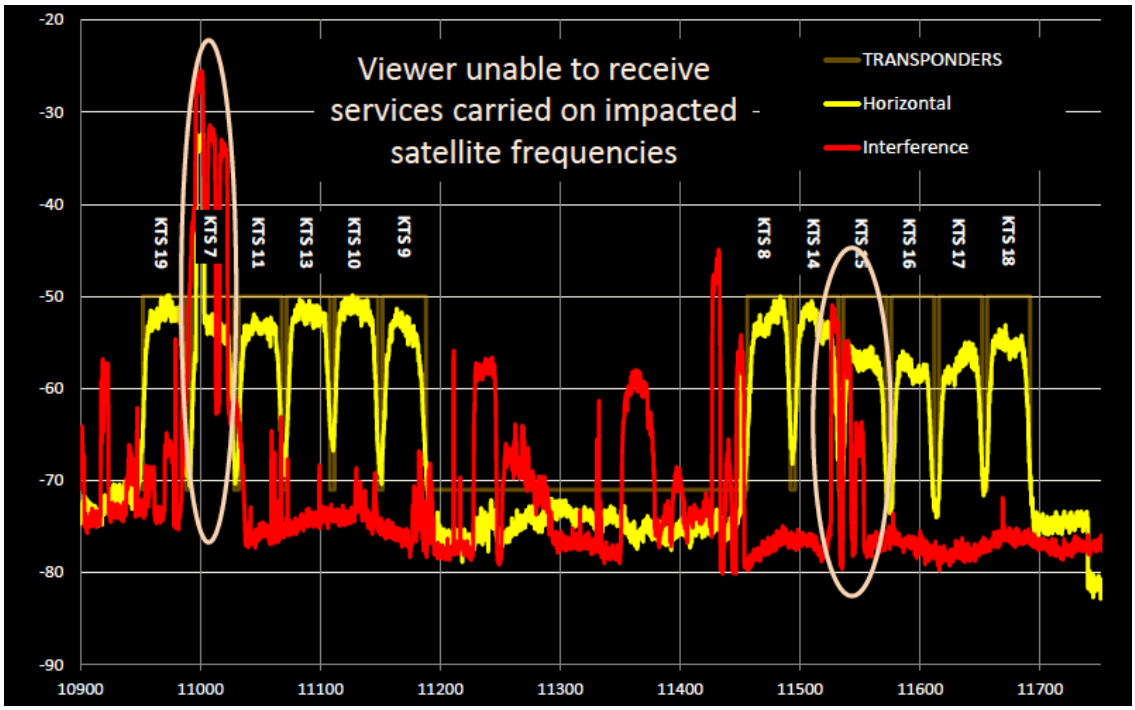

Figure 1: Interfering FS signals dominating FSS reception

23 This interference seriously degrades, obstructs and interrupts subscribers' access to the DStv service.

24 These interference cases, international best practice and technical coordination criteria for sharing in this band are being investigated within a combined industry forum under the auspice of the Southern African Digital Broadcasting Association (SADIBA) of which Orbicom is a member. The detailed findings of the working group will be presented to the Authority in due course. The work is still ongoing and the findings to date are considered too voluminous to be included here. Only a few of the salient points are discussed in this submission.

25 In 1998, the number of links in this band were few enough to manage, and they also adhered to the technical criteria set through the feasibility study by Telkom, Orbicom and Sentech. The location and structure of the FS deployment is illustrated in Figure 2.

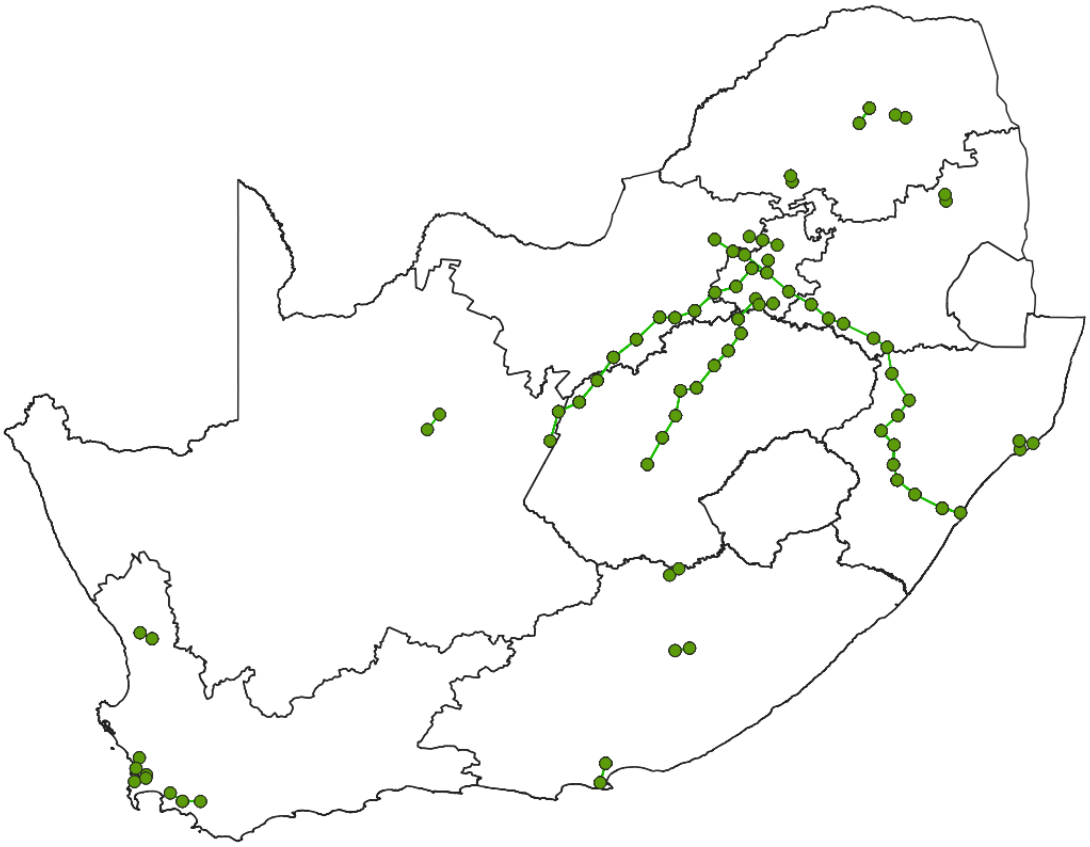

Figure 2: FS Links in the 11 GHz band – 1998

26 The FS links in the 11GHz band provided high capacity long-hop backhaul links for the telecommunications services and were deployed on high sites using large high-gain antennas informed by meticulous planning per hop and link.

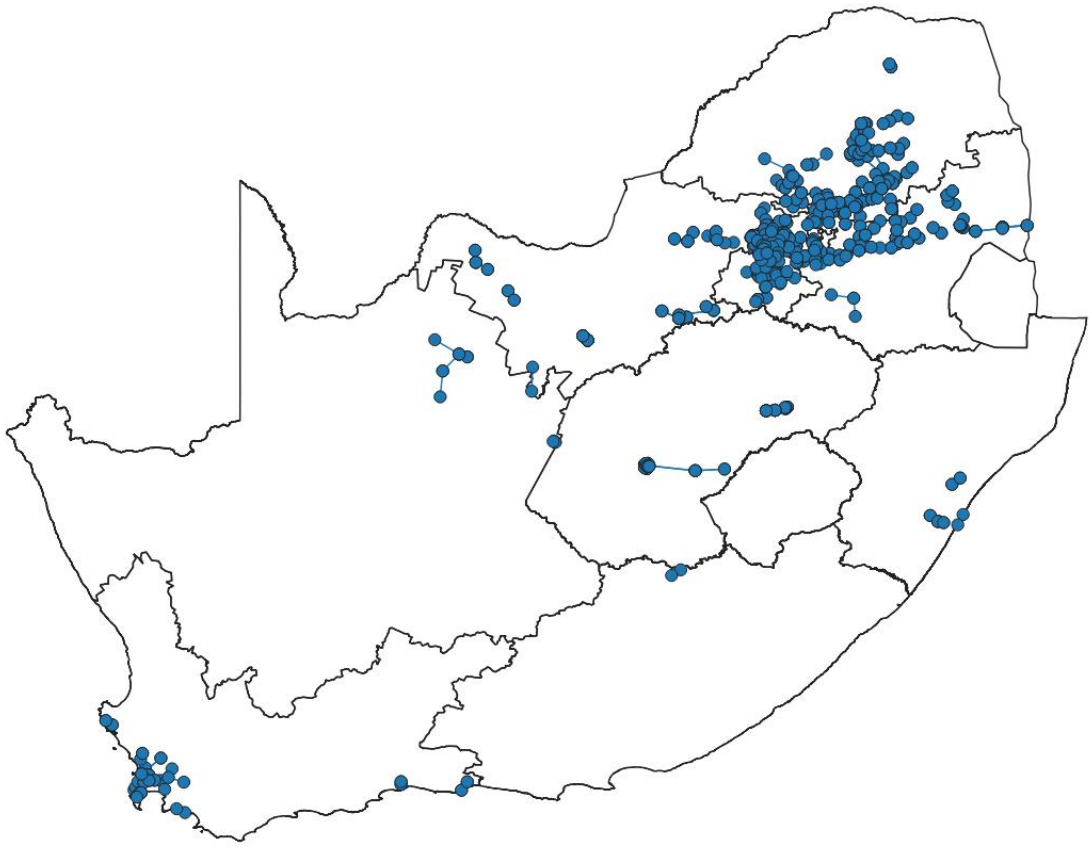

Figure 3: FS Links in 11 GHz band - 2018

27 The situation in 2018 is shown in Figure 3. The FS links are no longer deployed exclusively for high capacity backhaul as was the case in 1998. Antenna sizes, gains and installed heights and hop lengths have decreased resulting in higher interference risk and compromising the feasibility of sharing.

	11 GHz FS links in 1998	11 GHz FS links 2018
Number of Links	274	511
Average Antenna Gain (dBi)	47.1	38.2
Average Antenna Diameter (m)	2.6	1.0
Average Antenna Height (m)	39.5	22.5
Average Path length (km)	33.9	14.6

Table 1: Comparison of 1998 and 2018 11 GHz FS data

28 An analysis of the hop lengths in 2018 shows that the average hop length licensed in South Africa is much shorter than those licensed in Europe, thus increasing the interference risk. At the same time, there is no evidence of regulating downwards the link power in sympathy with the shorter hop distance.

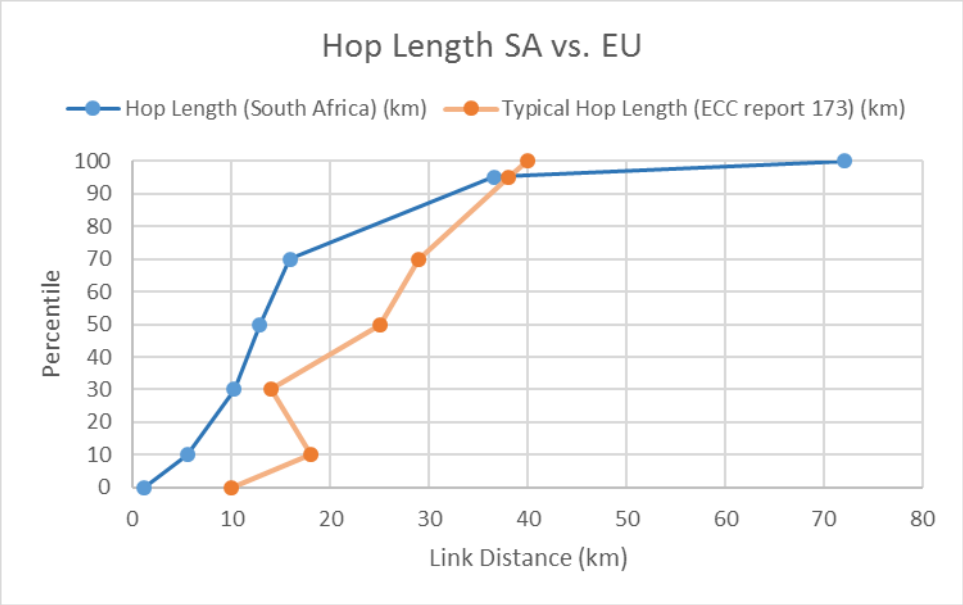

Figure 4: Hop Lengths in South Africa vs. Europe (based on ECC report 173)

29 A preliminary analysis of the licensed FS powers shows that irresponsibly high powers result in link margins that are between 30 to 70 dB more than required. In other words: more than 1 000 to 1 000 000 times the required power for the FS link to work is allowed. This is highly inefficient, unnecessary and dramatically increases the interference risks to other FS as well as FSS and uncoordinated FSS services.

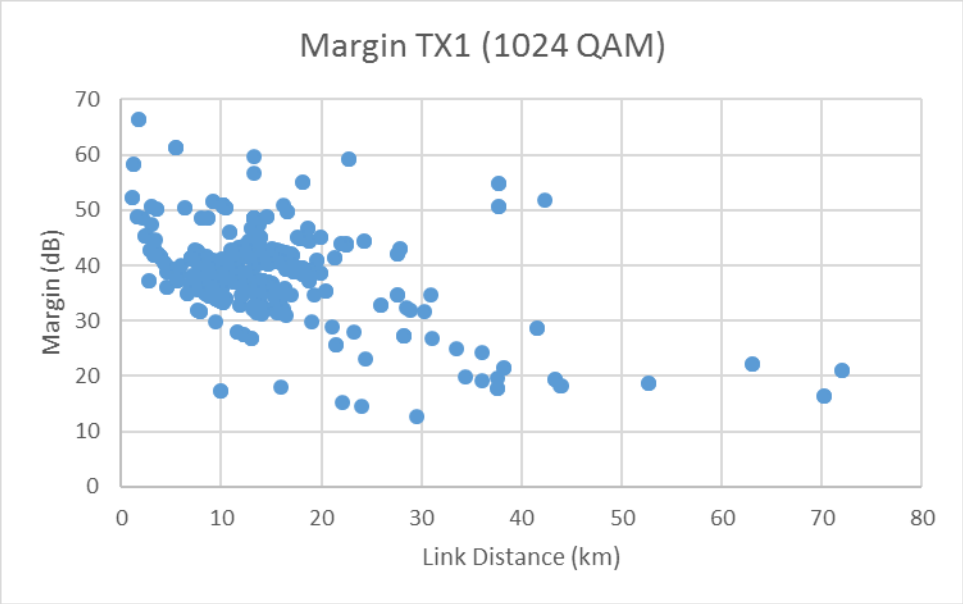

Figure 5: Link Margin (2018) allowed based on licensed power

30 Another pertinent observation is that the FS links are now deployed across densely populated areas whilst links in the urban areas were the exception in 1998. With increased deployment in densely populated urban areas the risk of interference to the public increases equally.

31 However, with the number of links licensed in the band since 1998, Figure 3 shows the magnitude of the links, specifically in urban centers. Deployment of these links was uncoordinated and not communicated to broadcasters, which then led to harmful interference to the viewing public and customer complaints by DStv subscribers.

32 Although Orbicom has investigated cases in amongst others Bloemfontein, Kwa-Mhlanga, Randburg, Cape Town, Tshwane and Emalahleni, it can be seen from Figure 6 and Figure 7 that the magnitude of the interference is potentially huge. Figure 7 zooms in to Gauteng and also indicates known interference locations. Interference cases included interference to broadcasting backhaul feeds and VSAT services as well as uncoordinated FSS.

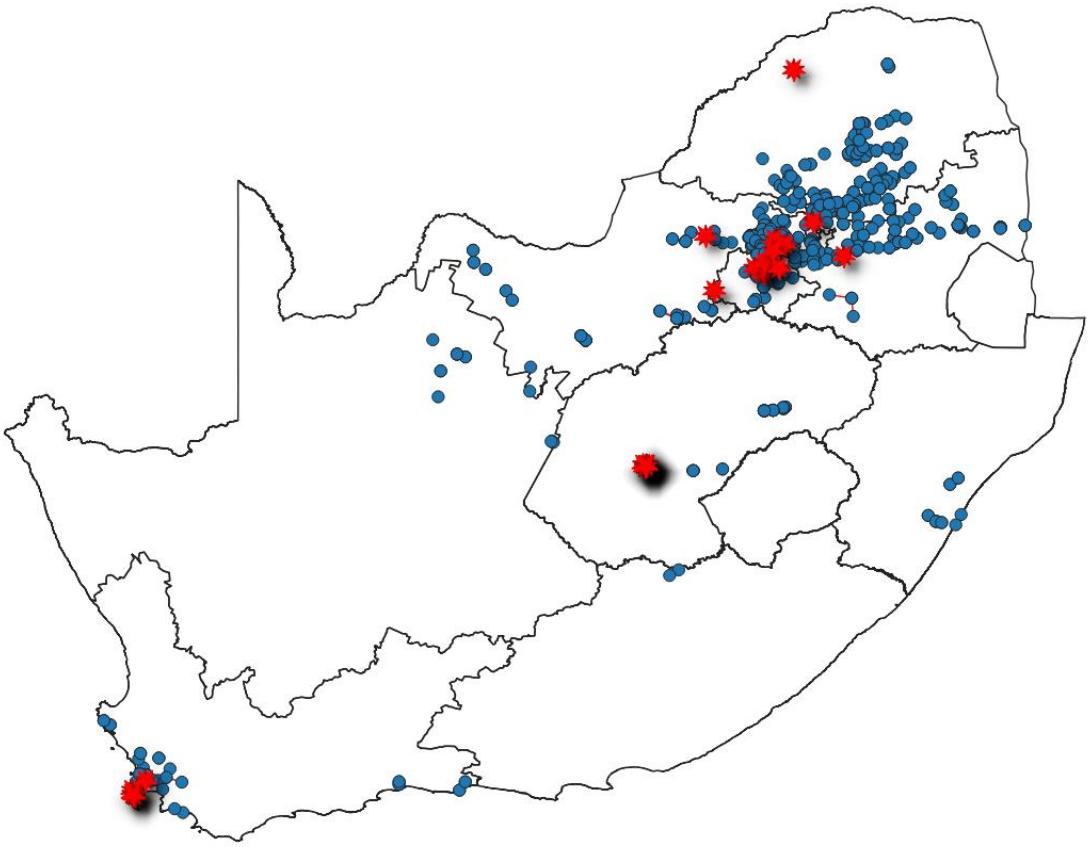

Figure 6: FS 11 GHz links 2018 and interference locations

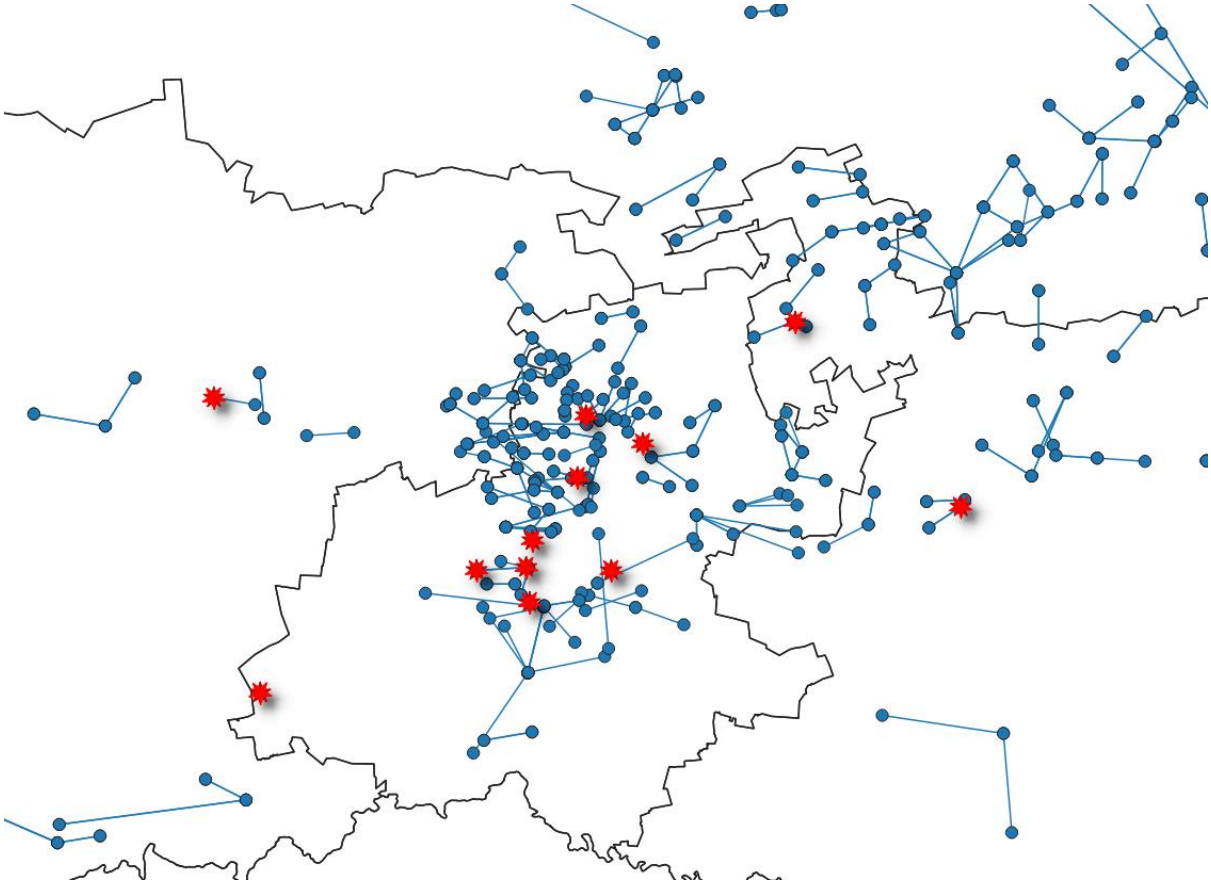

Figure 7: Gauteng FS 11 GHz links 2018 and inference cases

33 It is anticipated that more subscribers will experience this interference, but may believe that the channel is not part of their chosen package (when they do not receive the channel) or it could be that the subscriber never tunes to the impacted channel. The impact across the country is not fully known as studies have not been conducted in all areas. MultiChoice has had to train customer service agents to recognize the issue when receiving DStv subscriber complaints. Initially it would take a number of months before field service agents recognized that the issue was caused by interference. Where possible, subscriber satellite dishes were re-installed to shield them from interfering signals, but this is not always possible. Some customers have even escalated their complaints to the Authority.

34 In order to provide a clear regulatory framework for future investment and deployment of fixed, broadcasting satellite and fixed-satellite systems within 10.7 – 11. 7 GHz the European Conference of Postal and Telecommunications Administrations (CEPT) developed an ERC Decision on the use of the band 10.7 – 12.5 GHz by the fixed service and Earth stations of the broadcasting-satellite

and fixed-satellite service (space-to-Earth) (ERC/DEC/(00)08)[7] ("the ERC Decision")

35 The ERC Decision addresses the use of the band 10.7 - 12.5 GHz by the fixed service and Earth stations of the broadcasting-satellite service and fixed-satellite service (space to-Earth) in relation to the requirements and priorities of CEPT administrations. In order to enable coexistence between the fixed and the fixed-satellite service in the band 10.7 - 11.7 GHz without imposing undue constraints on either of the services. The decision encourages the approach of 'sharing' should be applied.

36 However, the ERC Decision also recognises that the installation of millions of satellite dishes for TV reception has led to a slowdown in the development of the fixed service in the band 10.7 - 11.7 GHz in some European countries despite the number of interference cases being very low. Consequently, satellite systems are also a key medium for delivery of future telecommunication services, enabling communication to rapidly be established over wide areas.

37 Moreover, there is not much use of this band for FS in CEPT countries. This band is also considered by some NGSO operators for the use of a high number of FSS earth stations. Therefore, this ERC Decision limits the deployment of new FS links in the band 10.7 - 11.7 GHz to point-to-point high capacity fixed links and gives the priority to these new links over the uncoordinated FSS Earth stations.

38 The Electronic Communications Committee (ECC) of CEPT conducted a study of Fixed Services in Europe in 2011/2012. (ECC Report 173). This report provides very insightful information on all FS bands. On the band 10.7 to 12.5 GHz the report states: "*It has been noted that due to satellite sharing problems, some countries have stopped the introduction of new links in this band*"[8] .

39 Thus we believe that the Authority should freeze any future deployment of new FS links while limiting the number of these links because of the capacity and type of links imposed, as this band will then not be a high density FS band. It is expected that in the longer term, the number of FS links in this band could stabilise, or even decrease when some FS operators move to fibre optic or alternative FS bands.

40 Orbicom is a spectrum licensee in this band, for which it pays annual spectrum fees for the paired spectrum (uplink and downlink frequencies) assigned to it by the Authority. This assignment allows Orbicom to uplink and downlink services to the 6.9 Million DStv subscribers, who expect to receive channels for which they have subscribed.

41 The DTT Gap Filler, which is expected to cover approximately 1.5 Million households following the switch off of analogue television, will also suffer the impact of interference from fixed links should more licensees be assigned

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7 https://www.ecodocdb.dk/download/fb513095-9c6a/DEC0008.PDF

8 Fixed Services in Europe: Current use an future trends post 2011, ECC Report 173, March 2011, Page 49 as available on line on 11 October 2018 at https://www.ecodocdb.dk/download/6fd0de6b-f796/ECCRep173.PDF

spectrum in this band. The DTT Gap Filler is supposed to provide digital television to households that will not be covered by digital terrestrial television signals.

42 The interference cases referenced above and others which MultiChoice is currently not aware of (as they may not have been reported as yet), caused by the number of FS assignments in this band, which were not coordinated with broadcasters could get even worse should more FS licensees be assigned spectrum in the band.

43 Migration of the DTH service in this band is not an option, for the following reasons:

43.1 Satellite payloads are designed to cater for operational use that extends to at least 15 years and beyond. It is simply not possible to modify the payload once satellites are in orbit. Most of the DTH services in South Africa today are contractual for a long-term commitment plan with the satellite operator. Simply migrating to other bands will not be technically feasible but will also be economically detrimental to DTH operators. Furthermore, future satellites are already being designed or soon to be launched that also deploy these bands.

43.2 A number of GSO/NGSO FSS systems are currently in use or being planned to operate in this frequency range, which intend to deploy large numbers of user terminals.

43.3 There is an increasing demand for DTH services and other related broadcasting services in South Africa (as acknowledged as early as 1998 when DTH services were introduced into the band). It is of great importance to exercise flexibility in catering for such services and recognising future demand for DTH services across Southern Africa. Therefore, a high number of FSS and BSS user terminals are already in use in this frequency range and this is of vital importance to provide South African's telecommunications and broadcasting infrastructure.

44 Noting the above, we therefore recommend that a freezing of any FS license renewal should be introduced and that no new FS assignments be made in this band. We further recommend that existing assignments be migrated (or new assignments be at least licensed) to any of the numerous alternative FS bands (refer ECC Report 173) including the following candidate bands, which are also allocated to FS:

44.1 5.925 - 7.125 GHz

44.2 7.425 - 7.900 GHz

44.3 12.75 - 13.25 GHz

44.4 17.7 - 19.7 GHz

44.5 17.7 - 19.7 GHz

45 The Authority currently does not keep a register of all FSS, VSAT and SNG installation points across the country. These services are broadly referred to as uncoordinated FSS. This includes DTH receive points that, like FSS, VSAT and SNG receive points, are not recorded by the Authority.

46 In order to allow sharing in the band as contemplated by the Authority, technical measures and coordination criteria need to be put in place in order to protect both the FS service as well as the FSS and uncoordinated FSS from interference from FS services. The SADIBA study group has through a review of regulation across several territories identified criteria as coordinated by other regulators and is in the process of drafting recommendations on the criteria, the respective parameter and values. These include limits on radiated power, hop lengths, antenna pattern, antenna heights and use in densely populated area. These parameters need to be analysed as part of any license application, amended if required and included in the license conditions as part of coordination ahead of any new system being licensed.

47 We urge the Authority to consult on such criteria and consider the SADIBA inputs in this regard and to freeze any new FS licenses in this band until such consultation has been concluded and coordination measures have been put in place by the Authority, should migrating FS assignments out of this band not be considered feasible.

48 We are of the view that licensing fixed links to the above recommended candidate bands will ensure continuity of DTH services to almost 9 Million (and more in future) combined viewers across the DStv, OpenView HD and the DTT Gap Filler services.

49 Our desired outcome from this important process, as undertaken by the Authority, is to safeguard services that reach almost 9 Million households across the country (and more in future), who depend on DTH coverage to their homes. Based on all issues discussed with regards to this band, our proposal therefore is for the Authority to consider including, in the Radio Frequency Migration Plan 2018, migration of FS assignments from this band to any of the candidate bands as recommended in paragraph 44 above. Although sharing is possible, with strict sharing conditions as discussed above, we believe the first prize is our proposal of migrating FS assignments to other bands.

Process for spectrum migration

50 Paragraph 2.3 of the draft Plan lists a number of considerations which the spectrum migration process should include, one of which is the "*economic lifetime of the equipment*".[9] We reiterate in this regard our point in paragraph 43.1 above that satellite payloads are designed to cater for operational use for at least 15 years.

51 In addition, it is of concern that the draft Plan does not consider the economic impact/value of migrating or not migrating certain services from a particular band.

[9] [2.3.1] Radio Frequency Spectrum Rights (Page 26/198)

52 The economic impact on spectrum licensees and consumers should be a key consideration.

53 Lastly, we submit that a key objective of the Electronic Communications Act, and indeed the Authority's functions, is to coordinate spectrum to prevent or restrict harmful interference. We urge the Authority, when finalising the draft Plan, to endeavour to avoid, reduce and eliminate interference to the maximum extent possible.

Conclusion

54 We reiterate our thanks for the opportunity to comment on the draft Plan and trust that our comments will be of assistance.

Yours sincerely

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Thabo Makenete
GM: Technical Regulatory