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For attention: Mr. Manyapelo Richard Makgotlho

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Dear Sir

## **COMMENTS: DRAFT FREQUENCY MIGRATION REGULATIONS AND RADIO FREQUENCY MIGRATION PLAN**

1. Transnet SOC Ltd ("Transnet") wishes to express its appreciation for being afforded the opportunity to comment on the Draft Frequency Migration Regulations (hereinafter referred to as ("the Regulations") and Radio Frequency Migration Plan (hereinafter referred to as "the Frequency Migration Plan") published in Government Gazette No 35598.

### **2. Introduction**

2.1. Transnet SOC Ltd ("Transnet") has launched its Market Demand Strategy (MDS), which is driven by a R300 billion infrastructure investment over a seven-year period. The MDS underpins Government's growth strategy and is a key component for enabling the targets of the New Growth Path ("NGP") and the National Development Strategy.

2.2. The MDS investment is already being rolled out and committed, which means that the Frequency Migration Plan has the potential to make new capital investments for the expansion of South Africa's railways, ports and pipelines redundant in a very short space of time. In this regard it should be borne in mind that Transnet, the Passenger Rail Agency of South Africa (PRASA) and South African Airways (SAA) depend on a number of wireless telecommunication systems for their operations. All these systems operate in the 450-470 MHz frequency bands (the "Transnet Allocated Spectrum") and it is Transnet's main concern that the re-allocation of the 450-470 MHz band will in most cases result in the replacement of entire radio networks and their associated peripheral equipment, which will include new equipment acquired under the MDS.

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- 2.3. Transnet conducts train, port and pipeline operations through various Operating Divisions (i.e. Transnet Freight Rail, Transnet National Ports Authority, Transnet Port Terminals and Transnet Pipelines). Some aspects of these operations that require telecommunications support may be referred to as follows:
- 2.3.1. Crane movements;
  - 2.3.2. Ship movements;
  - 2.3.3. Lighthouse operations;
  - 2.3.4. Train movements control, which is extremely safety critical;
  - 2.3.5. Telemetry and telecontrol of remote switching of electrical substations;
  - 2.3.6. Safety critical communications with train drivers;
  - 2.3.7. Shunting of trains in marshalling yards and sidings, for which activities telecommunications are extremely safety critical to prevent loss of life, injuries and damage to valuable assets;
  - 2.3.8. The use of telemeters on trains to monitor braking capability, execute brake applications, and control train dynamics; and
  - 2.3.9. Electronic measuring equipment on trains and the rail track for safe train handling.
- 2.4. It should be noted that Transnet also provides network services to PRASA and SAA, all of which are safety critical.
- 2.5. Transnet's railway operations are governed by the National Railway Safety Regulator Act, 2002 (Act No. 16 of 2002) (the "Railway Safety Regulator Act"), which Act regulates railway safety in South Africa. In terms of the Railway Safety Regulator Act, Transnet is required to hold a Railway Safety Permit issued by the Railway Safety Regulator. One of the conditions of a Railway Safety Permit, is that the operator must implement and maintain a safety management system ("SMS"). A "safety management system" is defined as "a formal framework for integrating safety into day-to-day railway operations and includes safety goals and performance targets, risk assessment, responsibilities and authorities, rules and procedures, monitoring and evaluation processes and any other matter prescribed". It stands to reason, that any migration from the current stable Transnet Allocated Spectrum to another frequency band would have to be subjected to a risk assessment to determine the impact of the migration on safe railway operations. Should such a risk assessment indicate a negative impact on safe railway operations, even during the period of migration, the Railway Safety Regulator has the authority to suspend or revoke Transnet's Railway Safety Permits until the impact on safe railway operations are resolved to the satisfaction of the Railway Safety Regulator. Such a response would no doubt negatively impact the South African economy as a whole.
- 2.6. The requirements for safe railway operations in terms of the Railway Safety Regulator Act would also require a re-assessment of any migration initiative that would negatively impact the Transnet Allocated Spectrum and the integrity of that spectrum.



This implies that the granting of frequencies in the Transnet Allocated Spectrum for International Mobile Telecommunications ("IMT") purposes would have to be done in a manner that will not compromise safe railway operations. For the same reason ICASA would also be required to engage countries adjacent to South Africa with a view to minimise the impact of their migration initiatives on the Transnet Allocated Spectrum in so far as radio frequencies are utilised for railway operations close to and into those countries.

- 2.7. A safety mind set in all aspects of railway operations is so critical, that the concept of safe railway operations is embedded even through the target slogan for Transnet Freight Rail, which reads:

"225 Million Tons SAFELY, Fo sho Noma kanjani!!"

- 2.8. Hence the concerns regarding the impact of frequency migration plans on safe railway operations.

### 3. General Comments

The overall concerns regarding the Regulations and the Frequency Migration Plan may be summarised as follows:

- 3.1. Transnet currently uses analogue technology and will migrate to a suitable digital technology once these have stabilised. In this regard it should also be noted that there are at least five different digital technologies, (e.g. TETRA2, GSM-R, DMR, dPMR, P25 and NextEdge) , some of which are still in the development stage (for example, Tier 3 working is currently not available).
- 3.2. ICASA is to be commended insofar as it follows a technology neutral approach by not specifying the technology to be employed. It is, however, noted that the allocation in the 410-420 MHz band specify 25 kHz channel spacing which implies that TETRA technology must be used. ICASA should reconsider the indicated channel spacing to allow for more cost-effective technologies to be deployed in the 410-420 MHz band.
- 3.3. Preliminary calculations indicate that the costs of replacing Transnet's current radio network would be between R500 million and R1 billion. (More information on the potential impact is provided in paragraph 4 below.)



- 3.4. There is no indication that the proposed Frequency Migration Plan has been subjected to a comprehensive cost benefit analysis. Such an analysis should not only consider the cost impact on users of a particular frequency band, but should also consider the overall cost to South Africa as a whole.
- 3.5. Transnet holds the view that IMT destination bands in the 698-960 MHz band (262MHz width in total) as per the ITU will provide sufficient additional capacity for new broadband allocation, whilst the cost-benefit of the allocation of IMT allocation in the 450-470MHz band will have a negative cost-benefit ratio in South Africa.
- 3.6. There are several overlaps between the Regulations and the Frequency Migration Plan, which may raise interpretation challenges where inconsistencies arise. For example, both regulation 4 of the Regulations and section 3 of the Frequency Migration Plan addresses principles governing frequency migration. Depending on which of the Regulations or the Frequency Migration Plan is to take preference, different results would be obtained. However, if regard is had to regulations 3 and 4 of the Regulations, it would appear that the Frequency Migration Plan is supposed to be subservient to the Regulations, which means that the Frequency Migration Plan should only address operational aspects of frequency migration whilst the process and principles should be set out in the Regulations.

#### **4. Impact Overview**

In order to contextualise the potential impact of migration on the Transnet Allocated Spectrum and to highlight cost items that will be affected, the following impact overview may be provided:

- 4.1. More than 60% (or 12 000 km) of the rail network relies exclusively on radio communications between the train driver/s and train control officers for safe and efficient train movement authorisation and control - this being the ONLY communication between train drivers and control personnel. The proper interference-free operation of the radio network is therefore vital. These networks and peripheral equipment will all have to be duplicated to ensure safe train operations during any frequency migration period.



- 4.2. The various radio networks built to support all Transnet operations include more than 550 radio repeater sites across the country to ensure on a national basis seamless and contiguous train movement. Yet again, all the radio frequency equipment and power supply will have to be duplicated during any frequency migration period. In practice, such duplication may not be technically possible depending on the migration destination band, as significant interference may be experienced between existing and new radio frequency equipment.
- 4.3. Where the new network requires the development of additional high sites, Environmental Approval and Authorisations are not guaranteed, which may in turn undermine or inhibit migration efforts. It should also be noted that current experience regarding the time required for the processing of applications for Environmental Authorisations would indicate that the time frames mooted for frequency migration are unrealistic where Environmental Authorisations are also required.
- 4.4. Transnet operates a fleet of 2200 locomotives at a cost of R30 million each. Each locomotive is fitted with two to five purpose designed low profile DC-Ground antenna systems which are specially designed to ensure optimum Radio Frequency (RF) performance whilst ensuring safe operations under the traction voltages of up to 50KV. The roof of a locomotive does not allow for the installation of additional antennas on the migrated frequency, amongst others, due to de-sensitisation of radio receptions and other electrical apparatus placed on the roof of the locomotive. Frequency migration may therefore cause locomotives to be withdrawn from service for a substantial period of time whilst the radio network is being migrated and new antenna design is being developed and tested. This would be extremely costly from an asset utilisation perspective (each loco costs R30m), with the result that Transnet may not be able to meet its MDS targets as agreed with the Government and the South African economy in general.
- 4.5. All South African ports utilise the Transnet radio network infrastructure for their operations. Radio communication is used in the ports for crane operations, the off-loading of general cargo and container units, movement of vehicles and terminal equipment in the port, and train movements in and out of the port. The Port of Durban, for example, is already working at maximum capacity and the proposed frequency migration will have a major impact on sustained port operations and may even require the temporary shutdown of the port to introduce the migrated radio systems and



peripheral equipment to ensure safe operations in the port. This again will have a major negative impact on the South African economy and impede Transnet's ability to deliver on the MDS.

- 4.6. Radio communications to all MetroRail trains are provided via the Transnet radio network infrastructure described above. MetroRail trains will therefore be equally affected. It follows, therefore, that PRASA as a public entity would be similarly affected as Transnet. From a safety perspective, the potential loss of life as a result of a lack of radio communication or deficiencies in radio communications is much higher in a passenger environment than in a freight environment.
- 4.7. There are some 3000 radio links operating in the 450 MHz band as per the Frequency Migration Plan (cf. item 4.11.13). Most of these links are already used to provide radio communication to rural areas. The replacement of these links to operate in a different frequency band to serve the same purpose will also negatively affect the cost-benefit ratio of the proposed migration.

## 5. **Specific comments**

### 5.1. **The Regulations**

- 5.1.1. As indicated above, Transnet is a state-owned company and a public entity listed under the Public Finance Management Act, 1999 (Act No. 1 of 1999). In terms of section 34(16) of the Electronic Communications Act, 2005 (Act No. 36 of 2005) (the "Electronic Communications Act"), any migration that "involves governmental entities or organisations", must be referred to the Minister of Communications. Consequently, it would appear that the impact of the Regulations on public entities such as Transnet, SAA and PRASA would have to be referred to the Minister of Communications. Transnet requests that it be involved via the Department of Public Enterprises in the consultation with the Minister of Communications as required by section 34(16)(b) of the Electronic Communications Act.
- 5.1.2. In view of the potential impact on safe railway operations, ICASA should also engage the Railway Safety Regulator as required by section 6 of the Railway Safety Regulator Act regarding migration initiatives that would impact safe railway operations.



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#### 5.1.3. Ad regulation 3(3)

This regulation should be qualified to reflect the possibility that the Minister of Communications may, in terms of section 34(16) of the Electronic Communications Act, not approve a migration initiative. The qualification of this regulation should also refer to the South African footnotes that qualify Resolution 224 of the World Radio Conference ("WRC").

#### 5.1.4. Ad regulation 3(6)

The requirement for migration set out in this regulation appears to have been over simplified to such an extent that legal principles contained in the Electronic Communications Act are not properly reflected. It is clear under section 11 of the Electronic Communications Act that licensees have a legitimate expectation that their licences would be renewed if they comply with licence conditions, the provisions of the Electronic Communications Act and related legislation. Consequently, licencing may be of unlimited duration, albeit by way of regular licence renewal.

Further evidence of this simplistic approach may be found in the restriction of cost drivers to the "economic life time of the equipment". In this regard it should be borne in mind that equipment is deployed within certain infrastructure and geological configurations. It stands to reason that where new equipment is necessitated as a result of frequency migration, wholesale changes to complementary infrastructure and geological architecture may be required that will make it uneconomical or cost prohibitive for the licensee to continue with electronic communication activities in the new frequency band. The concept of "economic life time of equipment" would only be relevant if replacement costs of equipment for the same activity are being considered.

In consequence, it is suggested that more comprehensive parameters are set for the cost considerations of frequency migration, which parameters should account for all relevant cost drivers such as the knock-on effect to other spectrum users that must also be migrated as a result of a particular migration initiative.





An additional aspect that should be noted in respect of the concept of “economic life time of equipment”, is the inconsistency between what is regarded as the “economic life time of equipment” according to applicable accounting rules and practices, and the proposed time frame for frequency migration. For purposes of the International Financial Reporting Standards (IFRS) applied by Transnet, a lifespan of seven years is allocated for radio infrastructure, and consideration should be given to legislating such time periods in the Regulations themselves. It also follows that the proposed time frame for frequency migration (cf. item 3.3.5 of the Frequency Migration Plan) should be aligned with generally accepted life spans of equipment.

#### 5.1.5. Ad regulation 4

This regulation does not set out a process for migration as intimated by the heading, but only identifies the triggers for migration. Triggers for a frequency migration are but one step in a process, which should reflect other activities, such as the development of a frequency migration plan, cost benefit analysis and a regulatory impact assessment, as well. It would appear that the steps of a process listed under item 2.3.1 of the Frequency Migration Plan may be useful in developing such a process.

In any event, it is suggested that ICASA be obliged to undertake a proper regulatory impact assessment (RIA) prior to making determinations as envisaged by paragraphs (d) and (e).

#### 5.1.6. Ad regulation 6

This regulation appears to be incomplete and should be reviewed to reflect acceptable drafting techniques. For example, it is not clear whether the “notice” referred to in sub regulation (1) is the same as the “notice” referred to in subsection (2). The regulation also does not make reference to section 10 of the Electronic Communications Act, or the requirements for amending a licence as set out in that section.

Frequency migration is a process (as acknowledged in both the Regulations and the Frequency Migration Plan). Consequently, it would not be practical to fix dates for the ceasing of transmitting in an existing frequency range and





the commencement of transmitting in a destination frequency range in a consecutive manner. In order to prevent such an event from occurring, it is proposed that paragraphs (a) and (b) of sub regulation (2) be qualified by adding a proviso to this regulation that requires the fixing of dates to reflect the need for dual illumination for an appropriate period.

## **5.2. The Frequency Migration Plan**

5.2.1. The status of the Frequency Migration Plan is unclear. Apart from references contained in regulations 3(1) and 4(a) of the Regulations, there is no direct link between the Regulations and the Frequency Migration Plan indicating that the Frequency Migration Plan is issued under and as part of the authority to issue regulations.

5.2.2. Ad item 2.1.1

The reference to section 34(16) of the Electronic Communications Act should be further expanded on by indicating the process for engaging the Minister of Communications, and how the Frequency Migration Plan and public entities may be affected if the approval of the Minister is not obtained.

5.2.3. Ad item 3.3.3

The primary deficiency of the Frequency Migration Plan is that the destination bands are not indicated (see, for example, paragraph 4.11.13 where the destination band for fixed link is indicated, but not indicated for mobile application), which means that the impact on current equipment cannot be assessed. In addition, it is not only the retuning of equipment at relatively low cost that should be considered (if that is possible taking into account the frequency ranges that are mooted) but also the adjustments to peripheral equipment and geological configurations that would be required. Transnet maintains that a very small portion of the composite parts of a network can be "retuned" whilst the majority will have to be replaced. In addition, continuous operational dictates require that dual illumination is mandatory whilst a new network is being constructed.

5.2.4. Ad item 3.3.5



The time frame of 3-5 years for spectrum migration should be reconsidered in view of various other time factors that impact negatively on the mooted time frame. These additional time factors may be summarised as follows:

- The economic life span of equipment for accounting purposes is seven years.
- Applications for Environmental Authorisations take three to four years to be processed.
- Where dual illumination would be required, vacating an existing frequency band may be delayed for the creation of a vacant destination band.

#### 5.2.5. Ad item 4.9:

The entries in the table row that addresses the 450-470 MHz frequency band should be qualified by a reference to Footnote 16 of Resolution 224 of the WRC.

#### 5.2.6. Ad item 4.11.13:

The introductory words of this item refer to a spectrum audit that was done, which audit indicated low spectrum usage. Transnet disputes this finding in relation to its allocated frequency band as the method of measurement is questionable and the fact that the geographic areas where these audits were conducted are not representative. Furthermore Transnet needs to emphasise that its frequencies are used for mission critical communication where guaranteed availability of a radio channel is vital for safe railway operations.

This item indicates a destination band for fixed link but is silent on the destination band for mobile application. However, if it is ICASA's intention to also migrate mobile applications to the above 3GHz band, it must be strongly emphasised that such equipment does not exist, and if the equipment is developed in future, the cost and amount of infrastructure required at this very high frequency will be prohibitive and cannot be supported.



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5.2.7. Ad item 4.11.25:

The following statement is made in this item:

*"... but currently lies unused in the lower band and utilized by SANDF, Transnet amongst other users in the upper band; this is however under-utilized".*

In so far as Transnet is concerned, this statement is not factually correct since Transnet migrated out of this band in 2007. Consequently it would be appreciated if ICASA could rectify its records and this document in this regard.

## **6. Transnet's proposed frequency migration strategy for the 450-470 MHz band**

- 6.1. Transnet conducted a successful migration from the VHF band (138-142MHz) to the current UHF band (450-470MHz) during the period 1999 to 2005 at a cost of more than R160M. Since 2005 train communications, including tunnel coverage, became mandatory and Transnet developed a number of antennas for use on train locomotives. It also developed special software tools to enable maximum usage of frequency channels, minimise co-channel interference and optimum RF predictions for network build.
- 6.2. Even on the argument of economic lifecycle of equipment most of the network elements were recently replaced, or are currently being replaced. As a result various options are presented below.
- 6.3. The option preferred by Transnet may be summarised as follows:
  - 6.3.1. Transnet remains within its current allocation and do not incur any additional costs or disruptions to its services.
  - 6.3.2. Transnet continues to utilise analogue technology until such time that digital technologies become stable, at which stage Transnet moves to digital technology, which should release some spectrum
  - 6.3.3. A timeframe of 7 to 10 years is allowed for digital migration with dual illumination for 3 years to allow for construction of the new network.



- 6.3.4. The need for additional IMT spectrum can be addressed within the 698- 960 MHz band where spectrum would be available as a result of digital television migration. This approach would minimise the prejudice to other users.
- 6.3.5. Transnet will be in a position to comply with the MDS Strategy and Deliverables to the benefit of the whole of the South African economy if this option is adopted.

6.4. A first alternative option may be summarised as follows:

- 6.4.1. Transnet remains in the 450-470 MHz band with its current 1,8 MHz block for its use, but is migrated to the side of the 450-470 MHz band to allow contiguous re-allocation of the rest of the band to IMT.
- 6.4.2. A significant portion of current radio peripheral equipment can be re-used in this band and will mitigate migration cost.
- 6.4.3. A timeframe of 5 to 7 years must be allowed for sideways migration within the 450-470 MHz band as the destination channels become available.
- 6.4.4. Transnet continues to utilise analogue technology until such time that digital technologies become stable, at which stage Transnet moves to digital technology, which should release some spectrum.
- 6.4.5. A timeframe of 7 to 10 years is allowed for digital migration with dual illumination for 3 years to allow for construction of the new network.
- 6.4.6. The need for additional IMT spectrum can be addressed within the 698- 960 MHz band where spectrum would be available as a result of digital television migration. This approach would minimise the prejudice to other users.

6.5. A second alternative option may be summarised as follows:

- 6.5.1. ICASA allocates full spectrum (1,8 MHz block) to Transnet in the 410 - 420 MHz band.
- 6.5.2. ICASA must reclassify the band to allow for initial analogue technology.
- 6.5.3. Transnet continues to utilise analogue technology until such time that digital technologies become stable, at which stage Transnet moves to digital technology, which should release some spectrum.
- 6.5.4. A timeframe of 7 to 10 years is allowed for digital migration with dual illumination for 3 years to allow for construction of the new network.



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- 6.5.5. This destination band is currently in use by SAPS, Eskom and others, which means that the band must be cleaned up before the Transnet migrations starts.
- 6.5.6. A limited portion of existing equipment may be migrated without replacement.
- 6.5.7. A timeframe of 7 to 10 years is allowed for this option to allow for the maximum life of existing assets and the reduction in operational risk. This period may run concurrent with the digital migration plan time frame.
- 6.5.8. This option is premised on the fact that TFR Operations must allow for the ring fencing of locomotives to operate on only certain sections of a route where the applied technology is suited to work under high voltage overhead wires. In this regard it should be noted that changeover of locomotives during a journey from, for example Hotazel to Nqura for the Manganese export line, will incur significant additional costs and lead to lower utilisation of very expensive assets (i.e. locomotives). (This is but one example of many.)
- 6.5.9. The time frame of 3-5 years as suggested in draft migration plan is not feasible for this option as it will have major operational and cost implications.
- 6.5.10. The impact of this option on Transnet National Ports Authority and Transnet Port Terminals needs to be assessed in terms of the requirements for National Key Points, as well as the disruptive impact this change in frequencies will have on port operations and associated imports and exports.

## 7. Conclusion

- 7.1. In terms of paragraph 3 of Government Notice No. 606 of 2012, Transnet requests an opportunity to make oral representations on the Regulations and the Frequency Migration Plan.
- 7.2. We thank you for this opportunity to comment on the Regulations and the Frequency Migration Plan. We trust that our submission will assist.

Kind regards

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Group Chief Executive

Date: 5/10/2012

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