

- Migrate the remote controlled industrial apparatus out of the 141 -142 MHz band into a band dedicated for ISM. This is important since the alarms are sensitive and the remote controlled industrial apparatus devices may cause interference with the operation of these alarm systems.

It is therefore proposed to allocate this band in the following manner:

- Mobile 1 MTX 138 – 140.5 MHz paired with 141.5 – 144 MHz.
- SF alarms 140.5 – 141.5 MHz.

#### **Outcome of 1<sup>st</sup> Consultation**

No objection to proposal

#### **4.10.3 150.05 – 153 MHz**

The current users may continue to operate in this band with the following exceptions:

- Channels 150.625, 150.650, 150.675 MHz are reserved for in-house paging. The demand for paging has shown a sharp decrease over the past decade and may only occupy a very niche segment (e.g. hospitals etc.). If there are no current assignments for paging it is proposed to de-allocate these channels for this purpose.
- SF Alarms are supposed to operate within the 152.05 – 152.55 MHz band on an exclusive basis. However, there are other users (SF Mobile etc.) operating in this band. Given the growing demand from alarms (refer 4.10.2) it is proposed to migrate these users out of this band (Year 0 – Year 3) and allocate it on an exclusive basis to SF alarms.

#### **Outcome of 1st Consultation**

No objection to proposal

#### **4.10.4 156.4875 – 156.5625 MHz**

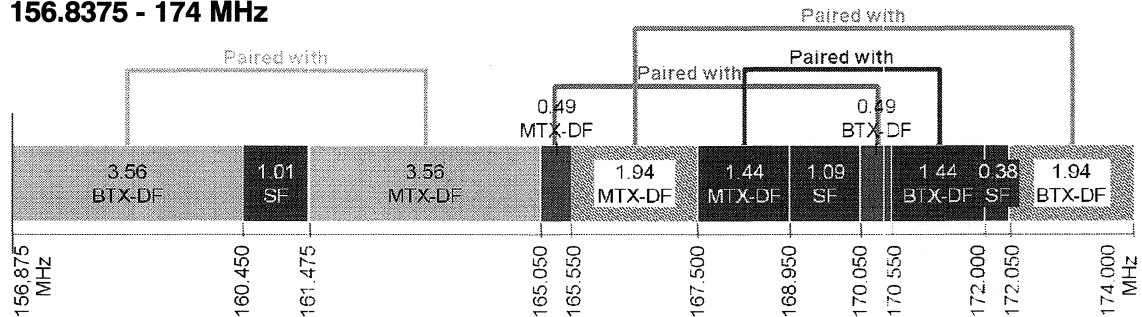
Although SF Mobile may continue to operate within 156.375 – 156.7625 MHz on a non-interference basis and non-protection basis to Maritime mobile services in inland areas, there are many occasions where these are situated in proximity (50km or less to water-bodies). This is as per ITU RR Article 31 and Appendix 18. It is therefore proposed to:

- Identify and migrate all SF Mobile users within close proximity (50 km or less) to water-bodies out of this band and/ or relocate the same.

#### **Outcome of 1st Consultation**

No objection to proposal

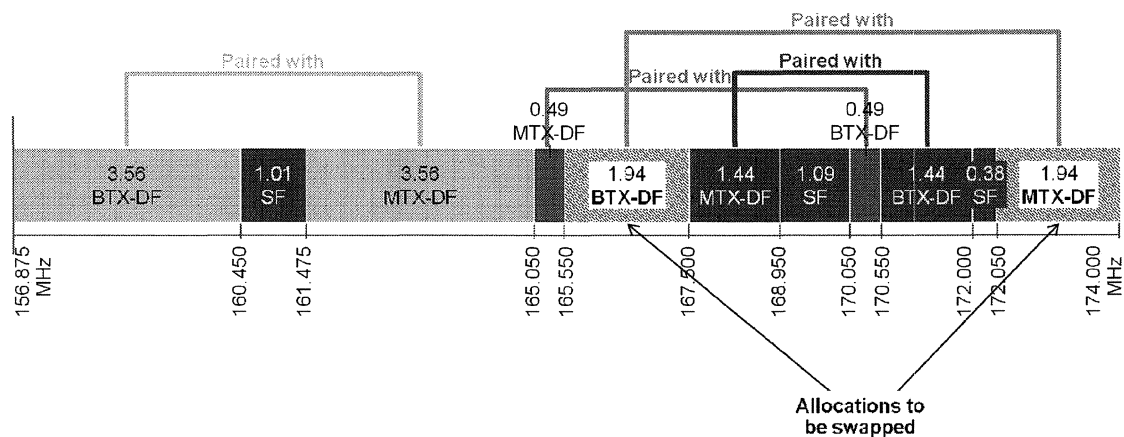
#### 4.10.5 156.8375 - 174 MHz



The planned frequency allocation as per the NFRP in this band is as shown in Figure 3

**Figure 3 Proposed Allocation 156.875MHz – 174MHz**

However at present the MTX-DF (165.55 – 167.5 MHz) and BTX-DF (172.05 – 174 MHz) are interchanged as indicated in Figure 4.



**Figure 4 Current situation 156.875MHz – 174MHz**

This has resulted in the situation that the BTX lies within the MTX allocation and vice-versa, leading to interference and other challenges during assignment.

It is therefore proposed to:

- Restore the allocation as proposed with immediate effect by swapping the MTX and BTX.

#### Outcome of 1st Consultation

Consultation submissions lead to the following modified proposal.

- First step, ensure that the appropriate nesting of the spectrum is carried out by swapping the MTX and BTX allocations as indicated in the ICASA proposal (as proposed)
- Second step - Conduct technical feasibility study into simplex frequencies (FDMA or TDMA) with different channel spacing – including coexistence of multiple technologies, bandwidth etc. Depending upon the outcome, the band would need to

be re-planned (year 2 + after studies have been completed) – need for studies stemming from the submissions.

#### **4.10.6 174 – 223 MHz**

The VHF TV service currently operating in this band will be migrated to DTT by 2015 in line with GE-06 guidelines. The new allocation could be carried out in line with SADC FAP proposed common sub-allocation / utilization.

There are a few important points to consider here:

- T-DAB: in line with SADC proposed common sub-allocation/ utilization, this service has been allocated to two bands (214 – 230 MHz) as well as (1452 – 1492 MHz). Depending upon the utilization of the service related to this band, the allocation of two frequency bands would be re-evaluated. It may be sufficient to restrict allocation of T-DAB to 214-230 MHz and allocate the 1452 – 1492 MHz band for other uses.
- It is also recognized that although DAB is the standard proposed by SADC for sub-allocation/ utilization there are other alternatives being proposed such as DMB, DVB-H etc.
- It is recognized that apart from selecting the technology based upon spectral efficiency itself, it is also important to be harmonized with the SADC region as well as to consider the wide-spread availability and costs associated in using alternative standards.

It is therefore proposed that the allocation for this band be as follows:

- 174- 214 MHz TV Broadcasting.
- 214 - 230 MHz Terrestrial – Digital Audio broadcasting and comments and considerations for the technology standard(s) to be specifies for this purpose are invited.

#### **Outcome of 1st Consultation**

- Consultation submissions concern alignment with the Broadcast plan regarding VHF. Where this is not explicitly covered, then ICASA will determine if the future needs of audio broadcasters are covered by the current allocation and evaluate with respect to the entire broadcasting plan.

#### **4.10.7 223 – 230 MHz**

The band is proposed to be allocated for T-DAB (refer to 4.10.6):

- 214 - 230 MHz T-DAB.

#### **4.10.8 235 – 267 MHz**

This band is currently being occupied by Analogue TV. Consequent to the planned migration in line with GE-06, the band can be used for the following purposes as per SADC proposed sub-allocation / utilization:

- 235 – 238 MHz TV Broadcasting.
- 238 – 242.95 MHz PMR including public trunking.
- 242.95 – 243.05 MHz International Distress.
- 243.05 – 246 MHz Low power devices ancillary to broadcasting services.
- 246.18 – 254.18 MHz TV Broadcast (Channel 13).
- 254 – 267 MHz PMR and/ or PAMR including public trunking.

#### **Outcome of 1st Consultation**

Based upon the submissions received the allocation for this band is modified:

- 230 – 238 MHz TV Broadcasting as per submission (to form a complete 8MHz DVB-T2 Channel)
- 238 – 242.95 MHz PMR including public trunking (national trunking)
- 242.95 – 243.05 MHz International Distress
- 243.05 – 246 MHz Low power devices ancillary to broadcasting services.
- 246– 254 MHz TV Broadcast (Channel 13) modified as per submission254 – 267 MHz PMR and/ or PAMR including public trunking (national trunking)

#### **4.10.9 335.4 - 387 MHz**

Spectrum in this band could be freed up for rural broadband if equipment for FBWA in this band is available in the market. The current players have shown indications that they may relinquish this spectrum due to spectrum fees imposed.

It is proposed that the band be allocated for one or more of the following uses as per SADC FAP proposed sub-allocation/ utilization:

- 335.4-336 MHz PMR and / or PAMR.
- 346.0-356.0 MHz PMR and / or PAMR.
- 366.0-380.0 MHz PMR and / or PAMR.
- 336-346 MHz paired with 356-366 MHz for Fixed Wireless Access/ PTP/PTMP rural system.

#### **Outcome of 1st Consultation**

- Based upon the submissions received, the migration of fixed links out of this band should be subject to feasibility studies.

**4.10.10 380 – 400 MHz**

This band will be allocated as a contiguous block for public protection and disaster relief (PPDR) as well as public safety with users including SAPS, SANDF, the ambulance service, metro police and Fire-fighting services. All other users will migrate out of this band. This allocation recognizes the importance of having a band dedicated for public safety and free of any other potential sources of interference. In ideal circumstances, these users could make use of a common digital public trunking network which could also promote interoperability between such users in periods of emergency.

It is also recommended that private establishments who work alongside and are responsible for public safety also operate within this band. This would allow interoperability with other public safety/ emergency services users.

The proposed allocation of this band would be as per SADC proposed sub-allocation/ utilization

- 380.0-387.0 MHz paired with 390.0-397.0 MHz for digital systems to be used for PPDR.
- 387.0-390.0 MHz paired with 397.0-399.9 MHz. To be used mainly for digital systems (PMR and/or PAMR).
- It is the new ICASA proposal that this band be exclusively reserved for public safety and all users (e.g. SAPS etc.) migrate into this band.
- Considerations be made to adopt a common digital trunking technology standard which would allow:
  - Economic savings by operating and sharing a single network infrastructure
  - Improving effectiveness and promoting interoperability

**Outcome of 1st Consultation**

- Need for a dedicated PPDR system in this band, and there is support for the use of TETRA as the technology of choice. The use of a single PPDR system infrastructure which facilitates communications between different groups involved in public safety has its benefits.
- Concerns arose about the cost to roll out such a system – leading to a long migration time as indicated by SAPS.
- Suggestions pointed to the need to consult the Department of Communications on this matter along with all parties involved.

**4.10.11 406.1 - 430 MHz**

This band is currently used for public trunking services. In addition there is a Mobile Data Service (WBS) operating in this band as well the SADC proposed sub-allocation/ utilization indicates use for PMR and/ or PAMR as well as PPDR. Given the NRFP

allocation for Digital Trunked Mobile there is the possibility of other services (including those using FDMA) and other TDMA systems, including DMR, may be introduced in this band. ICASA proposes that:

- 410 – 430 MHz reserved for digital public trunking only.
- All other services apart from public trunking to be migrated out of the band.

It is important to note that although this band is allocated to Digital Trunking there are several different technologies which could suit this purpose, not all of which are interoperable with each other. In the present assignments there are several who are using TETRA, while other Digital Trunking technologies are also being proposed. Proposals are invited to determine the best way forward which would allow technology neutrality but however would ensure that interference between users using different technology standards (FDMA versus TDMA etc.) is minimized.

#### **Outcome of 1st Consultation**

- The band changed to 406.1 – 430 MHz
- Submitting company studies (IMS and others as referred to in their submission) regarding the advantages of TDMA systems over FDMA
- ICASA is to examine this, taking into cognizance the preference for a technology neutral approach (unless deemed detrimental) and the concerns of Transnet, in order to determine cost effective solutions for this band
- This exercise has also to be synchronized with the migration into the PPDR band (380 – 400 MHz)
- The planned time period would be determined after the 380 – 400 MHz migration plan (above) is finalized

#### **4.10.12 440 - 450 MHz**

This band is allocated for Short Range Business Radio (441 – 441.1 MHz) while the remaining portion is allocated for PMR (both UHF repeaters and DMR). The Short Range Business Radio has wide application in South Africa and is type approved (unlicensed). It is important to ensure that this sub-band is maintained for Short Range Business Radio purposes. There is no migration planned in the PMR sub-band.

It is hence proposed by ICASA that:

- 440 – 440.1 MHz is allocated to Short-range Business radio,
- 446 – 446.1 MHz is used for temporary assignments within PMR band,
- All other users migrate out of the band, and
- The rest of the users in this band can remain as-is.

#### **Outcome of 1st Consultation**

As per submissions – the migration of users only reflects to 440 – 440.1 MHz, and 446 – 446.1 MHz. All users who are not either Short Range Business Radio or PMR should migrate.

#### 4.10.13 450 - 470 MHz

This band is currently used for Trunked Mobile with several users including the Railways (Transnet) and mines (Figure 5). The SADC FAP proposed common sub-allocation/ utilization seeks to allocate this spectrum for Mobile IMT. This is important to note that several adjacent countries (e.g. Mozambique) are moving to implement this proposal. Although the band has a large number of assignments, a recently concluded spectrum audit indicates that the spectrum usage is quite low – indicating inefficient spectrum use.

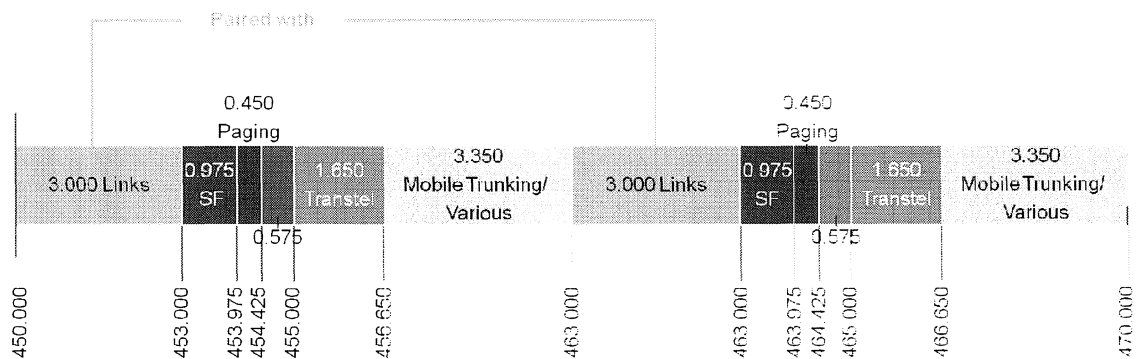


Figure 5 Current assignment 450 – 470 MHz

In view of the other spectrum that has been identified for IMT, it is proposed therefore:

- To migrate the current users out of this band into the radio frequency 3 GHz and above space.
- To allocate this band to Mobile (IMT) as per Res. 224 of WRC-07.

In view however of the large number of assignments in this band, additional comments on this suggestion are particularly welcome

#### Outcome of 1st Consultation

As expected there was considerable response on the use of the band:

- This band is deemed advantageous by multiple parties for rural coverage,
- There are requests to assign this band for public safety using LTE – however, there is no elaborated approach on how such a network would be financed or operated,

- Both Telkom and Transnet have indicated that the band is currently being used for different services – this would have to be validated via the spectrum audit and ESKOM –has also indicated need of spectrum for smart grid applications

It is therefore proposed to

- Subject this band to a feasibility study including
  - Evaluate the ITU-R M.1036 recommendations in light of current usage
  - Determine current levels of utilization (especially for Transnet and Telkom) via validated methodology
  - Determine harmonization potential with neighbouring states
- Based upon the results of the feasibility study determine band allocation

#### **4.10.14 470 - 790 MHz**

This band has been assigned for (Terrestrial) Broadcasting and Mobile on a co-primary basis for Region 1 countries at the WRC-12 (Table 2).

Given that there is a current planned migration underway in the 790 – 862 MHz band (due to be completed after analogue switch off in by 2015), a proposal would be to concurrently define and implement a migration plan for the 694 – 790 MHz band as well. The time-line to complete the migration could be staggered as compared to the 794 – 862 MHz band. This would ensure that no new services are allocated for this band and the existing users have a finite and defined period to migrate.

It is proposed that:

- The migration plan is aligned with the on-going efforts within the 800 MHz band as defined in Government Gazette 34872<sup>17</sup>.
- With respect to the small number of Studio Links in this band; these must be migrated out and given point to point fixed assignments.
- Self Help Stations must be migrated out into the broadcast bands below 694 MHz.

#### **Outcome of 1st Consultation**

As expected there was considerable response on the use of the band – comments that are of relevance to the band allocation include:

- Submissions requested that a study should evaluate the needs of broadcasters.

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<sup>17</sup> Government Gazette 34872: Draft invitation to apply for Radio Frequency Spectrum Licence to provide mobile broadband wireless access service for urban and rural areas using the Complimentary Bands, 800 MHz and 2.6 GHz



- Propose to consider both the digital dividend bands concurrently as well as a staggered approach (i.e. assign together with 790 - 862 MHz band).
- Migration plan should be following release of updated NRFP 12 indicating the new proposed allocations (ITU – RR Footnote 5.312A).
- Consideration is being given to using the 1.6 GHz band for the STL links.
- New assignment / licensing to be run in parallel with the migration process and commence as soon as ITU-R studies have resulted in the appropriate channel plan for the 700 MHz/800 MHz frequency bands for Region 1.

#### **4.10.15 790 - 862 MHz**

This band has been allocated for IMT (Terrestrial) for Region 1 countries at WRC-07 (Table 2) and is often termed as Digital Dividend 1. Currently this band is occupied by UHF TV. Migration is planned to be initiated and phased in through to 2015.

It is proposed that:

- The migration plan is aligned with the on-going efforts within the 800 MHz band as defined in Government Gazette 34872<sup>18</sup>.
- With respect to the small number of Studio Links in this band; these must be migrated out and given point to point fixed assignments.
- Self Help stations must be migrated out into the broadcast bands below 692 MHz.

#### **Outcome of 1st Consultation**

Comments that are of relevance to the band allocation include:

- Propose to consider both the digital dividend bands concurrently as well as a staggered approach (i.e. assign together with 694 - 790 MHz band).
- Migration plan should be following release of updated NRFP 12 indicating the new proposed allocations (ITU – RR Footnote 5.312A).
- The Broadcast Plan should incorporate Self Help and Studio Transmitter Links. Self Help stations need to be part of the DTT band plan.

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<sup>18</sup> Government Gazette 34872: Draft invitation to apply for Radio Frequency Spectrum Licence to provide mobile broadband wireless access service for urban and rural areas using the Complimentary Bands, 800 MHz and 2.6 GHz

- New assignment / licensing to be run in parallel with the migration process and commence as soon as ITU-R studies have resulted in the appropriate channel plan for the 700 MHz/800 MHz frequency bands for Region 1.

#### **4.10.16 862 - 890 MHz**

This band currently has several users including:

- Wireless audio (863-865 MHz).
- Fixed links (868.1–876 MHz).
- RFID (865 – 868 MHz), RFID (869.4- 869.65 MHz).
- Alarms (868.6 – 868.7 MHz, 860.25 – 869.3 MHz, 869.65 – 869.7 MHz).
- Wireless Access Services (824-849 MHz paired with 869-894 MHz).
- Mobile (880-890 MHz paired with 925-935 MHz) – currently assigned to Cell C.

It is essential to note that alarms were not part of the SABRE proposed allocations and may need to be consolidated within designated alarm bands. Additionally there is some level of confusion with regards to the Wireless Access Service (824-849 MHz paired with 869-894 MHz) as part of the NRFP – given that such an assignment would interfere with the Mobile band assigned to Neotel. It is proposed to:

- Align re-planning efforts within the 800 MHz band as defined in Government Gazette 34872<sup>19</sup> as amended / replaced.
- Remove the assignment for Wireless Access Services in this band.
- Re-plan the entire band to accommodate IMT (terrestrial) as per SADC FAP proposed common sub-allocation/ utilization.
- Migrate existing users out of this band.

#### **Outcome of 1st Consultation**

- Migration of other users to be considered when the use of 862 – 876 MHz for IMT in the future to has been investigated as part of the development of harmonised IMT channelling arrangements (i.e. when ITU-R WP5D has agreement on the appropriate channel plan for the 700 MHz/800 MHz frequency bands for Region 1).
- There was no support for GSM-R (876-880) MHz paired with 921-925 MHz) by Transnet.

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<sup>19</sup> Government Gazette 34872: Draft invitation to apply for Radio Frequency Spectrum Licence to provide mobile broadband wireless access service for urban and rural areas using the Complimentary Bands, 800 MHz and 2.6 GHz.

**4.10.17 890 - 942 MHz**

This band currently has several users including:

- Mobile (890 – 915 MHz paired with 925 – 935 MHz) currently assigned to Vodacom, MTN and Cell C.
- Several RFID (short range applications) from 915.1 – 919.2 MHz.
- GSM-R (921-925 MHz) - However, it is important to note that GSM-R is not mentioned as an explicit service in the NRFP, while SABRE recommended that this band be allocated for digital trunking.

It is proposed that:

- 921-925 MHz is allocated for the purposes of GSM-R.
- The remaining allocations remain as-is.
- Spectrum re-farming, when deemed necessary is carried out based upon the principles and policies defined in section **Error! Reference source not found..**

**Outcome of 1st Consultation**

Submissions that are of relevance to the band allocation / migration:

- There was no support for GSM-R (876-880) MHz paired with 921-925 MHz) by Transnet
- No migration at this stage.

**4.10.18 942 - 960 MHz**

This band currently is allocated for GSM900 (Vodacom, MTN). There is currently no spare capacity left in this band.

It is proposed that:

- No migration is planned for the band, the allocations remain as-is.
- Spectrum re-farming, when deemed necessary is carried out based upon the principles and policies defined in section **Error! Reference source not found..**

**Outcome of 1st Consultation**

Submissions made regarding potential refarming.

- No out- migration planned for this band.
- Harmonization of the 900 MHz band to be carried out.

**4.10.19 1350 – 1375 paired with 1492 – 1517 AND 1375 – 1400 MHz paired with 1427 – 1452**

This band is currently allocated to low capacity PTP / DF links. Spectrum is available on a radio coordinated basis. Based upon availability of equipment as well as user demand, ICASA proposes that:

- Maintain existing links where required (too expensive to migrate etc.).
- Allocation to rural broadband (BFWA) due to good propagation characteristics.

**Outcome of 1st Consultation**

- As proposed by submissions, the proposed allocation is adjusted to BWA (both fixed and mobile)
- As indicated by submissions, potential band is best for IMT as per WRC-15 Agenda Item 1.1.
- Migration planning postponed until decision at WRC-15 (enabling harmonization, equipment availability etc.)

**4.10.20 1452 - 1492 MHz**

This band is currently allocated to T-DAB and S-DAB due to the current South African allocations of BROADCASTING and BROADCASTING-SATELLITE. Given the allocation of DAB in the VHF band (from 214 – 230 MHz) it is important to determine whether the frequency allocation is sufficient or additional spectrum in the L-band needs to be allocated for the purpose. Consideration of this depends upon:

- Whether there is sufficient and adequate demand for DAB services to require assignment in two bands.
- Whether equipment is readily available encompassing both bands.

Under the present and forecasted situation, it is believed that the DAB allocation in the VHF band is sufficient to meet the requirements of T-DAB. This would also result in lower equipment costs since any receiver would have to be designed to cover only a single band rather than two distinct bands. In addition, S-DAB may have only very limited potential within South Africa and this spectrum may be better utilized for other purposes. It is there proposed by ICASA to:

- Modify the allocation in this band and align it with the ITU Region 1 to include FIXED, MOBILE except aeronautical mobile, BROADCASTING and BROADCASTING-SATELLITE.
- Allocate this band to PTP/ PMP/ BFWA depending upon the availability of equipment. Communal/ private repeaters could also operate in this band.

**Outcome of 1st Consultation**

- FIXED will be inserted as an allocation as submitted by Cell C – so that the allocation in this band is aligned with the ITU Region 1 to include FIXED, MOBILE except aeronautical mobile, BROADCASTING and BROADCASTING-SATELLITE.
- As submitted by Telkom, this frequency band has been mentioned in WP5D as a possible candidate band for IMT under WRC-15 Agenda Item 1.1. If WRC-15 decides to identify this band (and adjacent bands) for IMT, a re-planning of the band could be performed. In such cases, a common profile (channelling plan) will be developed, which will drive the availability of equipment.
- Therefore, a decision pertaining to this band should be postponed until after WRC-15.
- Consideration to be given at that point for 1452-1492 MHz to be designated for 'mobile supplemental downlink' use (as submitted by Qualcomm).
- A feasibility study to be conducted on various options.

#### **4.10.21 1518 - 1525 MHz**

The band was allocated for both SF links as well as the IMT satellite component. However, this band remains unoccupied and there are views that the IMT (satellite) will have limited usage within South Africa.

Due to these factors, ICASA proposes to:

- Allocate this band for repeater links for land-mobile radio (LMR) and migrate such links into this band.
- This band could also be allocated for outside-broadcasting links currently operating in 2300 – 2450 MHz.

#### **Outcome of 1st Consultation**

- In view of the submissions from industry regarding the importance of maintaining the band for MSS (mobile satellite service), the existing allocations will be maintained and no migration is planned.
- The submissions will be taken into account in formulating South Africa's position at global forums.

#### **4.10.22 1525 - 1559 MHz**

The band has been identified for IMT (satellite); and Res. 225 (WRC applies). In the band 1530 – 1544 MHz priority for maritime mobile distress is given, urgency and safety communication (GMDSS); Res. 222 applies. The band is currently being used by INMARSAT.

Due to these factors, ICASA proposes to:

- Consider using the 1525 – 1530 MHz band for Fixed links (e.g. repeater links) and migrate such links into this band.

- This band could also be allocated for outside-broadcasting links currently operating in 2300 – 2450 MHz.
- Keep the remaining allocation (1535 – 1559 MHz) of the band as-is.

#### **Outcome of 1st Consultation**

- Current usage by INMARSAT needs to be further evaluated. The proposal for no change would be based upon the current levels of usage. If deemed low utilization then 1525 – 1530 MHz will be used for simplex fixed links only.
- For 1530 – 1559 MHz – it is confirmed no changes will occur.

#### **4.10.23 1668 – 1675/ 2483.5 - 2500 MHz**

The band has been identified for the satellite component of IMT; and Res 225 applies. However, the use of IMT (Satellite) within South Africa is limited and it is unclear whether this application would ever become significant for broadband with the strong growth of IMT (Terrestrial).

It is therefore proposed by ICASA to:

- Change the current allocation to be in line with ITU Region 1 allocations of:
  - 1668 – 1668.4 MHz:
    - MOBILE-SATELLITE (earth-to-space)
    - RADIO ASTRONOMY
    - SPACE RESEARCH (passive)
    - Fixed
    - Mobile except aeronautical mobile
  - 1668.4 – 1670 MHz:
    - METEOROLOGICAL AIDS
    - FIXED
    - MOBILE except aeronautical mobile
    - MOBILE-SATELLITE (earth-to-space)
    - RADIO ASTRONOMY
  - 1670 – 1675 MHz:
    - METEOROLOGICAL AIDS
    - FIXED
    - METEOROLOGICAL SATELLITE (space-to-earth)
    - MOBILE

- MOBILE-SATELLITE (earth-to-space)

- This change in allocation is in line with ITU region 1 and will open up the possibilities of introducing Fixed links (PTP, PMP) into this band.

#### **Outcome of 1st Consultation**

- In view of the submissions from industry regarding the importance of maintaining the band for MSS (mobile satellite service), the existing allocations will be maintained.
- No migration is planned.
- The submissions will be taken into account in South Africa's position at global forums.

#### **4.10.24 1880 - 1900 MHz**

The band was allocated for cordless DECT by SABRE proposed allocation. This is currently used by Telkom to provide WLL services. Depending upon the current utilization of this band and as per SADC FAP, it is proposed that a common sub-allocation/ utilization be proposed as follows:

- Allocate this band to BFWA.

#### **Outcome of 1st Consultation**

- Evaluate DECT FWA migration proposal from Telkom
- Note taken of interference concerns between DECT cordless and BWA in submissions<sup>20</sup>
- Future allocation (with measures in place to allow sharing and minimize interference) for BWA (fixed and mobile) rather than BFWA will be considered.

#### **4.10.25 1980-2010/ 2170-2200 MHz**

The band has been identified for the satellite component of IMT; and Res 225 applies. However, the use of IMT (Satellite) within South Africa is limited and it is unclear whether this application would ever become significant for broadband with the strong growth of IMT (Terrestrial). The band is also allocated for Fixed Links, but is currently not used in the lower band; it is utilized by SANDF, Transnet and others in the upper band; but is under-utilized. It is therefore proposed to:

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<sup>20</sup> ERC Report 100; 'Compatibility between certain Radiocommunication system operating in adjacent bands – evaluation of DECT/ GSM1800 compatibility, 2000'

- Allocate for Fixed links and migrate in Fixed links (DF) from other bands.
- Allocate for BFWA depending upon availability of equipment in these bands (New ICASA proposal).
- 

#### **Outcome of 1st Consultation**

- Submissions from satellite organisations propose to reserve the band for MSS and migrate terrestrial links out.
- Submissions did not favour migrating fixed links into this band.
- Submissions request study on the availability of BFWA equipment before making allocation.
- ICASA conclusion is to maintain status quo for the moment.

#### **4.10.26 2025 – 2110 paired with 2200 - 2285 MHz**

The band is currently allocated for fixed links – but is under-utilized. SABRE proposed use of 2075 - 2110 MHz for WLL was never implemented.

It is proposed to:

- Keep allocation for Fixed links and migrate in Fixed links (DF) from other bands.
- Allocate for BFWA if band continues to remain under-utilized and depending upon demand and availability of equipment, (New ICASA proposal).

#### **Outcome of 1st Consultation**

- Some submissions support BFWA being allocated but point out difficulties of frequency sharing with PTP links.
- Arguments for the band to allow Rural Broadband (BFWA), albeit conditions must be put in place to allow co-existence of BWA and PTP.
- In case co-existence is not possible, then BFWA could be implemented in areas where PTP links are absent.

#### **4.10.27 2290 - 2300 MHz**

The band is currently unused; In line with SADC proposed common sub-allocation/ utilization, ICASA proposes to

- Allocate this band to BFWA.

#### **Outcome of 1st Consultation**

- Submission proposed extending band to 2285-2300MHz and allocating it to BWA (fixed and mobile) rather than just BFWA.



- This will require MOBILE to be included in the South African allocations in the NRFP (MOBILE is already a Region 1 allocation).
- Submissions alerted that 2285-2290 MHz is unused.

#### **4.10.28 2300 - 2450 MHz**

The band is currently in use for several services including:

- Fixed links – 2307 – 2387 MHz paired with 2401 – 2481 MHz.
- Outside broadcasting links (28 MHz) – primary basis at (2377, 2471 MHz), secondary basis at (2321, 2349 MHz, 2415, 2443 MHz).
- ISM – 2400 – 2483.5 MHz.

As per SADC FAP proposed common sub-allocation/ utilization, it is proposed to:

- Allocate 2300 – 2400 MHz for IMT (Terrestrial).
- Continue to retain allocation of 2400 – 2483.5 MHz for ISM.
- Existing Fixed links could be migrated above 3 GHz.
- Migrate outside-broadcasting links in line with the DTT migration (potentially to 1518 – 1559 MHz band).

#### **Outcome of 1st Consultation**

- The band is to be allocated for IMT as proposed and supported by submissions
- A detailed study of the current users and uses may be carried out (based upon MTN, Telkom submissions)
- Migration will commence once the results of the study are available.

#### **4.10.29 2500 - 2690 MHz**

This band is being used by Sentech (50 MHz) and WBS (15 MHz); 125 MHz is currently available for assignment. As per SADC FAP proposed common sub-allocation/ utilization this band has been allocated for Mobile IMT.

It is proposed to:

- Align re-planning efforts within the 2.6 MHz band as defined in Government Gazette 34872<sup>21</sup>.
- Allocate the band to Mobile IMT.

#### **Outcome of 1st Consultation**

- Submissions support the allocation of the band for IMT as proposed
- Re-planning efforts within the 2.6 MHz band should be as defined in Government Gazette 34872 as amended or replaced.

#### **4.10.30 3400 - 3600 MHz**

This band is currently being utilized by:

- Sentech (national).
- Neotel (national).
- Telkom (national).
- USAL (regional).

In terms of WRC 07 decisions and as per SADC FAP proposed common sub-allocation/ utilization it is proposed to:

- Allocate for mobile service on a primary basis and use for Mobile IMT. This would also result in a harmonized Mobile IMT band across the entire SADC region.
- Migrate existing users out of the band.

#### **Outcome of 1st Consultation**

- Submissions support the allocation of the band for IMT
- Inmarsat submission was concerned with BFWA interference with earth stations

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<sup>21</sup> Government Gazette 34872: Draft invitation to apply for Radio Frequency Spectrum Licence to provide mobile broadband wireless access service for urban and rural areas using the Complimentary Bands, 800 MHz and 2.6 GHz

**4.10.31 3600 - 4200 MHz**

This band (C-band) is currently being utilized for PTP links (terrestrial backhaul) and Satellite links including VSAT, Satellite downlink and tracking. The proposed allocation as per SADC proposed common sub-allocation/ utilization is:

- (3600-4200 MHz) Fixed services (PTP).
- (3600-4200 MHz) Fixed-satellite (space-to-Earth) (PTP/VSAT/SNG).
- (3600-3800 MHz) Broadband Fixed Wireless Access (BFWA).

The sub-band 3600-3800 MHz could be used for BFWA where frequency sharing with FS PTP and/or FSS is feasible. The channelling arrangement for PTP links in this band is based on ITU-R Recommendation F.635. The sub-band 3600-4200 is used for medium and high capacity PTP links and FSS. In the band 3600-3800 MHz, BFWA, FS PTP and FSS applications will have to operate on coordinated basis. However, considering the difficulty in coordinating ubiquitous user terminals used for BFWA and VSAT, it is proposed that:

- VSAT systems should be migrated to the Ku-band (ref: 4.10.36).

**Outcome of 1st Consultation**

- Submissions from industry strongly argued against the migration of C band to Ku band because of physical limitations and the extensive use of this band by broadcasters.
- Other submissions proposed deferring any decision on this band until after WRC 15.
- Submissions suggested that there was not strong evidence of demand for this band for BWA.
- In view of the arguments expressed in the submissions, there will be no change.

The submissions will be taken into account in South Africa's position at global forums.

**4.10.32 5470 - 5725 MHz**

As per as per SADC proposed common sub-allocation/ utilization, the band can be allocated for:

- Wireless Access Systems (WAS) / RLAN.

**Outcome of 1st Consultation**

- SARL requested retention for amateur of at least secondary allocations of the band 5650 – 5850 MHz and upgrade to primary status in the bands 5650 – 5670 MHz and 5830 – 5850 MHz.
- The amateur-satellite service seeks to retain access to the band 5650 – 5670 MHz in the Earth-to-space direction and 5830 – 5850 MHz in the space-to-Earth direction.

- Submissions requested that this band be removed from the FMP
- There will be no change for now and the request of the SARL is noted.

#### **4.10.33 5725 - 5850 MHz**

This band is currently being used for ISM, amateur and SRD services. As per ITU footnote 5.453 the band can also be allocated for fixed and mobile services on a primary basis. SADC FAP footnote SADC18 allocates this band for similar services in Swaziland and Tanzania. The NRFP can be updated to reflect the assignment if there is an interest within South Africa for this service in the band.

#### **Outcome of 1st Consultation**

- Submissions suggested that this band be removed from the FMP and any issues addressed as part of the NRFP
- SARL requested retention for amateur of at least secondary allocations of the band 5650 – 5850 MHz and upgrade to primary status in the bands 5650 – 5670 MHz and 5830 – 5850 MHz.
- The amateur-satellite service seeks to retain access to the band 5650 – 5670 MHz in the Earth-to-space direction and 5830 – 5850 MHz in the space-to-Earth direction.
- There will be no change for now and the request of the SARL is noted.

#### **4.10.34 5850 - 5925 MHz**

The upper C-band is currently being used for terrestrial backhaul and satellite (uplink, VSAT). As per the SADC FAP proposed common sub-allocation/ utilization outside broadcasting links could also be potentially migrated into this band with the proposed allocation as follows:

- Fixed-satellite uplinks (PTP/VSAT/SNG) (5850-6425 MHz) – this could also be used for temporary outside-broadcast links.
- FIXED links (5850-5925 MHz).
- ISM (5725-5875 MHz).

#### **Outcome of 1st Consultation**

- The OB links as PTP links will be added to the Fixed services allocation
- These will have to be coordinated on a case by case basis with both PTP and FSS systems

**4.10.35 5925 - 6700 MHz**

As per the SADC proposed common sub-allocation/ utilization the current band could be allocated as follows:

- 5925 – 6425 MHz Fixed links (lower 6 GHz in accordance with ITU-R Rec. F.383).
- 6425 – 7110 MHz Fixed links (upper 6 GHz in accordance with ITU-R Rec. F.384).
- 5850 – 6425 Fixed-satellite uplinks (PTP, VSAT, SNG).

**Outcome of 1st Consultation**

- Submissions suggested that this band be removed from the FMP.
- There will be no change for now.

**4.10.36 10700 - 11700 MHz**

This is the defined Ku band. VSAT links should be migrated into this band as per SADC proposed common sub-allocation/ utilization.

**Outcome of 1st Consultation**

- No out-migration is planned or proposed.
- As the proposal to migrate VSAT links out of the C-Band will no longer be part of the FMP, this band may be removed from the FMP.

**4.10.37 12390, 16420 and 154 – 15700****Outcome of 1st Consultation**

- No relevant comments received.
- There will be no change

**4.10.38 40000 MHz and above**

Although out-migration is not an issue above 40GHz, the following comment should be noted:

- Frequency bands above 40 GHz are relatively under-utilized. Equipment is available off the shelf for high bandwidth PTP links over distances of up to 5km. It is proposed that in the spectrum above 40GHz, allocations are made for Fixed Services such as PTP links – which would be useful especially in metropolitan areas for line-of-sight (LoS) high capacity data links.

**Outcome of 1st Consultation**

- ISPA and WAPA submitted on the desirability of light licensing type regimes above 40 GHz.
- MIMOTECH submitted on the need for the spectrum fees regime to be adjusted to stimulate use of high frequencies.

- Studies will be carried out concerning these issues.

#### 4.11 Summary of New ICASA Proposals

The following table summarises the proposals ICASA is making regarding frequency migration (New ICASA proposals) as extracted from the previous section. These proposals are additional to those proposals made by SABRE and migrations stemming from the WRC and the SADC FAP.

**Table 4 Consolidated list of New ICASA proposals for migration**

<b>Frequency Band (MHz)</b>	<b>Notes on migration/ usage</b>
141 – 141.5	Migrate SF Mobile out of this band and allocate for SF alarms.
141 – 142	Migrate remote controlled industrial apparatus to ISM Band.
380 – 400	Allocated for public safety/ government services. Migrate all such users into this band.
410 – 430	Allocated for Digital Public Trunking.
440 – 440.1 paired with 445 – 445.1	Allocated for Short-range Business Radio; all other users migrate out of band.
921 – 925	Allocated for GSM-R;
1350 – 1375 paired with 1492-1517 1375 – 1400 paired with 1427 – 1452	Allocate for Rural BFWA; migrate existing fixed duplex links out of this band. – Pending investigation
1452 - 1492	Change allocation to include FIXED, MOBILE except aeronautical mobile. Use for BFWA/ PTP/ PMP depending upon availability of equipment.
1518 – 1559	No change
1668 – 1675	Change allocation in line with ITU Region 1 allocations to include FIXED and Mobile except aeronautical mobile within the allocations.
1980 – 2010 paired with 2170-2200	Migrate in Fixed links (DF) from other bands; allocate for BFWA. OR Reserve for MSS
2025 – 2110 paired with 2200 - 2285	Migrate in Fixed links (DF) from other bands; allocate for BFWA where there are no PTP links to be interfered with

Frequency Band (MHz)	Notes on migration/ usage
2300 – 2450	Migrate outside broadcasting links to the 1518 – 1559 MHz band.

## 5 Potential Impact of Spectrum Migration

### 5.1 Bands planned for IMT

One of the critical issues under public debate in South Africa is the availability of spectrum for mobile broadband wireless access.

The potential spectrum that could be made available for IMT following WRC resolutions and SADC FAP proposed common sub-allocation is indicated by the following table.

**Table 5 Bands planned for IMT**

Frequency Band (MHz)	Bandwidth (MHz)	Current Allocation	Notes
450 – 470	20	Various allocations (Fixed, Mobile)	Enabled for IMT as per WRC-7, Res. 224 applies Subject to feasibility
694 – 792	98	TV Broadcasting	Enabled for IMT as per WRC-12, Res. 232 – Digital Dividend 2
790 – 862	72	TV Broadcasting	Enabled for IMT as per WRC-7, planned for 2015 – Digital Dividend 1
862 – 876	14	Fixed, Alarms, Mobile Wireless Access	Enabled for IMT as per SADC FAP proposed common sub-allocation/ utilization
1880 – 1920	40	DECT/ Extended DECT (Telkom National License)	Enabled for IMT as per SADC FAP proposed common sub-allocation/ utilization
2010 – 2025	15	FIXED / MOBILE	Enabled for IMT as per SADC FAP proposed common sub-allocation/ utilization
2500 – 2690	190	MOBILE	Enabled for IMT as per SADC FAP proposed common sub-



			allocation/ utilization
3400 – 3600	200	BFWA	Enabled for IMT as per WRC-07, effective Nov. 2010

This does not include the frequency already allocated and assigned to GSM / UMTS.

## 5.2 Other Migration issues

The table below summarises other migration issues that have been highlighted.

**Table 6 Summary of migration issues**

<b>Frequency Band (MHz)</b>	<b>Current Allocation</b>	<b>Proposed Allocation</b>	<b>Notes</b>
<b>380 – 400</b>	Public Safety (SAPS, DoD etc.)	Public Safety only	Consolidate all public safety related services in this band; move other users out of the band
<b>410 – 430</b>	Government services, Mobile Data and Trunking	Digital Trunking only	Reserve for Digital Trunking use only; migrate mobile data, ESKOM, SAPS out of the band
<b>440 – 450</b>	Short range business radio/ PMR/ other links	Short Range business Radio, PMR only	Should be cleared of all other users; Communal repeaters can be allocated in this band
<b>450 – 470</b>	FIXED, MOBILE	IMT	Should be cleared of all other users
<b>790-862</b>	BROADCAST	IMT	Studio Links need to be migrated out to enable efficient allocation for IMT. Self Help stations need to migrate to below 692 MHz.
<b>921 – 925</b>		GSM-R	Originally allocated by SABRE 1 for digital trunking – currently unused
<b>1350 – 1375 paired with 1492 – 1517</b>	Shared duplex band	BFWA	Could be a consideration for rural BFWA

<b>1375 – 1400 paired with 1427 – 1452</b>	Shared duplex band	BFWA	Could be a consideration for rural BFWA
<b>2025 – 2110 paired with 2200 – 2285</b>	Fixed links (DF)	BFWA	Fixed links currently underutilized
<b>3600 – 4200</b>	Satellite (VSAT, downlink), Terrestrial backhaul	3600 – 3800 MHz BFWA  3600 – 4200 MHz PTP and FSS	No Change
<b>5850 – 6425</b>	Fixed/ Satellite uplinks	Fixed/ Satellite uplink/ Outside Broadcast links	Migrate outside-broadcast from 2300 – 2450 MHz into upper C band
<b>40000 and above</b>		Allocate for PTP links	For local high-speed PTP data links (up to 5 km)

## 6 Future trends

***THIS SECTION IS FOR INFORMATION PURPOSES ONLY – NO COMMENTS ARE INVITED AT THIS STAGE.***

This section highlights a few key trends that may have a significant impact to the current allocation in the mid - long term future. Although no immediate measures are recommended as of now it is important to track and carefully monitor these trends in order to be able to take pro-active measures.

### 6.1 Overall trends in broadband

There is a general movement world-wide to allocate an increasing amount of spectrum in the sub 5 GHz range for IMT. This move is driven by the fact that an increasing number of applications including alarms, mobile radios etc. can be served by IMT. Even typical fixed allocations such as BFWA could be subsumed as a variant of IMT – leaving it to the customer to determine whether he would like to operate the device in a mobile or fixed manner.

Another reason is that new and emerging technologies (e.g. LTE and LTE-Advanced) need an increasing amount of bandwidth in order to be able to achieve high data rate speeds. This can only be possible if spectrum in bands with good propagation characteristics is allocated for this purpose.

The ITU through the WRC's is actively looking into this need and each upcoming WRC may allocate additional spectrum for this purpose. Depending upon current utilization levels in these bands, South Africa would in principle be aligned with allocations made for Region 1. This would extend the spectrum used for mobile broadband and existing services of the type mentioned above could be served by different niche mobile broadband applications rather than being migrated out to dedicated bands.

### 6.2 Cognitive radios

The ITU (Report ITU R SM.2152) defined cognitive radios as

*'a radio system employing technology that allows the system to obtain knowledge of its operational and geographical environment, established policies and its internal state; to dynamically and autonomously adjust its operational parameters and protocols according to its obtained knowledge in order to achieve predefined objectives; and to learn from the results obtained'*

The ITU study determined that while Cognitive Radio System (CRS) technologies may yield significant benefits by providing increased spectral efficiency of existing spectrum and mitigate the problem of congestion additional studies needed to be carried out to:

- Ensure the protection of existing services from potential interference originating from the services implementing CRS technology, especially from the dynamic spectrum access capability of CRS.
- Ensure that any system of a specific service using CRS should be operated in accordance with the provisions of the Radio Regulations and administration rules.

The recently concluded WRC-12 conference advised that administrations continue active participation in ITU-R studies conducted under Resolution ITU-R 58 which seeks to:

- *To continue studies for the implementation and use of CRS in Radiocommunication services;*
- *To study operational and technical requirements, characteristics, performance and possible benefits associated with the implementation and use of CRS in relevant Radiocommunication services and related frequency bands;*
- *To give particular attention to enhancing coexistence and sharing among Radiocommunication services;*
- *To develop relevant ITU-R Recommendations and/or Reports based on the aforementioned studies, as appropriate*

ICASA will carefully monitor and participate in these studies. At present cognitive radios have not had any wide-spread commercial success, and is still in the feasibility stage. Once this technology is proven and appropriate ITU resolutions have been passed advocating for the same, South Africa could align itself with the applicable resolutions for Region 1.

### 6.3 White-space devices

White spaces is defined as

*“a label indicating a part of the spectrum, which is available for a Radiocommunication application (service, system) at a given time in a given geographical area on a non-interfering / non-protected basis with regard to other services with a higher priority on a national Basis”* [Source: CEPT Report 24]

Terrestrial TV networks have traditionally been planned as Multi-frequency networks (MFN) to support regional TV planning and frequency coordination<sup>22</sup>. This planning leads to locations in the country where particular UHF channels are unused either to avoid interference or simply because there are no broadcasting stations in the area. These channels are known as UHF White-spaces and are currently in used by broadcasters for lower power applications such as wireless-microphones (referred to as Program Making

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<sup>22</sup> Sharing the Broadcasting Spectrum: digital dividend, white spaces, power line telecommunication (PLT) system - (by Mr N. Venkatesh, Counsellor ITU-R Study Group 6)

and Special Events (PMSE) applications). The criteria for the interference-free operation of such equipment are provided by:

- ITU-R BT.1368 - 'Planning criteria for digital terrestrial television services in the VHF/UHF bands'.
- ITU-R BS.1786 - 'Criterion to assess the impact of interference to the terrestrial broadcasting service (BS)'.

These unused channels are now being proposed to be used for mobile broadband using a combination of either spectrum sensing via Cognitive Radios (6.2) or geo-location (via a database of channel usage). The spectrum is being proposed to be allocated on an unlicensed basis. Although the ITU has yet to come up with specific resolutions on the subject, it is currently investigating the use of Cognitive Radios with White Spaces as one of the primary beneficiaries. A few countries in the world have trialled White Space Devices (WSD) including:

- OFCOM (U.K) – The regulator has stated the intention (September 2011) to allow WSD on a license exempt basis on the proviso of no harmful interference to existing services. Rather than use Cognitive Radios the proposition was based up the use of a geo-location database.
- FCC (U.S.A) – The FCC with FCC-10-174 memorandum (September 2010) allowed the use of unlicensed white space spectrum including:
  - Protection criteria for Incumbent Authorised Services
  - Technical rules for TV band devices
  - Database Requirements for TV band devices
  - Channels that can be used by TV band devices (e.g. fixed devices cannot operate on channels adjacent to occupied TV channels)
  - Technical requirements and cognitive capabilities. It is important to note that the FCC, through this order has eliminated the requirement that radios (incorporating geo-location and database access) must first sense TV broadcast signals. This eliminates the mandatory requirement for cognitive radios in this space.
  - Separate channels were allocated for wireless microphones and other devices; in case these devices wanted to use the UHF channels due to unavailability or any other reason they would then need to be registered in the database.
  - The FCC, via (Order DA 11-131) in February 2011 has also registered 9 entities as database administrators.

It is important to align the approach to WSD with its overall mobile broadband as well as DTT strategy. ICASA will continue to conduct its own feasibility studies in this area as well as follow international activities in this area.

#### **6.4 The ‘internet of things’ – M2M considerations**

Another emerging trend is in the fast growing sector of machine-to-machine communications. Although primarily in the region of low data rate communications, the world-wide market is projected to grow and exceed over 50 billion connected devices<sup>23</sup> by 2020. This would necessitate spectrum allocated for this purpose – either shared via Managed Spectrum Parks or by some other means.

ICASA will study trends to determine the size and opportunity for these services in South Africa.

#### **6.5 Potential alternative licensing models**

Various alternative models of licensing which could be termed ‘Spectrum Management by Intermediaries’ is being assessed on a worldwide basis.

The reason for inclusion here is that the adoption of these models could require the change of existing individual assignments and consequent in-band migration.

##### **6.5.1 Wholesale open access**

The principle of Wholesale Open Spectrum Access is where the entity to whom the spectrum is assigned, then sub-leases it to other entities that may then use it for providing services to retail service providers such as Internet Service Providers (ISP’s), either individually or collectively.

The wholesale spectrum licensee may also install and operate the network infrastructure which is then used by the retail service. The presumed advantage of this arrangement is that the wholesale spectrum manager is able to operate far more flexibly than the national regulator in ensuring that spectrum is used efficiently by a far larger body of retail service providers.

The wholesale spectrum manager will be able to assign frequency more flexibly in terms of the bands used and coverage. Depending on the model adopted, the retail service providers may also not need to install their own radio equipment.

##### **6.5.2 Managed Spectrum Park**

The managed spectrum park approach is an experience learned from New Zealand. It is intended for local and regional broadband services, and seeks to encourage a flexible, cooperative, low cost and self-managed approach to allocation and use of radio spectrum.

Furthermore, it is catering for a situation in which a nationwide spectrum right is not required, but where services require some self-coordination and sharing in a harmonise manner

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<sup>23</sup> Ericsson: The M2M 50B Connected Devices Opportunity, Middle East Telco World Summit 2011

*"It is intended for local and regional services, and seeks to encourage a flexible, cooperative, low cost and self-managed approach to allocation and use".*

The basic principle is that the licence holders are expected to sort out issues of sub-assignment and interference between themselves and the onus is on the licensees in the spectrum park to behave like responsible and cooperative citizens.

The application of the Managed Spectrum Park model may not necessarily be the same as in New Zealand. A key issue is whether a Managed Spectrum Park should be defined at national level, regional and or local level and the principles on exactly how it should be managed should be established.