7 October 2014

Dr Stephen Mcube
Chairperson
The Independent Communications Authority of South Africa
Pinmill Farm Block A
164 Katherine Street
Sandton
South Africa
2146

By e-mail: chairperson@icasa.org.za
rmakgotlho@icasa.org.za

Dear Chairperson

Vodacom's written submission in response to the invitation for comments on the Draft International Mobile Telecommunications ("IMT") Roadmap for consultation

Please find herewith Vodacom's written submission in response to the Independent Communications Authority of South Africa ("the Authority" / "ICASA")'s invitation to comment on the International Mobile Telecommunications ("IMT") Roadmap for consultation as published in Government Gazette No. 37948, Notice No. 729 of 27 August 2014.

Vodacom herewith confirms its willingness to participate in any further consultative process which the Authority may wish to undertake in this regards.

We trust that you will find the above to be in order.

Yours sincerely

Dr Andrew Barendse
Managing Executive: Regulatory Affairs

Vodacom (Pty) Ltd
Vodacom Corporate Park
082 Vodacom Boulevard, Midrand, 1685
Private Bag X9904, Sandton, 2146
Phone +27 (0)11 653 5000

vodacom.co.za

Vodacom's written submission in response to the invitation for comments on the

Draft International Mobile Telecommunications ("IMT") Roadmap for consultation

[Notice 729, Government Gazette. No. 37948 of 27 August 2014]

PART A: EXECUTIVE SUMMARY

Vodacom affirms its willingness to engage in the IMT Roadmap public consultative process as initiated by the Independent Communications Authority of South Africa ("the Authority"/"ICASA") and remains dedicated to the sector initiatives that are aimed at ensuring that all South Africans enjoy universal broadband access and services.

Vodacom sincerely hopes that the Authority will find its submission technically sound and providing the required regulatory guidance, with a view of supporting the Authority in its efforts to achieve universal service and access to broadband services by all South Africans and the establishment of a vibrant and competitive telecommunications industry.

Vodacom wishes to take the opportunity to commend the Authority on its compilation of this very extensive IMT Roadmap opus. Vodacom believes that the document should, after the necessary public consultative process, be utilised as the basis for the future assignment of IMT spectrum.

Vodacom notes that in a document as extensive as this one, several errors do creep in, attributed in part to erroneous transcription. In most instances, these errors have not led to serious misunderstandings or ambiguities and Vodacom has been able to respond accurately based on the context provided. Nevertheless, although this is not an urgent matter at this juncture, Vodacom is more than willing to assist the Authority by drafting a list of all errors, with a view of contributing to the finalisation of the Draft IMT Roadmap.

Nonetheless, this submission covers Vodacom's perspective on IMT deployment in certain frequency bands, national broadband and the related universal service obligations. Vodacom's key positions regarding the aforementioned issues are as follows:

1. IMT 450

Vodacom shares the Authority's view that IMT 450 will become increasingly attractive for the deployment of future IMT

networks. Vodacom believes that the IMT 450 band is a potential enabler for the cost effective deployment of rural IMT networks. However, the limited assignable bandwidth of 2x5 MHz or 15 MHz and lack of an established terminal ecosystem could create barriers to utilization of this band. Vodacom is of the view that the aforementioned, regarding the lack of terminal ecosystem and limited bandwidth, may be resolved by global harmonization efforts and technological developments (e.g. carrier aggregation), respectively. Therefore, Vodacom shares the Authority's view that IMT 450 will become increasingly attractive for the deployment of future IMT networks. Furthermore, Vodacom view is that it is premature to finalize the duplexing scheme for the IMT 450 band at this stage and it is therefore recommended that the decision be delayed pending further global ecosystem development.

2. IMT 700 and IMT 800

Vodacom supports Option 2, which permits full harmonization with the existing Region 1 IMT 800 channeling arrangement (A3 of the International Telecommunications Union-Radio Sector ("ITU-R" M 1036-4)) and partial harmonization with the lower duplexer of Region 3 IMT 700 (A5 of ITU-R M 1036-4). Furthermore, Vodacom supports utilization of the IMT 700 center gap through alternatives technologies, subject to the technical feasibility of this proposal. However, Vodacom believes that a decision on same is considered premature given the fact that ITU WP 5D is still studying possible channeling arrangements. Vodacom is of the view that Option 2 has the potential to become the band of choice for global mobile broadband roaming, which would in turn trigger unmatched availability and choice of terminals. With regard to future assignment of IMT 700 and IMT 800, Vodacom suggests that assignments be limited to an absolute maximum of 4 Electronic Communications Network Service ("ECNS") licensees as this will allow for an assignment of 2x15MHz to each operator. Assignments of less than 2x15MHz will compromise the extent to which the performance capability of LTE/LTE-A and the objectives and targets set in the SA Connect policy could be realized.

3. IMT 850

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

4. IMT 900

Vodacom strongly advises the Authority against consolidation while 2G remains the dominant technology in the 900 MHz band. It is envisaged that high demand is likely to persist for GSM for several years to come, typically to 2020 and beyond. Moreover, Vodacom's view is that contiguity would be ideal in Greenfield assignments. However, since the 900 MHz band is the most extensively deployed band, reconsolidation of existing assignments between the 3 GSM incumbents would in practice be a complex and costly exercise involving significant frequency re-planning and re-optimisation. Vodacom's position is that in the short term IMT 900 consolidation is not a priority. However, should this become a priority in the longer term, Scenario 3B, which promotes 5 MHz channelization and differentiated reassignment is supported.

5. IMT 2600

Vodacom supports the IMT Roadmap confirmation that IMT 2600 should follow the worldwide preferred allocation plan with 2×70 MHz FDD and 50 MHz TDD. (Option C1 in Table 29 p.107.) This configuration is desirable since it provides a technology-neutral frequency arrangement, supporting both TDD and FDD. Furthermore, Vodacom suggests that future Radio Frequency

Spectrum Assignment Plans ("RFSAPs") make provision for 2x20 MHz assignments, in the 2.6 GHz band as this bandwidth is deemed suitable to meet the ever increasing data demands.

6. **Capacity and Universal Service Obligations**

Vodacom supports the concept of capacity and service obligations subject to the viability of same. Furthermore, Vodacom is of the view that these obligations should be imposed exclusively on new assignments as existing spectrum assignments are generally accompanied by obligations.

7. **Wholesale Open Access Network ("WOAN")**

Vodacom's view on mobile WOA is that, WOA as a generally imposed solution in a single national broadband network, which receives significant and preferential spectrum assignments, is not supported. However, where bandwidth in specific bands is too limited to support distributed assignment between competitors, then the option (p.127) of strengthening the TDD-ecosystem in South Africa (p.127) could be explored.

In conclusion, Vodacom kindly urges the Authority to take the above contributions into account when developing future RFSAPs and Invitations to Apply as the consideration of same will ensure that IMT spectrum is assigned and utilized in a manner that maximizes the potential socio-economic benefits of mobile broadband.

PART B: SPECIFIC COMMENTS

The Authority invites written comment from relevant stakeholders on the draft IMT Roadmap and Feasibility studies for IMT in 450-470MHz and 880-960 MHz bands.

1. IMT 450

1.1. The Authority invites industry views on IMT usage in general in 450 – 470 MHz

Vodacom believes that the IMT 450 band is a potential enabler for the cost effective deployment of rural IMT networks. However, the limited assignable bandwidth of 2x5 MHz or 15 MHz and lack of an established terminal ecosystem could be barriers to utilization of this band. Vodacom is of the view that the aforementioned, regarding the lack of terminal ecosystem and limited bandwidth, may be resolved by global harmonization efforts and technological developments (e.g. carrier aggregation), respectively. Therefore, Vodacom shares the Authority's view that IMT 450 will become increasingly attractive for the deployment of future IMT networks. Furthermore, Vodacom's view is that it is premature to finalize the duplexing scheme for the IMT 450 band at this stage and it is therefore recommended that the decision be delayed pending further global ecosystem development.

1.2. The Authority invites industry views on IMT paired spectrum usage for Public Protection and Disaster Relief ("PPDR").

Vodacom wishes to make the Authority aware that studies[1] on PPDR spectrum requirements reveal a bias towards traffic in the uplink traffic. Considering the nature of FDD and TDD modes, it is generally understood that FDD is a symmetrical system allocating the same amount of resources to both uplink and downlink. As such, Vodacom believes that for a more uplink orientated service, TDD would be better suited for asymmetric operation. Therefore, Vodacom does not recommend IMT paired spectrum usage for PPDR in the 450 MHz band. Given South Africa's unique national requirements, Vodacom cannot, at this stage provide a formal position on IMT spectrum usage for PPDR because the capacity and coverage requirements have not been clearly documented. Regarding the broader discussion on dedicated spectrum for PPDR services, Vodacom advises against it because PPDR services could be achieved cost effectively and reliably by incumbent ECNS licensees.

1.3. The Authority invites industry views on IMT paired spectrum usage for the SA connect initiative.

Vodacom's view is, taking in account the guard bands and duplex separation, the IMT 450 paired configuration leaves at best only 2x5 MHz of assignable spectrum. Its application would therefore be limited to wide area coverage with low speed and capacity and would thus not be ideally suited to support the SA Connect initiative.

1.4. The Authority invites industry views on IMT unpaired spectrum usage for M2M and smart energy/grid applications in South Africa.

Vodacom believes, in general, that Machine to Machine ("M2M") and smart energy/grid applications exhibit asymmetric traffic behavior, where majority of data is transferred via the uplink. In light of the above, the unpaired TDD configuration may be configured to support either downlink or uplink orientated traffic. As a result thereof, unpaired IMT 450 is best suited to meet the asymmetric traffic requirements and high growth projections of M2M and smart energy/grid applications. (See also the statement in section 2.3(2) in the IMT Roadmap p.16.) Furthermore, Vodacom is of the view that TDD also reduces the terminal complexity relative to FDD due to the requirement for minimizing duplex interference with a 5 MHz center gap.

[1] ECC Report 199

In regards the broader discussion on dedicated spectrum for M2M or other applications as listed in the IMT Roadmap, Vodacom maintains that unpaired IMT 450 will play an important role in serving M2M applications but need not necessarily be reserved for one application. The Authority should rather embrace a technology and service neutral approach in this regard.

1.5. The Authority invites industry views on the migration of incumbents (Transnet, SAA, Telkom, etc.) out of the 450-470 MHz band.

Vodacom fully supports the migration of incumbents from 450-470 MHz, in accordance with Scenario 2, with a view of utilizing this band for future IMT based applications. Furthermore, Vodacom is in favor of expediting the migration process so that the country may reap the socio-economic benefits of an IMT deployment in the 450 MHz band sooner rather than later.

1.6. The Authority invites industry views on the migration time line.

Vodacom argues that clearing the IMT 450 should be expedited, subject to cost and practicability for the incumbent 450 MHz ECNS licensees. The migration time frame in the IMT Roadmap (p.119) appears to be structured to accommodate the incumbents in 3 phases, allowing up to 2024 for full migration but yet clearing spectrum of 80% of current rural licenses for new IMT 450 ECNS licensee(s) within 2-3 years. Vodacom's view is that the overall migration timeframe of 9-10 years is expected to be more than ample to give all affected parties sufficient time for migration and this is therefore supported by Vodacom. Furthermore, Vodacom concurs with the statement in the IMT Roadmap (see 2.3 pp.16/17) that clearance of the band be prioritized for rural areas.

1.7. The Authority invites industry views on destination bands.

Vodacom's understanding is that suitability of the destination bands is a matter that could be best addressed by the incumbents. Vodacom's position however, is that the destination bands must comply with ITU Regional band planning activities and the latest amendment of the National Radio Frequency Plan.

1.8. The Authority invites industry to give any other inputs that must be taken into consideration when finalizing plans for the IMT 450 band

This has been covered above in respect of the need for harmonization and spectrum efficiency. In addition, Vodacom advises that the Authority should reconsider the coverage and capacity obligations for IMT 450 in view of the fact that certain obligations may not be commercially sustainable, in particular the obligation of covering all roads. This may require in excess of 80% geographic coverage and would therefore result in significant network deployment costs.

2. IMT 700

2.1. The Authority invites industry views on Option 1 (ITU Region 3).

Vodacom is of the opinion that the development of a suitable IMT 700 channelling arrangement should take into account the progress made at the ITU as this will facilitate the adoption of a globally harmonised frequency arrangement.

ITU Working Party ("WP") 5D is currently studying options for the development of an IMT 700 MHz channelling arrangement. Vodacom wishes to highlight that it would be considered premature for the Authority to finalize a particular channelling arrangement prior to the completion of studies by WP 5D. Furthermore, it is suggested that Industry views regarding a suitable IMT 700 channelling arrangement form the basis of a South African submission to the next meeting of WP 5D scheduled for 15 - 22 October 2014. This will ensure that national interests are adequately represented at International Forums such as the ITU. Vodacom also supports utilization of the IMT 700 centre gap through alternatives technologies, subject to the technical feasibility of this proposal. However, Vodacom believes that a decision on same is considered premature given the fact that ITU WP 5D is still studying possible channelling arrangement.

Having noted the above, Vodacom wishes to highlight the current developments with regard to the development of an IMT 700 channelling arrangement. Based on the studies in WP 5D, the proposed IMT channelling arrangement comprises a common baseline arrangement of 2x30 MHz FDD (UL: 703-733 MHz and DL 758-788 MHz), which is the lower duplexer of A5 channelling arrangement in Recommendation ITU-R 1036-4.

The possible additions to the baseline are:

- Up to 20 MHz SDL within the centre gap 738-758 MHz;
- 2x3 MHz FDD (UL: 733-736 MHz, DL: 788-791 MHz), which could be used for special applications. It is also harmonized with the upper duplexer of A5 arrangement in Rec ITU-R 1036-4; and
- 2x5 MHz FDD (UL: 698-703 MHz, DL: 753-758 MHz) which could be used for special applications subject to maintaining the criteria to be agreed on in the JTG 4-5-6-7 for the protection of broadcasting services below 694 MHz in Region 1.

To date, the ITU WP 5D have derived the following principles, inter alia, that aim to guide the development of an IMT 700 arrangement, while adhering to Resolution 232 (WRC-12)[2]:

- Principle 1 - Protection of GE06 Channel 48;
- Principle 2 - Spectral Use Optimisation;
- Principle 3 - Coexistence with existing arrangements in the band 790-862 MHz; and
- Principle 4 - Harmonisation

Vodacom will assess the suitability of Option 1 based on the aforementioned principles.

- *Principle 1: Protection of GE-06 Channel 48*

Option 1 provides a large guard band of 9 MHz between the closest uplink frequency and GE-06 channel 48. Therefore, it is envisaged that adequate protection will be afforded to Digital Terrestrial Television ("DTT") services operating below 694 MHz band.

- *Principle 2: Spectral Use Optimisation*

[2] Resolution 232 (WRC-12) - Use of the frequency band 694-790 MHz by the mobile, except aeronautical mobile, service in Region 1 and related studies

Option 1 utilises 120 MHz out of a possible 168 MHz in the frequency range 694 - 862 MHz band. Note that the bandwidth utilisation due to the proposed CDMA 850 assignment has not been taken into account.

- *Principles 3 and 4: Coexistence and Harmonisation*

Option 1 will not coexist with the current Region 1 IMT 800 channelling arrangement (A3 of ITU-R 1036-4). This will negatively impact the ability to achieve harmonised IMT 700/800 frequency arrangements for Region 1.

Despite satisfying principles 1 & 2, Option 1 does not allow for coexistence with the current Region 1 IMT 800 channelling arrangement thus hindering harmonisation. In view of the fact that harmonisation is a prerequisite for a suitable mobile eco-system; economies of scale; and global roaming, Vodacom does not support Option 1.

2.2. The Authority invites industry views on Option 2 (ITU Region 1).

Vodacom will assess the suitability of Option 2 based on the principles mentioned in 2.1 above.

- *Principle 1: Protection of GE-06 Channel 48*

Option 1 provides a large guard band of 9 MHz between the closest uplink frequency and GE-06 channel 48. Therefore, it is envisaged that adequate protection will be afforded to DTT services operating below 694 MHz band.

- *Principle 2: Spectral Use Optimisation*

Option 2 utilises 135 MHz out of a possible 168 MHz in the frequency range 694 - 862 MHz band. Note that the bandwidth utilisation due to the proposed CDMA 850 assignment has not been taken into account.

- *Principles 3 and 4: Coexistence and Harmonisation*

Option 2 is harmonised with the lower duplexer of A5 of ITU-R 1036-4 and will coexist with existing Region 1 IMT 800 channelling arrangement A3 of ITU-R 1036-4.

Vodacom supports the adoption of Option 2 since it adheres to all the stated principles. Vodacom is of the view that Option 2 has the potential to become the band of choice for global mobile broadband roaming, which would in turn trigger unmatched availability and choice of terminals. Furthermore, Option 2 is favoured due to it maximizing the use of TDD spectrum for the future exploitation of the Chinese IMT 750 TDD ecosystem.

Vodacom reiterates that the effect / impact of implementing an unpaired assignment in the duplex gap of Option 2 would require further studies in order to ensure the practical feasibility of this proposal.

2.3. The Authority invites industry views on Option 3 (ITU Region 3)

Vodacom will assess the suitability of Option 3 based on the principles mentioned in 2.1 above.

- *Principle 1: Protection of GE-06 Channel 48*

Option 3 provides a large guard band of 9 MHz between the closest uplink frequency and GE-06 channel 48. Therefore, it is envisaged that adequate protection will be afforded to DTT services operating below 694 MHz band.

- *Principle 2: Spectral Use Optimisation*

Option 3 (Region 1) utilises 136 MHz out of a possible 168 MHz in the frequency range 694 - 862 MHz band. Please note that the bandwidth utilisation due to the proposed CDMA 850 assignment has not been taken into account.

- *Principles 3 and 4: Coexistence and Harmonisation*

The 2x30 MHz and 2x3 MHz portions of Option 3 (Region 1) are fully and partially harmonised with the respective lower and upper duplexers of A5 of ITU-R 1036-4. Furthermore, Option 3 will coexist with the existing Region 1 IMT 800 channelling arrangement A3 of ITU-R 1036-4.

Similar to Option 2, Option 3 adheres to all the stated principles. However, Option 3 does not maximize the use of TDD spectrum thus hindering the exploitation of the future Chinese IMT 750 TDD ecosystem. In addition, a 2x3 MHz assignment will compromise the potential performance capability of LTE/LTE-A. On the basis of the aforementioned, Vodacom does not support Option 3.

2.4. The Authority invites industry views on 2 X 3 MHz IMT band of ITU Region 1 solution

As indicated in paragraph 2.3 above, Vodacom does not support the 2x3 MHz paired variations. Furthermore, (see paragraphs 2.1 and 2.3)

2.5. The Authority invites industry views on other ITU Region 1 based suggestions.

Vodacom advises that the band planning should be fully harmonised with IMT standards for Region 1. In particular, 700, 800 MHz and GSM-R frequency arrangements should take precedence over bands which overlap or conflict with them, such as Region 3 APT 700 or CDMA 850 standards. The former has been discussed above in setting the preference of Option 2 over Option 1 and 3. The latter is covered under section 5 (IMT 850) below.

Vodacom advises that assignments within the Option 2 channelling plan (2x30 MHz in each of IMT 700 and IMT 800) should be limited to an absolute maximum of 4 ECNS licensees as this will still allow an assignment of 2x15 MHz for each ECNS licensee. Vodacom's considered view is that assignments of less than 2x15 MHz will compromise the extent to which the performance capability of LTE/LTE-A and the objectives and targets set out in the Broadband Policy ("South Africa / SA Connect") – published in Government Gazette No. 37119 of 6 December 2013 - could be realised.

Vodacom acknowledges that the time frame for the deployment of IMT bands and the associated migration timeline (section 9, p.118) are stated to be subject to essential conditions inter alia section 9.1, No.2. Therefore Vodacom believes that the broadcasters should complete the DTT process with analogue switch off by mid-2015. Vodacom believes that in order for the assignments of IMT spectrum to be effective, commitment to the June 2015 date is critical although indications are that this time line might not be realised.

3. IMT 750

3.1 The Authority invites industry views on IMT unpaired spectrum in the coverage band of 750MHz.

This has been covered under section 2.2 above. In summary, Vodacom supports the allocation of the unpaired extended TDD band gap of IMT750 with preference for a downlink-only application which is expected to render better customer experience, subject to the technical feasibility of this proposal.

4. IMT 800

4.1 The Authority invites industry views on Option 1 (ITU Region 3).

This has been covered under section 2.1 above. In summary, Vodacom does not support Option 1, because it will not coexist with the current Region 1 IMT 800 channeling arrangement (band 20). This will negatively impact the ability to attain harmonized IMT 700/800 frequency arrangements for Region 1.

4.2 The Authority invites industry views on the 2×3 MHz IMT band of Option 1 (ITU Region 3).

As stated in section 2.4, Vodacom does not support Option 1.

4.3 The Authority invites industry views on Option 2 and 3 (ITU Region 1

This has been covered in sections under 2.2 and 2.3 above; Vodacom reiterates its support for Option 2 but not Option 3.

5. IMT 850 (including Neotel CDMA and GSM-R)

5.1 The Authority invites industry views on the migration of incumbents (Neotel, etc.) out of the band.

Vodacom agrees with the Authority's proposal to formally amend the National Radio Frequency Plan by allocating the 876-880 // 921-925 MHz exclusively to GSM-R. (See 8.5.1.3.1 p.85.) This would result in Neotel's CDMA assignment being migrated out of the GSM-R band.

However, Vodacom's position is that IMT 850 is not a feasible band in a harmonized Region 1 IMT 800 band planning environment. The interference issues of having an uplink and downlink block less than 3 MHz apart is of a significant concern. This would require radio co-ordination to mitigate interference. Furthermore, Vodacom believes that the similar coverage obligations for both 800 and 850 MHz (see section 10.4 p.124) would likely lead to significant interference between 850 MHz and 800 MHz deployments.

Vodacom suggests that any migration be negotiated with Neotel directly. Vodacom is of the opinion that it would be preferable for Neotel to migrate to a harmonized IMT 800 LTE assignment[3] as this seems to be the only practical option for ensuring unobstructed national deployment.

6. GSM 900 spectrum consolidation

6.1 The Authority invites industry views on spectrum consolidation.

Vodacom's view is that contiguity would be ideal in Greenfield assignments. However, since the IMT 900 band is the most extensively deployed band, consolidation of existing assignments between the 3 GSM incumbents would in practice be a complex and costly exercise involving significant frequency re-planning and re-optimization.

Referring to the cost-benefit summary table (Figure 26 p.91), while the equipment cost of migration may be low, the operational cost would be substantial and maintenance of service quality during such migration would be subject to risk.

[3] Note that in the December 2011 draft assignment plan for 800MHz and 2600MHz, Neotel's 2x5MHz CDMA2000 existing assignment would be migrated and expanded to 2x10MHz (791 – 801 // 832 – 842MHz).The assignment plan was postponed pending finalisation of the policy direction.

Thus, if consolidation into contiguous assignments was to take place, albeit over an extended time frame, the prioritization of consolidation scenarios as proposed in (section 8.6.4, p.90) is not simplistic and each scenario would need to be explored further.

Consolidation is motivated on the basis of the following benefits:

- Contiguity of assignments for MTN and Cell C. Vodacom's assignment is already a continuous sub-band;
- Additional spectrum (max 600 kHz per network in scenario 1) derived from contiguity and reduction of guard bands. While additional spectrum is always important, 3 additional GSM frequencies for each incumbent would be marginal especially viewed in the context of the urgent need for additional relief spectrum in LTE bands, which in turn would immediately reduce the pressure on the GSM assignments anyway. Note however that limited additional spectrum obtainable from guard band reduction (such as is stated in the IMT Roadmap) could be obtained without consolidation for contiguity; and
- Preparation of the 900 MHz band plan for a future conversion from GSM 900 to UMTS 900 or LTE 900.

Therefore (and also in the context of 6.2 to 6.6 below), Vodacom's position is that in the short term IMT900 consolidation is not a priority. However, should this become a priority in the longer term, Vodacom would prefer Scenario 3B.

6.2 The Authority invites industry views on guard bands.

Vodacom's view is that the argument for dispensing with guard bands be applied consistently. For example, if a guard band is to be maintained between GSM and GSM-R, it would be expected that guard bands should also be maintained between the GSM assignments as well. However, with newer, more robust technologies such as LTE, dispensing with guard bands may be explored.

6.3 The Authority invites industry views on the time line of spectrum consolidation, i.e. when it should be done.

Vodacom believes that while 2G is still the dominant technology in the IMT 900 band, consolidation is not advised. However, as legacy infrastructure is migrated to newer technologies such as 3G/UMTS and 4G/LTE-A, the principal benefit of restructuring the channelization from 200 kHz to 5 MHz could potentially be realized. Vodacom confirms that this, rather than any other argument, is the motivation for consolidation, albeit in the longer term. Setting a timeline for such technology evolution which culminates in GSM end-of-life, would be speculative, given that GSM may need to be supported in the field well beyond 2020.

6.4 The Authority invites industry views on demand for IMT migration of 5 MHz taking into consideration the spectrum for IMT available in the 700 and 800 MHz bands.

Assuming the question here refers to migration towards 5 MHz channelization within the IMT 900 band, please refer to 6.3 above. However, to be more specific, Vodacom's position is that UMTS will be the priority technology to occupy IMT 900 as GSM is migrated out. The spectrum in the IMT 700 and IMT 800 bands, when it does become available, will immediately be utilized for LTE/LTE-A technology. Migration towards the UMTS 900 technology is already in progress and a significant UMTS 900 subscriber base has been developing and will need to be supported. Therefore in the short term, technology migration of the IMT 900 spectrum would be better used to support the UMTS 900 technology in order to deliver broadband to outlying areas where 5 MHz of the 900 MHz spectrum can be relinquished. This, in part, is as a consequence of the delays in the release of high demand spectrum in the digital dividend bands.

6.5 The Authority invites industry views on need-based differentiated spectrum assignments in the 880-915 MHz (paired with 935-960 MHz).

Vodacom supports the principle of differentiated reassignment in the 900 MHz band because the legacy assignments (based on parity) were only appropriate in the Greenfield situation which applied earlier. Vodacom recommends the following criteria for differentiation.

- Preferential assignment to operators based on the traffic load that has to be sustained on the dominant technology in the applicable band; and
- A mechanism should be established to audit traffic load and efficiency of spectrum utilization.

In practice, recovery of spectrum from any operator based on the above criteria is likely to be fiercely contested and quid pro quo's demanded.

However, what is more urgent and important is that the principle of differentiated spectrum assignments be applied to forthcoming IMT 700/800/2600 assignments. The mechanisms for achieving this may not be simplistic but spectrum could be assigned in bandwidths based on the ability of applicants to pay for and efficiently utilize spectrum (e.g. as would apply in auctions) or ability to commit the resources (financial and other) to meet strict rollout targets. The Authority might reserve spectrum within the aforementioned bands for later differentiated assignment to licensees based on audited traffic load, need and efficient utilization.

6.6 The Authority invites industry views on demand for IMT migration of 10 MHz, taking into consideration the new spectrum for IMT 700 and 800 MHz bands.

This was covered in 6.3 and 6.4 above. In addition, Vodacom's position is that it would be difficult to relinquish as much as 10 MHz for refarming (or migration) while high demand is likely to persist for GSM for several years to come, typically to 2020 and beyond, as indicated above.

7. IMT 2300 unpaired spectrum TDD

7.1 The Authority invites industry views on usage of 2300 – 2400 MHz

Vodacom's understanding is that there is a risk that legacy links within the 2380-2400 MHz band have not been satisfactorily accounted for. As such, Vodacom's position is that the usage of this band may be limited and subject to possible interference. In addition, Vodacom wishes to express its concern that the wideband 60 MHz assignment to Telkom puts it in a dominant position in terms of access spectrum holdings as compared with all other operators.

7.2 The Authority invites industry views on usage of 2290-2300 MHz for IMT.

The National Radio Frequency Plan ("NRFP") identifies this band as fixed and alternatively mobile with typical fixed links applications. Vodacom supports the future earmarking of this band for possible IMT deployments. However, it should be noted that 3GPP has not standardized this band for mobile use. Vodacom submits that the assignment of the additional spectrum must enable the country to leverage synergies from existing broadband networks (both private and public sector owned networks), and also be in sufficient bandwidths for broadband technologies to realise their potential for delivering affordable and quality broadband services.

8. IMT 2600 paired FDD spectrum

8.1 The Authority invites views on demand in the IMT 2600 FDD band

The 2600 MHz band currently provides one of the dominant global LTE ecosystems. As such, Vodacom supports the IMT Roadmap confirmation that IMT 2600 should follow the worldwide preferred allocation plan with 2×70 MHz FDD and 50 MHz TDD. (See Option C1 in Table 29 p.107.) This configuration is desirable since it provides a technology-neutral frequency arrangement, supporting both TDD and FDD. Furthermore, Vodacom suggests that future RFAPs make provision for a minimum of 2x20 MHz assignments, in the 2.6 GHz as this bandwidth is deemed necessary to deliver on the ever increasing data demand.

8.2 The Authority invites industry views on the migration of the incumbent (WBS), into 2380-2400 MHz band.

Vodacom advises that the risk of interference (referred to in 7.1 above) coupled with potentially exorbitant migration costs, may be unacceptable to a small operator such as WBS.

8.3 The Authority invites industry views in-band migration of the incumbent (WBS), into IMT2600 unpaired spectrum.

Vodacom's position is that since the IMT 2600 unpaired spectrum is currently vacant, it is better suited for assignment to a smaller operator such as WBS. However, the option could be put to WBS because harmonized assignment in this well supported LTE band may improve WBS' viability. Nonetheless, Vodacom believes that this question can be better addressed by WBS.

8.4 The Authority invites industry views on alternative destination bands for the incumbent (WBS).

Vodacom at this juncture has no additional advice regarding the alternative destination bands for WBS. WBS would have to be consulted to ascertain which destination bands pose suitable alternatives to those proposed in 8.2 and 8.3 above given the Authority's objective of achieving harmonization with ITU Region 1 band planning.

9. IMT2600 unpaired TDD spectrum

9.1 The Authority invites industry views on demand in IMT 2600 TDD band

The 2600 MHz band is currently one of the dominant global LTE ecosystems. As such, Vodacom's position is that the demand will continue to be significant and likely to grow exponentially with the take-up of next generation broadband services. Vodacom supports the IMT Roadmap confirmation that IMT 2600 should follow the worldwide preferred allocation plan with 2×70 MHz FDD and 50 MHz TDD. (See Option C1 in Table 29 p.107.) This configuration is desirable since it provides a technology-neutral frequency arrangement, supporting both TDD and FDD.

10. IMT 3500 unpaired TDD spectrum

10.1 The Authority invites industry views on migration out of 3400-3600 MHz from FDD usage to TDD

Vodacom's position is that migration from FDD to TDD should be supported because currently, albeit small, an IMT 3500 unpaired ecosystem does exist already. In addition, Vodacom advises the Authority to consider supporting the role of both IMT 3500 and 3800 bands as small cell, small cell backhaul and general backhaul spectrum. It is expected that IMT 3500 and 3800 would, in the short term, provide the greatest benefit as a supporting band as there is limited antenna support for macro deployment currently in similar bands.

10.2 The Authority invites industry views on status and time line.

Vodacom's position is that IMT 3500 will find favourable application in high data demand concentrated areas as small cell and small cell backhaul solutions. Therefore, the migration should be expedited in order to facilitate the deployment of future high capacity IMT networks.

10.3 The Authority invites industry views on interest in TDD downlink focused spectrum.

Vodacom's position is that downlink focused spectrum should be supported given that current network behaviour exhibits a strong bias towards downlink traffic. However the best application will always depend on the usage, which generally changes over time. Therefore the blanket TDD frequency arrangement plan F1 in Table 34 p.114 may be preferable because it better supports the dynamic balance between uplink and downlink usage.

10.4 The Authority invites industry views on interest in TDD uplink focused spectrum.

Vodacom's position is that uplink focussed spectrum could be supported. However, currently downlink traffic is predominant and therefore the balance between uplink and downlink allocations must be adjusted accordingly. However the best application will always depend on the usage, which generally changes over time. Therefore the blanket TDD frequency arrangement plan F1 in Table 34 p.114 may be preferable because it better supports the dynamic balance between uplink and downlink usage.

10.5 The Authority invites industry views on interest in the introduction of a Managed Spectrum Park ("MSP").

While Vodacom, in principle, supports the provision for an experimental MSP in the 3400 - 3600 MHz band, this reserved spectrum might also be put to better use e.g. for differentiated assignment as argued above. If used for a MSP, assignments should be based on Licensed Shared Access (LSA), i.e. not unlicensed band or for any current allocations such as for Industrial, Scientific and Medical ("ISM").

11. Operators' opinion on one TDD-operator instead of every operator having parts of TDD spectrum

11.1 The Authority invites industry views on the TDD spectrum bundling of IMT 450, 750 and 2600 and assignment to one (wholesale) operator.

Vodacom supports the assignment of certain TDD spectrum to a single wholesale operator, however while the IMT 450 and 750 could be considered for this purpose, not all of the 2600 MHz TDD spectrum should be assigned to the wholesale operator. LTE TDD small cells are one of the most potent solutions to the ever increasing data demand and therefore operators should be given an opportunity to access unpaired spectrum in this band.

In addition, if one of the incumbent operators elects or is selected to become the wholesale operator, then that operator's existing spectrum holdings should be take into account prior to the assignment of additional TDD spectrum. For example, should Telkom be designated as the wholesale operator, and then it already has sufficient assigned bandwidth in the 2300 MHz band to exclude it from an additional 2600 MHz assignment.

11.2 The Authority invites industry views on the operator interest in individual IMT 3500 assignments per operator or in one assignment to one (wholesale) operator.

Reiterating the principle of 11.1 above, LTE TDD small cells are one of the most potent solutions to the ever increasing data demand and therefore operators should be given an opportunity to access unpaired spectrum in this band. As a result, not all the TDD bands in IMT 3500 should be reserved for single wholesale operator use. Similarly, unpaired spectrum in the 1900MHz, unused 2300 MHz and 3800 MHz bands could be used for assignments to non-wholesale operators.

12. Universal service obligations for lower frequency bands (sub-1GHz)

12.1 The Authority invites industry views on universal service obligations for lower frequency bands (sub-1GHz).

Vodacom notes that imposing certain service obligations has become an accepted practice and subject to the viability of the obligations, it could be supported, with the exception of the IMT 450 obligation of covering all roads as that could be in excess of 80% geographic coverage and would require significant cost to cover. All obligations should be applicable to normal

operating conditions, and should exclude abnormal load conditions that may be experienced from time to time. Furthermore, Vodacom is concerned about the impact of the proposed obligations on the customer experience as driven by market conditions.

13. Capacity license obligations for new and existing IMT bands

13.1 The Authority invites industry views on license obligations for new and existing IMT bands, including infrastructure sharing.

Vodacom would support viable obligations being imposed for new spectrum assignments but existing spectrum assignments should be excluded as they already generally included these obligations in the ECNS licenses.

Vodacom has analyzed the matter of infrastructure sharing, single national broadband networks and mobile wholesale open access (WOA) networks. Proposals where WOA could be usefully applied have been elaborated e.g. for sharing coverage obligations for underserved areas. The attached appendix refers.

As a result, Vodacom's position remains as follows:

- Mobile WOAN is not a radical new concept. In the form of national roaming it is well established;
- It can find good application to address coverage for underserved/marginal/rural areas where there is no business case for coverage at all, let alone deployment of multiple networks;
- In such cases, mobile operators should be allowed to cooperate by sharing coverage obligations. This seems a very reasonable proposal but may need clearance by the Competition Commission;
- This is one of the main objectives of SA Connect i.e. Coverage of underserved areas and solutions whereby it can be achieved, whether by cooperative sharing of coverage obligations by incumbent operators, or a consortium of new entrants in a WOA network, or SOE's and private enterprise with funding support from the universal service fund, or any combination thereof, should be explored. The currently successful competitive model which serves the market well should not be compromised through any regulatory mechanism. For example forced inclusion in or exclusion from a WOA network should not be imposed by constraining spectrum assignments to incumbents and affording preferential assignments to the WOA network;
- SA Connect appears to be determined to impose a single national mobile WOA network (or in short a SWN) , but Vodacom has studied this topic in some depth and proposed an alternative solution, which is flexible enough to support increased competition, allows for a number of assignment scenarios, and which maintains ongoing commitment to invest heavily in the network;
- This applicability of this model has been borne out by detailed subsequent studies and recommendations by Frontier Economics Consultancy on behalf of the GSMA; and
- Vodacom's alternative is exactly the model described in Vodacom's support of the GSMA initiative to expedite the provision of broadband for underserved communities.

PART C: GENERAL COMMENTS

The Authority requests any other inputs that are deemed necessary and appropriate which should be taken into consideration.

Although the IMT Roadmap states that the assignment of spectrum to licensees is beyond the scope of the document, it does reiterate SA Connect in respect of immediate priorities (see section 5.3, p.38) inter alia:

- Identification of unused spectrum and its reassignment;
- The removal of bottlenecks preventing migration of terrestrial broadcasters from analogue to digital in order to realize the digital dividend; and
- Approval of spectrum-sharing (which should be extended to leasing) between spectrum licensees; (This can be negotiated between operators on a commercial basis.) The enabling of dynamic spectrum allocation.

Much can be done in the short term to overcome the spectrum shortages especially critical to large incumbents ahead of formal assignment processes and eventual implementation of the assignments in network rollout. Assignment delays are forcing incumbents to:

- Use base station densification as the only way to increase capacity, which unnecessarily escalates rollout cost;
- Re-farm minimum tranches of existing assignments (e.g. 2x5 MHz of 1800 MHz) to implement limited LTE coverage; and
- Re-farm minimum tranches of existing assignments (e.g. 2x5 MHz of 900 MHz) to extend broadband coverage to rural areas.

Vodacom appeals to the Authority to recognize the urgency of the situation that Vodacom is facing especially with the escalating broadband traffic demand. In this respect the projections in the IMT Roadmap (see Section 7 Forecasts and Figure 6 p.48) are considered to be too conservative when applied to broadband demand and the required minimum spectrum deployments per operator. The Authority should as a matter of urgency commit to the following:

- Establishment of a spectrum assignment framework which will provide assurances to the industry to proceed with forward planning;
- The framework should indicate both 2600 and 700/800 MHz assignments even if only the 2600 MHz can be made available immediately;
- Release of the digital dividend for IMT deployment by the ITU committed date of June 2015;
- Establishment of a more flexible spectrum management regime such as sharing and leasing negotiated by operators on commercial terms;
- Infrastructure sharing between operators based on commercially negotiated terms (subject to the normal non-discriminatory conditions);
- Non-interference in market driven consolidation activity (mergers and acquisitions) within the industry subject to the normal, laid down competition evaluation processes. In particular, access to the spectrum holdings of the merger partners should not be obstructed.

Issue 6: 2014-09-09

NATIONAL WHOLESALE LTE MODEL: VODACOM'S RECOMMENDATION

Synopsis

1. Government's broadband objectives and concerns
2. Model
3. Retail ECS layer
4. National ECS administration layer
5. Network operator (ECNS) layer
6. Spectrum
7. Coverage obligations and regional roaming for underserved/marginal areas
8. Wideband transmission infrastructure especially fibre

Appendix 1: Broadband mobile wholesale open access LTE model and summary

NATIONAL WHOLESALE LTE MODEL: VODACOM'S RECOMMENDATION

Synopsis

The well established practices of providing open access to network services through regional roaming and MVNO/SP operations will be applied in a non-discriminatory model to achieve government's broadband objectives and to address its concerns especially for underserved areas. A figure with key notes extracted from the text summarises the recommendation.

1. GOVERNMENT'S BROADBAND OBJECTIVES AND CONCERNS

1.1 Achieve affordable universal coverage (including underserviced / marginal areas)

1.2 BBBEE

1.3 Support health, education and job creation

1.4 Stimulate demand

1.5 Facilitate competition wherever appropriate

1.6 Incentivise investment

1.7 Maximise efficient use of scarce spectrum

1.8 Leverage existing infrastructure and minimise unnecessary non-competitive duplication.

1.9 Rapid deployment of electronic communications networks generally.

2. MODEL

The model comprises 3 layers (see Figure 1).

- Retail ECS layer for new entrant MVNO's, SP's and resellers.
- National ECS administration (NEA) layer for interfacing wholesale LTE and roaming services from the network operators to the retail ECS layer
- Network layer comprising ECNS network operators either singly or in consortia.

3. RETAIL ECS LAYER

3.1 Competition at the retail level in the market will be increased by encouraging new ECS entrants as MVNO's and SP's. These will neither be assigned spectrum nor build nor operate networks.

3.2 This will create new opportunities for BEE companies to gain open access to the telecommunications market at much more affordable levels than the high investments which apply to entry into the capital intensive network provider industry.

3.3 This service based competition encourages a variety of MVNO/SP/reseller models and there is latitude in negotiating the commercial agreements with the NEA provider. For example floor prices may be made proportional to the relative coverage or service area in which the MVNO/SP wishes to operate. On the other hand, safeguards may be required to prevent cherry picking of higher revenue areas only e.g. through obligations to provide support of underserviced / marginal areas.

4. NATIONAL ECS ADMINISTRATION LAYER

4.1 A new NBN wholesale layer must not be introduced (see 5.4 below). A new national ECS MVNO/SP administration (NEA) layer will be introduced to facilitate administration i.e. so that network operators need not duplicate the administration function.

4.2 The NEA provider will not be assigned spectrum nor build nor operate network infrastructure.

4.3 The NEA provider will be the interface for providing the wholesale LTE and regional roaming services, as obtained from the ECNS operators or consortia, to the retail ECS providers (MVNO's/SP's).

4.4 The primary function of the NEA provider will be to establish and maintain two reference non-discriminatory LTE agreements with each of the network operators which are then made available to the retail ECS layer. These are:

a) The Reference LTE Services Agreement for packaging and on-selling wholesale LTE services to the retail ECS layer.

b) The Reference LTE (Regional) Roaming Agreement for allowing the customers of any network and/or service provider to roam on the networks of any operators in underserved/marginal coverage obligation areas (see section 7).

4.5 The reference LTE agreements will be negotiated with the network operators on a competitive basis and will determine details such as floor charges and volume discounts from the network operators.

4.6 Not only does the NEA provider ensure competitive confidentiality between all stakeholders (ECS providers and ECNS network operators), but it provides single rationalised agreement interfaces rather than the multitude of SP agreements which would apply in the absence of an NEA layer.

4.7 The NEA provider may explore and offer additional value-added services to the retail ECS providers such as retail billing, service packaging, branding etc.

5. NETWORK OPERATOR (ECNS) LAYER

5.1 Competition at the network infrastructure level will be maintained primarily through the existing ECNS operators. In order to address dominance concerns, the Authority might allow new entrant ECNS operators, including possible consortium agreements with existing operators, to jointly build LTE networks. This must take place on a commercially negotiated basis and must not be prescribed by the Authority using spectrum assignment as a means of coercion i.e. forced inclusion or forced exclusion in a national wireless wholesale open access network.

5.2 Existing ECNS operators, either as single operators or consortia, should be assigned additional spectrum in order to efficiently expand and operate LTE coverage and capacity, and will offer wholesale LTE and roaming services via the NEA layer to the ECS MVNO/SP layer on an open access non-discriminatory basis.

5.3 Proliferation at the network layer through introduction of new ECNS networks poses risks, not only of fragmentation of limited spectrum resources, but also that new entrants may not be sustainable in the long term. Infrastructure investment levels to meet rollout obligations are likely to be too high in a competitive market where there are already more than sufficient existing ECNS operators with proven LTE capable infrastructure which must be leveraged.

5.4 A new national broadband network layer such as a wholesale NBN, as has been mooted in some circles albeit not reasoned through to its logical consequences, which are unfavourable, must not be introduced. It will be a duplication of infrastructure, fragmentation of scarce sub-1GHz spectrum and ineffective leverage of investment resources.

5.5 It is important that the ECNS operators/consortia will continue to operate their own retail service provider chains as well i.e. are not restricted to wholesale-only LTE via the NEA. The wholesale reference point will be retail minus not cost plus which is inherently difficult to quantify. Exposure to the retail market will also ensure that the ECNS operators maintain close contact with end user expectations and ensure their networks support innovative services and high standards of network quality and end user experience.

6. SPECTRUM

6.1 The current SA assignments in bands of relevance to ITU IMT band plans are generally in the public domain but a comprehensive inventory of all assignments following several spectrum audits is still not available. Therefore speculation exists about licensees who have allegedly returned such of their assignments which are underutilised or even fallow.

6.2 For network operators (or LTE consortia) to deploy competent broadband LTE services in both urban and rural areas, assignments are essential in the sub-1GHz (700 and 800MHz) as well as super-1GHz (2600MHz) bands. Assignments in the latter are mainly for LTE urban capacity overlay. Assignments in the former are essential for the general LTE coverage layer including good indoor penetration and especially important, for economically viable rural coverage footprints. It is a well-established principle that sufficient spectrum must be available for cost efficient urban high density coverage so that coverage in marginal/rural areas may be cross subsidised.

6.3 Additional spectrum for LTE has to be assigned in sufficient bandwidths to deliver true broadband experience to end users that is comparable with that which is already possible with 3G HSPA+ technology as currently deployed, primarily in 2.1GHz spectrum albeit with relatively limited coverage. Several assignment scenarios present themselves, but bandwidths required are typically:

- 2x20MHz or 2x15MHz FDD in 2600MHz
- 2x10MHz FDD minimum in 800MHz (Digital Dividend - DD1) and 700MHz (DD2). To deliver true broadband LTE performance, the assignments should be increased to 2x15MHz or 2x20MHz. Assignments should not be based on parity between network operators (NO's) but on need to support high customer bases, proven spectrum utilisation efficiency, capability to invest and acceptance of obligations proportional to assignments.
- The ICASA band plan should be 2x30MHz FDD for both 800 & 700MHz i.e. Region 1 plan for 800MHz & reduced APT plan for 700MHz. Assignment table for digital dividend DD (see figure below) shows one of several possible scenarios e.g. assignments could be in tranches of 2x5MHz with max 2x20MHz of DD spectrum per network operator (NO).
- Since sufficient TDD spectrum already exists or is even already assigned, additional and/or separate TDD assignments are also possible e.g. in 2600 and 2300MHz and there is no justification for fragmentation of the 700 and 800MHz FDD bands.
- Parity in spectrum is applicable to green fields assignments but in established markets spectrum should be assigned to operators who value it most. This is generally the principle which applies in spectrum auctions.

6.4 The above bandwidth assignments will comfortably allow 3 to 4 network operators (or consortia) to provide FDD LTE. Fragmentation of these FDD assignments between more networks will reduce the leverage that established operators can contribute to rapid deployment of LTE.

6.5 In-band migration would be required in the 2600MHz band in order to be harmonised with the ITU Region 1 band plan. The frequency assignment plan (policy and regulations) should be formulated and advance notice thereof communicated without delay. With the implementation of the new spectrum fee structure, licensees who are not using their assignments effectively will be under pressure to return their spectrum. This has already been reported in respect of Sentech (2.6GHz and 3.5GHz) and Telkom (various assignments) and further returns of spectrum are expected. Assignments in the 800MHz (DD1) band should also be committed even though these are unlikely to take effect before

2015, because indications are that analogue switch off (ASO) in SA, in time for the mandatory ITU GA 2006 date of 17 June 2015, is at risk. Early commitment is required however because planning according to the model for coverage of underserviced/marginal rural areas (see 7 below) would need sufficient advance notice.

6.6 In addition to the FDD assignments in 2600MHz, 800MHz and 700MHz for preferably a maximum of 4 network operators/consortia, further spectrum exists in harmonised TDD bands for TD-LTE use. Telkom has 60MHz in 2300MHz. In the 2600MHz band, the historical 50MHz assignment returned by Sentech, harmonised to the ITU Option 1 allocation, is available for TD-LTE assignment. The leverage of such existing TDD bands for TD-LTE networks, in addition to FDD assignments, is more than sufficient to secure a sound technical basis for network level competition. The extent to which this will result in a sound commercial basis however will depend on the extent to which the market will be able to sustain more than the optimal number of ECNS operators. Experience even in developed markets indicates that this optimal number is 3 to 4, or as a maximum, 5. This includes both FDD and TDD assignments.

6.7 Government must assign spectrum on a national not regional basis. Government should spare no effort to compel broadcasters to meet the ITU target to clear the DD1 band by 17 June 2015. If assignments in 800MHz are further delayed, LTE broadband delivery will be jeopardised. Regional assignments will cause ongoing frequency coordination problems and compromise the service. In the very worst case, temporary regional assignments could be considered for remote rural areas only but not metropolitan areas. It is furthermore proposed that pilot LTE broadband services in 800MHz band can be demonstrated through TV white spaces spectrum sharing coordinated with broadcasters.

6.8 Finally, it is strongly advised that the spectrum regulation regime be made more flexible so as to facilitate spectrum leasing/sharing/pooling (as also recommended in the NDP and in principle provided for in the SA Connect Broadband Policy (GG37119 of 6 Dec2013)). This will allow productive operators to gain access to underused or fallow spectrum which may have been historically licensed to unproductive network operators. The use-it-or-lose-it policy must be enforced.

7. COVERAGE OBLIGATIONS AND REGIONAL ROAMING FOR UNDERSERVED/MARGINAL AREAS

7.1 Legacy spectrum licences incurred national coverage obligations for the network operator assignees and rollout targets generally specified coverage in terms of population, not geographical area. Competitive forces drive urban rollout where population coverage targets are relatively easy to achieve. Rural coverage is done on a more ad hoc basis because of weak business cases. It is in the interests of the end users that infrastructure based network level competition be maintained in all areas which will sustain it. The existing practices function effectively and need no elaboration here. The purpose of this section is to propose solutions which will ensure that broadband will also be delivered to underserved/marginal areas.

7.2 The objective of the following model is to apply wholesale open access through regional roaming and/or network sharing to extend coverage to underserved/marginal areas. It will maximise investment leverage by minimising unnecessary duplication of infrastructure. It does not supersede any existing national roaming agreements between operators. Metropolitan, urban and large town coverage areas are expressly excluded from these underserved/marginal area regional roaming agreements to discourage opportunistic arbitrage.

7.3 The model proposes two basic principles for extending coverage to underserved/marginal areas:

a) The specification of the underserved/marginal areas.

b) The allocation of coverage obligation areas to the network operators so as to avoid unnecessary duplication.

7.4 Specification: New spectrum licences could specify underserved/marginal areas as coverage obligation areas. The list of such areas could be updated periodically as required. The Authority will stipulate such areas, set out in priority classes if necessary, by explicit enumeration or by category only or both. The identification, classification and prioritisation of rural and under-serviced areas for purposes of broadband coverage should be aligned with the national rural development strategy. To this end, in designating areas as under-serviced as contemplated in applicable legislation, the Authority must consult the Department of Rural Development and Land Reform. Industry should be consulted in drawing up and updating the list as well as on the rollout schedules.

7.5 Allocation of coverage obligation areas: Having specified the list of coverage obligation areas, the Authority need not intervene in determining which areas are to be allocated to each of the licensee operators/consortia beyond setting the rules for such allocation and monitoring that each operator/consortium fulfills its obligations. Equitable sharing of coverage obligation areas means each operator will be designated specific areas in which it shall provide wholesale open access through regional roaming being offered to the customers of other service providers and network operators on non-discriminatory terms. These are matters which can more effectively be decided by negotiation between the operators themselves.

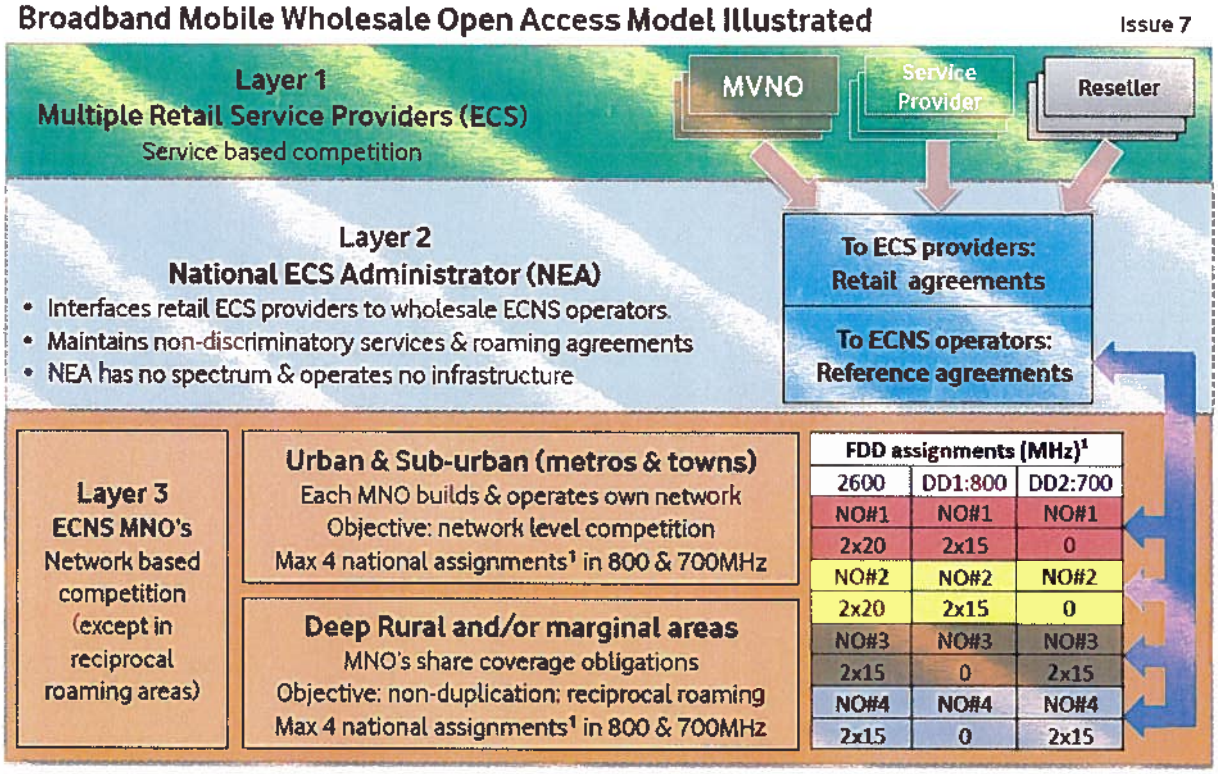
7.6 Rules would include the basis of reciprocal sharing to be that equal LTE spectrum assignments incur similar coverage obligations irrespective of the size of the network operator/consortium. Where applicable, coverage obligations could be made proportional to each licensee's assignment of spectrum in the bands which are appropriate to marginal / rural coverage. Market demand, competitive forces and business principles will determine whether operators wish to compete or cooperate in given coverage obligation areas. For example, any operator may (later) negotiate to build its own infrastructure in addition to that provided by the open access operator but would also incur roaming obligations. Further, some marginal/rural coverage areas which are not viable to cover with conventional broadband cellular spectrum solutions can employ alternative supplementary technologies. Operators are obliged to keep the Authority fully apprised on the agreed allocations between operators.

8. WIDEBAND TRANSMISSION INFRASTRUCTURE ESPECIALLY FIBRE

8.1 Fundamental to country-wide broadband rollout is wideband transmission infrastructure, both backhaul and access layers as well as core and edge layers which must be predominantly high capacity fibre. These are very high cost components in the infrastructure and duplication does not make overall economic sense.

8.2 Telkom possesses far more transmission and fibre than all the other operators combined, yet as a mobile broadband operator is not comparable with other industry players to load the fibre while other operators are incurring huge costs for fibre deployment. There is clearly a case for open access cooperation here in the national broadband interest.

APPENDIX 1: BROADBAND MOBILE WHOLESALE OPEN ACCESS MODEL



Note 1: ICASA band plan should be 2x30MHz FDD for both 800 & 700MHz i.e. Region 1 plan for 800MHz & reduced APT plan for 700MHz. Assignment table for digital dividend DD shows one of several possible scenarios e.g. assignments could be in tranches of 2x5 with max 2x20 of DD per network operator (NO). Additional and/or separate TDD assignments are also possible e.g. in 2600 and 2300MHz. Assignments should not be based on parity between NO's but on spectrum efficiency, need and obligations proportional to assignments.

SUMMARY NOTES ON MODEL (extracted from text):

1. **Retail ECS layer:** Competition at the retail level in the market will be increased by encouraging new ECS entrants as MVNO's and SP's. This will create new and less capital intensive opportunities for BEE companies to gain open access to the telecommunications market.

2. **National ECS administration (NEA) layer:** Infrastructure must not be duplicated through any new wholesale national broadband network (NBN). A new national ECS administration layer will be introduced. The NEA will interface the wholesale LTE and regional roaming services obtained from the ECNS operators to the retail ECS providers (MVNO's/SP's/resellers).

3. **Network operator (ECNS) layer:** More than sufficient ECNS operators exist to ensure network infrastructure level competition. Their proven LTE capable infrastructure must be leveraged. LTE spectrum must not be fragmented between too many operators. The leverage of FDD assignments with sufficient bandwidth for FD-LTE, as well as the additional TDD assignments possible for TD-LTE networks, is more than sufficient to secure a sound technical basis for network level competition. Smaller operators and new entrants can participate in the infrastructure market to build or expand joint LTE networks through consortia. The network operators must continue to operate their own retail service provider chains i.e. not restricted to wholesale only.

4. **Spectrum:** Government must assign spectrum on a national not regional basis. Regional assignments will cause ongoing frequency coordination problems and compromise the service. In the worst case, temporary regional assignments could be considered for remote rural but not urban areas. Broadcasters must meet the ITU target to clear the 800MHz band by June

2015 or LTE broadband delivery will be jeopardised. Several assignment scenarios for the 700 and 800MHz bands present themselves, one of which is set out in section 6 above and represented in the model. Assignments should be based on the need of an operator to support high customer bases, proven spectrum utilisation efficiency and capability to invest.

5. **Coverage obligations and regional roaming:** LTE spectrum licences specify coverage obligations for underserved/marginal areas where infrastructure should not be duplicated. Network operators share coverage obligations equitably by negotiating distribution of such areas i.e. which areas are to be allocated for single operator only coverage with regional roaming providing open access to the customers of other service providers and network operators on non-discriminatory terms. Metropolitan, urban and large town coverage areas are excluded from these underserved/marginal area regional roaming agreements to discourage opportunistic arbitrage.

6. **Wideband transmission infrastructure especially fibre:** Open access cooperation must be facilitated to avoid investment-wasteful non-competitive duplication.

7. **Non-discriminatory commercial terms:** The NEA provider maintains two reference non-discriminatory agreements with each of the network operators or consortia which are then made available to the retail ECS layer. These are the Reference LTE Services Agreement for packaging and on-selling wholesale LTE services to the retail ECS layer and the Reference LTE (Regional) Roaming Agreement for allowing the customers of any network and/or service provider to roam on the networks of any operators in underserved/marginal coverage obligation areas. Note that the ECNS operators/consortia continue to operate their own retail service provider chains i.e. are not restricted to wholesale-only open access LTE via the NEA. Exposure to the retail market will also ensure that the network operators maintain competitive retail awareness and reasonable wholesale rates to enable to MVNOs / ECS providers to compete effectively in the retail market for the benefit of end users. The wholesale rates charged by the network operators should not be subject to price regulation based on cost, but due to the above-mentioned awareness, the wholesale reference point can be based on retail minus because cost plus is inherently difficult to quantify.