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27 November 2015

Mr Mandla Mchunu
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Via email: MMchunu@icasa.org.za

Dear Mr Mchunu

RE: TELKOM'S WRITTEN SUBMISSION ON THE DISCUSSION DOCUMENT REGARDING THE USE AND LICENSING OF THE BAND 57-66 GHz (V-BAND) AND THE BAND 71-76 GHz PAIRED WITH THE BAND 81-86 GHz (E-BAND)

Telkom SA SOC LTD (**"Telkom"**) welcomes the opportunity to provide written comments on the discussion document regarding the use and licensing of the band 57-66 GHz (V-Band) and the band 71-76 GHz paired with the band 81-86 GHz (E-Band) ("**Discussion Document**"), as published in Government Gazette No. 39180 (Notice 895 of 2015) on 8 September 2015.

Please find herewith Telkom's written comments, and in the event that the Authority convenes public hearings in relation to the subject matter hereof, Telkom would appreciate an opportunity to make oral submissions thereto.

Yours Sincerely

Siyabonga Mahlangu
Group Executive: Regulatory Affairs and Government Relations

Telkom SA SOC Limited: Reg no 1991/005476/30. **Directors:** JA Mabuza (Chairman), SN Maseko (Group Chief Executive Officer), DJ Fredericks (Chief Financial Officer), S Botha, G Dempster, T Dingaan, N Kapila*, I Kgaboesele, K Kweyama, K Mzondeki, RN Njeke, F Petersen, R Tomlinson, LL Von Zeuner. **Company Secretary:** E Motlhamme
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Submission to the Independent Communications Authority of South Africa

Discussion Document

Government Gazette No. 39180 (Notice 895 of 2015) of 8 September 2015

Telkom SA SOC Ltd

Submission date: 27 November 2015

1 Executive Summary

The rapid growth in broadband data traffic and subsequent requirement for enhanced fronthaul and backhaul solutions has prompted wide interest in the utilisation of E-Band and V-Band frequencies. These frequency bands offer large channel bandwidths thus enabling the deployment of ultra-high capacity links that cannot be achieved with bandwidth-limited lower microwave frequency bands. In order to fully exploit the benefits offered by the E-Band and V-Band, it is imperative that an effective licensing framework be established. Telkom therefore proposes the following with regards to E-Band and V-Band, respectively:

E-Band

- Adoption of a hybrid licencing approach, which implements full licensing (regulator coordinated) in conjunction with light licensing. The hybrid licensing methodology offers the best compromise between efficient spectrum usage and user flexibility.
- Implementation of the channelling plan and block arrangement specified in ITU-R F. 2006. In particular, the FDD option with 2x19 basic channels of 250 MHz within the bands 71-76 GHz and 81-86 GHz is recommended.
- Segmentation of the E-band in order to give effect to the hybrid licensing regime.
- The online link registration process should elicit data in the format specified in the Harmonised Coordination Method for Africa (HCM4A) process. This will ensure that the requisite data is available for conducting interference analyses.
- Establishment of a detailed methodology for interference assessment, link planning and link coordination.
- Substantial revision of the Administrative Incentive Pricing licence fee regime with a view of promoting the adoption and development of next generation gigabit per second wireless systems.
- Assignment of exclusive channels for operators that envisage intensive national E-Band deployments.

V-Band

- Adoption of the licence exempt approach, where predefined technical rules and equipment type approval are applied in order to mitigate potential harmful interference cases.
- The registration of links is not required in view of the associated administrative burden that will be place the Authority.

- Adoption of technical parameters specified in ECC/REC/(0 9)01 for point-to-point fixed systems operating in the frequency range 57-64 GHz. With regard to the 64-66 GHz frequency range, the Authority is encouraged to define technical parameters based on ECC/REC/(09)01 and ETSI EN 302 217-3. Moreover, the parameters applicable to MGWS deployments in the 57-66 GHz frequency range are already prescribed in Annexure B of the Radio Frequency Spectrum regulations 2015 and should be maintained therein.

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Telkom SA SOC Ltd

Submission date: 27 November 2015

2 Response to Questions

2.1 E-Band

2.1.1 Interference considerations and implications for licensing

1. **Do you think light licensing would be an appropriate approach for the E band in South Africa?**

Telkom deems the light licencing regime appropriate for specified frequency ranges within the E-Band. However, Telkom's understanding of light licencing differs from that of the Authority with regard to the requirement for coordination. The Authority states that light licensing entails the, "*registration of the link, with no requirement for frequency coordination with links already deployed.*" Whereas Telkom's view is reflected in ETSI White Paper No.9, E-Band and V-Band - Survey on status of worldwide regulation, which states that for light licensing, "*link-by-link coordination, under users' responsibility*", is required.

Telkom wishes to highlight that countries such as Australia, United States of America and United Kingdom have all implemented self-coordination as part of their E-Band light licensing regimes. Telkom therefore recommends that the Authority review their interpretation of light licensing in order to align with international norms. In particular, it is proposed that the Authority adopt the following definition of light licensing, as contained in ECC Report 80:

> "*A 'light licensing regime' is a combination of licence-exempt use and protection of users of spectrum. This model has a 'first come first served' feature where the user notifies the regulator with the position and characteristics of the stations. The database of installed stations containing appropriate technical parameters is publicly available and should thus be consulted before installing new stations.*"

2. **Are there any other licensing approaches that should be considered by the Authority for the E band?**

In addition to the licensing approaches presented in the Discussion Document, Telkom is aware of alternate methods such as exclusive assignment through market based techniques.

2.1.2 E-band deployment scenarios

3. **What other applications for E-band spectrum should the Authority consider as part of this process, and should such applications impact either licensing approach?**

Telkom is of the view that the Authority need not consider specific applications but rather consider potential E-band applications in terms of their interference immunity; level of quality of service that will be delivered and potential to sterilise a particular geographic area. The aforementioned criteria will inform the adoption of a particular licensing approach. In this regard, applications with low interference immunity; high link availability requirements and potential to sterilise larger geographic areas may require a "full licenced" approach whereas other more robust applications lend themselves to light licensing.

2.1.3 The E-band channel arrangements

4. **Do you think a self-coordinated approach is appropriate under certain circumstances in the E band?**

The self-coordinated approach is appropriate under certain circumstances in view of the fact that this approach is extremely flexible and will promote rapid deployment and innovation in the E-Band. However, the light licensed regime may not provide sufficient protection from interference and therefore is not suitable for applications that require high availability (99.99% - 99.999%). The failure of light licensing to cater for high availability deployments was further highlighted in a recent public consultation which saw the UK regulator OFCOM move from a full light licence regime, based on a public database, to a hybrid regime where the band was subdivided into two parts, a part regulated as fully coordinated (link-by-link) and the upper parts as self-coordinated (light licensing). Telkom recommends the adoption of a hybrid fully licensed (regulator coordinated) and light licensed approach in order to accommodate the different envisaged E-Band application requirements.

5. **Are there any other potential approaches apart from band segmentation to accommodate the different spectrum demands in the E band?**

Telkom is unaware of further effective approaches, which may be adopted to cater for the different spectrum demands in the E-Band.

2.2 The V-Band

6. **What other applications for V-band spectrum should the Authority consider as part of this process?**

In light of the proposed licence exempt approach, Telkom is of the view that it is not necessary to consider specific V-Band applications. Telkom deems the current service allocations as per the National Radio Frequency Plan, sufficient to accommodate the innovative development of a myriad of V-Band applications. Furthermore, any attempt to tailor an unlicensed framework to suit a particular set of applications may stifle development and negatively impact the extent of use of the V-Band.

2.2.1 Interference considerations

7. **What technical sharing criteria should apply in a licence-exempt environment?**

In order to facilitate fair and efficient use of the V- band under the licence exempt regime, it is imperative that the Authority impose limitations on the emissions levels, antenna gain and transmit power of the deployed radio apparatus. In this regard, technical criteria for the licence exempt use of the V-Band are currently specified in Annexure B of the Radio Frequency Spectrum Regulations 2015, as shown below:

Table 1. Extract of Annexure B – Radio Frequency Spectrum Regulations 2015

Column A Frequency Band	Column B Type of Device	Column C Maximum Radiated Power or Field Strength Limits & Channel Spacing	Column D Relevant Standard	Column E Additional Requirements
57-64 GHz	Point-to-point links	55 dBm e.i.r.p	EN 305 550	The maximum transmitter output power is 10 dBm. The minimum antenna gain is 30 dBi.
57-66 GHz	Multi-gigabit wireless systems (MGWS)	40 dBm e.i.r.p	EN 302 567	The use of these systems is described in ITU-R Report M.2227 and ITU-R Recommendation M.2003. Fixed outdoor installations are not allowed.

Telkom supports maintaining the technical criteria prescribed in Annexure B of the Radio Frequency Spectrum Regulations 2015, noting that these may have to be revised in future based on the international trend of relaxing the allowable e.i.r.p.

8. <u>What principles should guide the allocation of spectrum for V band services?</u>

Telkom is of the view that the licence exempt use of the V-Band should be guided by the following principles:

- Licensees should not intentionally cause harmful interference.

- Non-restrictive technology deployment on condition that service allocations and technical limitations are adhered to.
- Non mandatory notification of deployments.
- Radio apparatus should demonstrate strict adherence to the prescribed technical limitations (through Type Approval).

9. As a general principle, should the Authority relax the transmit power restrictions on case by case basis e.g. rural areas where interference risk is lower than in urban/densely populated areas.

Telkom supports the relaxation of transmit power restrictions on a case-by-case basis in order to increase the hop length of V-Band links. However, the Authority is cautioned regarding the authorisation of excessive transmit powers, which may lead to cases of in band and adjacent band interference. The process of allowing increases in transmit power within a licence exempt environment should also be clearly articulated.

2.3 SUGGESTIONS FOR REGULATORY FRAMEWORKS FOR E BAND AND V BAND

2.3.1 Need for regulatory frameworks

10. Is there another approach that should be considered by the Authority?

The Authority may also consider exclusive assignment of channels either through direct assignment or market based techniques. This proposal may warrant future consideration in the event that E-Band or V-Band is identified for IMT purposes. In this regard, Telkom wishes to highlight that World Radiocommunication Conference 2015 (WRC-15) has adopted a future agenda item aimed at assessing the suitability of E-Band for IMT deployment.

2.3.2 The proposed E-band framework

2.3.2.1 Unsuitability of conventional licensing

11. Should the Authority consider conventional licensing? If so, please provide reasons.

Telkom is of the view that it is imperative to ensure the preservation of conventional licencing within certain E-Band frequency ranges. The adoption of the conventional licencing approach will yield the following benefits:

- Enhanced interference protection afforded to applications that require high availability.
- Permits the future deployment of government services.
- Provides confidentiality for security type applications.
- Affords the Authority full control and knowledge of deployments, thereby facilitating the implementation of future frequency migration, as required.

Moreover, the adoption of conventional licensing together with light-licensing is an observable trend in Region 1 countries such as the United Kingdom.

2.3.2.2 The need for band segmentation

12. Do you agree with the concept of segmentation for the purposes of providing both a light-licensing and a full -licensing approach? Please provide reasons for your position.

Yes, Telkom supports the concept of band segmentation for the purposes of providing both a light-licensing and full licensing approach. Telkom is of the view that band segmentation offers the best compromise between efficient spectrum usage and flexibility for the user. Moreover, it is envisaged that the adoption of the band segmented approach and subsequent hybrid licensing regime will foster unconstrained development of a myriad of E-Band applications, which will improve overall efficiency in use of spectrum.

13. Do you agree with the segmentation as proposed?

Yes, Telkom supports the proposed band segmentation, which is aligned with the frequency arrangement adopted in the United Kingdom. The adoption of the proposed band segmentation will facilitate harmonised use of the E-Band in region 1, thus potentially driving down the prices of E-Band equipment. This will also ensure that South Africa is aligned with possible future 5G developments in these bands.

2.3.2.3 The light-licensing (self-coordination) portion of the band

14. Will online registration be feasible?

The online registration system may prove feasible provided that the data required to implement self-coordination is submitted timeously; the relevant measures are put in place to protect commercially sensitive data and the link registration process is made relatively simple. Furthermore, Telkom proposes that the effectiveness of the online registration system may be enhanced by implementing the following:

- Intuitive graphical user input interface
- Training on system use
- Measures to ensure protection and integrity of data
- A feature that allows licensees to submit an electronic copy of an interference analysis to the database manager. The interference analysis must demonstrate that the potential for harmful interference to or from all previously registered links has been analysed according to the agreed standards and generally accepted good engineering practice, and that the proposed link will neither cause harmful interference to, nor receive harmful interference from, any previously registered link.
- An option for the periodic confirmation of link operation so as to eliminate ghost links and discourage spectrum hoarding.
- Dispute resolution mechanism to address issues arising from interference and other sources that inhibit link deployment.
- Ability to update registrations to reflect the latest link information.

Regarding the table in Annexure 1, Telkom is of the view that parameters contained therein are not sufficient for the purposes of conducting interference analyses. Telkom proposes the adoption of the data format as specified in the Harmonized Calculation Method for Africa (HCM4A), cross border frequency coordination process.

15. Will a 14 day registration requirement be effective and practical?

Telkom is of the view that the 14 day timeframe is practical.

16. Is there another approach that should be considered by the Authority?

Telkom is unware of other viable automated methods for the registration of links.

2.3.2.4 Benefits of this approach

17. Are there any other factors that the Authority should consider?

Telkom is of the view that the Authority should also consider establishing a methodology for interference assessment, link planning and link coordination. The establishment of this methodology will ensure that licensees adopt a unified approach towards assessment and planning of links in the E-Band.

2.3.2.5 Regulator-coordinated spectrum portion of the band

18. Is this type of regulation (for at least a portion of the E band) really necessary in view of light-licensing looking fairly attractive?

Yes, despite the inherent benefits of light licensing there still remains a need to adopt the regulator coordinated approach in order to cater for applications that require certainty for the provision of high levels of quality of service. Furthermore, the large amount of available E-Band bandwidth permits implementation of the hybrid approach.

19. Do you have any views as to whether the self-coordination approach or the regulator-coordinated approach is preferable?

Telkom is of the view that there is merit in applying both the self-coordinated or regulator-coordinated approach in a hybrid licensing regime. This regime will offer the best compromise between efficient spectrum usage and flexibility for the user. Furthermore, the hybrid regime offers the respective benefits of rapid deployment and enhanced interference protection, thus fostering the development of a myriad of E-Band applications.

20. Do you think an annual licence fee per point-to-point link is an appropriate approach whereby the licensee has exclusive, protected spectrum?

Yes, the implementation of an annual licence for the exclusive and protected use of a particular frequency is common practice in all jurisdictions which have either adopted the light-licensing, regulator-coordinated or hybrid approach. With regard to annual licence fees, Telkom wishes to highlight that the current administrative incentive pricing formulas are inadequate to the extent that application of same will result in extraordinarily high tariffs for high bandwidth systems; thereby disincentivising the adoption and stifling the development of next generation gigabit per second wireless systems.

Telkom recommends that the current spectrum fee regime is revised in order to cater for the unique high bandwidth characteristics of E-Band deployments. In this regard, Telkom proposes that the minimum prescribed fee in Annexure 2 of the Radio Frequency Spectrum Fee Regulations is substantially reduced to cater for deployment above 50 GHz.

2.3.2.6 Regulator-coordinated spectrum with national pre-assigned channel(s)

21. Do you think this is a sensible approach? Please provide alternative suggestions if you disagree.

Telkom considers the pre-assignment approach sensible in light of the envisaged extensive deployment of carrier grade links in the E-Band. The Authority stands to benefit

from the pre-assignment approach since implementation of same will greatly reduce the administrative burden that link processing places on the Authority. However, the uptake of pre-assigned channels by licensees will be largely dependent on the proposed licensing fee structure. See response to question 20 above.

22. Do you think it is a reasonable approach to do away with the exclusivity of a frequency channel to a specific user if there is a need for spectrum by other users who cannot be accommodated in alternative channels, because of congestion? Please provide alternative suggestions if you disagree?

No it is not feasible, an operator's decision to obtain an exclusive channel will be informed by, *inter alia*, forecasted network deployments, intended application (e.g. high quality of service) and a detailed business case. Foregoing the exclusivity of an operator's assignment during the licence term may negatively impact planned deployments, the performance of existing deployments and the subsequent ability to meet revenue targets specified in the initial business case.

Regarding occurrence of congestion, Telkom is doubtful that such an event will occur in the foreseeable future given the high frequency re-use factor and bandwidth available in the E-Band. However, in the event that this scenario does materialise, operators should explore using alternative frequencies such as the V-Band in order to meet their requirements.

The Authority would appreciate comments on:

23. Whether the Authority should specify channels;

Telkom supports the specification of channelized frequency bands, which are deemed necessary for coordinated link deployments. In particular, Telkom recommends the adoption of 2 × 19 basic channels from within the bands 71-76 GHz and 81-86 GHz jointly in a single duplex FDD arrangement with 10 GHz duplex separation, as contained ITU-R F.2006

24. If the Authority should specify channels, whether they should be for FDD or TDD or both;

Telkom supports the specification of both TDD and FDD channels in the self-coordinated portion of the band as this affords licensees a high degree of planning and deployment flexibility. On the other hand, Telkom supports solely FDD channels in the regulator-coordinated portion of the band this well-defined arrangement will provide certainty with regard to link planning, deployment and interference mitigation.

25. How the channels should be specified, also considering RF bandwidth.

As mentioned in the response to question 23, Telkom supports the specification of 2 × 19 basic of 250 MHz channels from within the bands 71-76 GHz and 81-86 GHz jointly in a single duplex FDD arrangement with 10 GHz duplex separation, as prescribed in ITU-R F.2006. Furthermore, Telkom supports the aggregation of consecutive 250 MHz channels in line with capacity requirements.

2.3.3 The proposed V-band framework

26. Please indicate if you agree with the Authority's view.

Yes, this frequency band is ideally suited to licence exempt use due to the high levels of oxygen attenuation combined with the enhanced frequency re-use capability.

27. What other considerations should guide the Authority's decision in this regard?

Telkom is of the view that the proposed adoption of the licence-exempt framework is optimal and based on the relevant considerations. It is therefore not necessary to take further considerations into account.

28. Do you think there are any risks or other factors that the Authority should consider before making the decision that a licence-exempt approach is appropriate for the V band?

The principle risk of licence exempt use is the potential harmful interference between licence exempt devices or to other users of the radio frequency spectrum. However, this risk should not serve as a deterrent to the adoption of this approach since interference can be effectively mitigated through the specification of pre-defined technical rules and the establishment of strict compliance processes.

29. Do you think there may be benefits to requiring link registration in this band and that this should be considered?

Link registration offers the advantage of having a database available for the resolution of claimed interference cases. However, this benefit does not offset the administrative burden associated with the maintenance of a database. Therefore, Telkom does not support the link registration approach for the V-Band and is of the view that that interference cases should be assessed on a case-by-case basis, preceded by the necessary investigation.

30. If you think that links should be registered, would you consider that to be compatible with MWGS to be licence-exempt?

Telkom does not support the registration of links in the V-Band.

31. Do you agree with the parameters set out above? Please substantiate your response.

Telkom supports the adoption of parameters specified in ECC/REC/ (09)01 for specific point-to-point fixed systems operating in the frequency range 57-64 GHz. For the frequency range 64-66GHz, the Authority should refer to ECC/REC/ (05)02, which states:

> *"administrations may wish to combine the use of PP radio systems in the 64-66 GHz band with the 57-64GHz band according to ECC/REC/(09)01 possibly with*

channel overlapping the boundary between these bands. Due regard should be given to the different maximum e.i.r.p. limits defined in the two bands"

"that ETSI has developed EN 302 217-3 for the FS point-to-point equipment in this frequency band"

The Authority is encouraged to define methodologies for the specification of technical parameters for the 64-66 GHz frequency range, taking into account the documents the relevant ECC and ETSI documents specified above. Moreover, Telkom wishes to highlight that the parameters applicable to MGWS deployments in the 57-66 GHz frequency range are already prescribed in Annexure B of the Radio Frequency Spectrum regulations 2015 and should be maintained therein.