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GENERAL NOTICES • ALGEMENE KENNISGEWINGS

INDEPENDENT COMMUNICATIONS AUTHORITY OF SOUTH AFRICA

NOTICE 895 OF 2015

INDEPENDENT COMMUNICATIONS AUTHORITY OF SOUTH AFRICA

PURSUANT TO SECTION 4 (B) OF THE INDEPENDENT COMMUNICATIONS AUTHORITY OF SOUTH AFRICA ACT (ACT NO 13 OF 2000),

HEREBY PUBLISHES A 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)" FOR CONSULTATION.

1. The Independent Communications Authority of South Africa ("the Authority"), hereby publishes a 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)" and invites written representations in terms of Section 4(4)(b) of the Electronic Communications Act (Act No. 36 of 2005).

2. Interested persons are hereby invited to submit their written representations including an electronic version of the representation in Microsoft Word, of their views on the Discussion Document by no later than 16h00 on Friday 27th November 2015.

3. Written representations or enquiries may be directed to:

   The Independent Communications Authority of South Africa (ICASA)

   Pinmill Farm Block A

   164 *Katherine Street*

   South Africa

or

Private Bag XI0002

Sandton

2146

Attention: Mr. *Mandla Samuel Mchunu*

e-mail: MMchunu@icasa.org.za

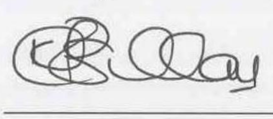
4. Enquiries should be directed to 011 566-3291 between 10h00 and 16h00, Monday to Friday. W*ritten representations should also be e-mailed through.*

5. All written representations submitted to the Authority pursuant to this notice shall be made available for inspection by interested persons from 30 November 2015 at the ICASA Library or website and copies of such representations and documents will be obtainable on payment of a fee.

6. At the request of any person who submits written representations pursuant to this notice, the Authority may determine that such representations or any portion thereof is to be treated as confidential in terms of section 4D of the ICASA Act. Where the request for confidentiality is refused, the person who made the request will be allowed to withdraw such representations or portion(s) thereof.

7. Any person that submit representation must indicate in their written representations whether they require an opportunity to make oral representations in the event the Authority may hold a public hearing.

8. A copy of the Discussion Document will be made available on the Authority's website at http://www.icasa.org.za and in the Authority's Library at 164 Katherine Street, Pinmill Farm, (Ground Floor at Block D), Sandton between 09:00 and 16:00, Monday to Friday once published in the Government Gazette.



KATHARINA PILLAY

ACTING CHAIRPERSON

ICASA

DISCUSSION DOCUMENT ON

THE USE AND LICENSING OF THE

THE BAND 57-66 GHz
(V BAND)

AND

THE BAND 71-76 GHz
PAIRED WITH
THE BAND 81-86 GHz
(E BAND)

SEPTEMBER 2015

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1. INTRODUCTION

The Authority has been inundated with enquiries and requests from telecommunication network operators and equipment suppliers for access to the following radio frequency bands:

- V-band (the band 57-66 GHz) and
- E band (the band 71-76 GHz paired with the band 81-86 GHz).

There has also not been a suitable, technical, regulatory framework for the use of these bands. This has necessitated the Authority to investigate the possibility of putting in place an appropriate regulatory framework, i.e. a framework covering the technical requirements licence exemption and light licensing.

Figure 1 shows the bands in relation to other licensed bands. Indicated in the figure is the manner in which many regulators regulate the bands, i.e., licensed, licence-exempt (unlicensed) or light-licensed.

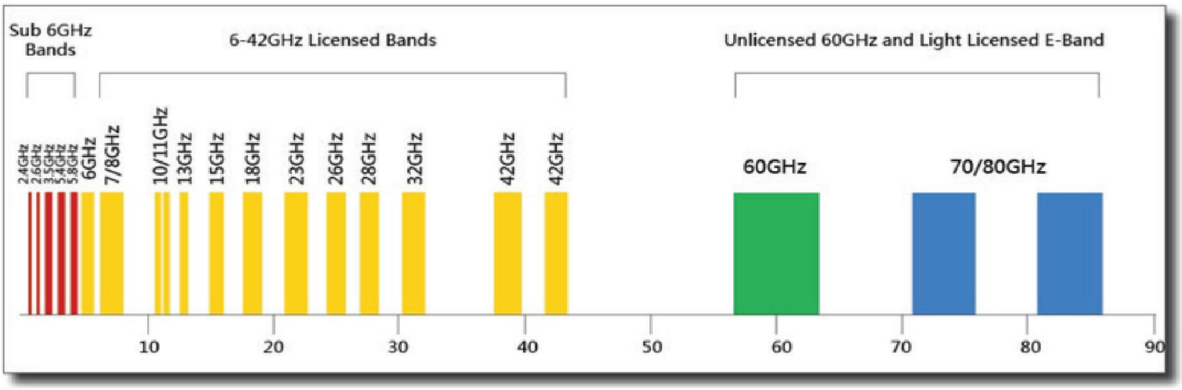

Figure 1. The V band and E band in relation to other licensed bands (*Source – Miwaves consortium)*

The suggestions in this document take the form of proposals that seek to introduce a licence-exempt approach for the V band and a hybrid approach – a combination of light licensing and full licensing – for the E band.

In the sections below, aspects are discussed that the Authority has considered in formulating some concepts, put forward as proposals for industry and the public to consider. Comments on these will assist the Authority in creating a regulatory regime for the V band and the E band. Questions are asked and respondents are encouraged to reply to these. Respondents are encouraged to raise any issues relevant to the Authority to facilitate the putting in place of a regulatory framework for the E and V band.

2. THE E BAND

The frequency bands 71-76 GHz and 81-86 GHz (widely known as the E band) is allocated, in the ITU Radio Regulations, to the Fixed Service on an international basis (all three ITU Regions). These bands are most useful for short links providing a high data transmission rate. They are normally used in a paired fashion on the same link, for FDD-based transmission.

Apart from rain attenuation – which is significant at these frequencies – there is clear-sky attenuation; it is caused by atmospheric absorption. Attenuation, as a result of this, varies significantly with frequency over the frequency range shown in figure 2 (10-400 GHz).

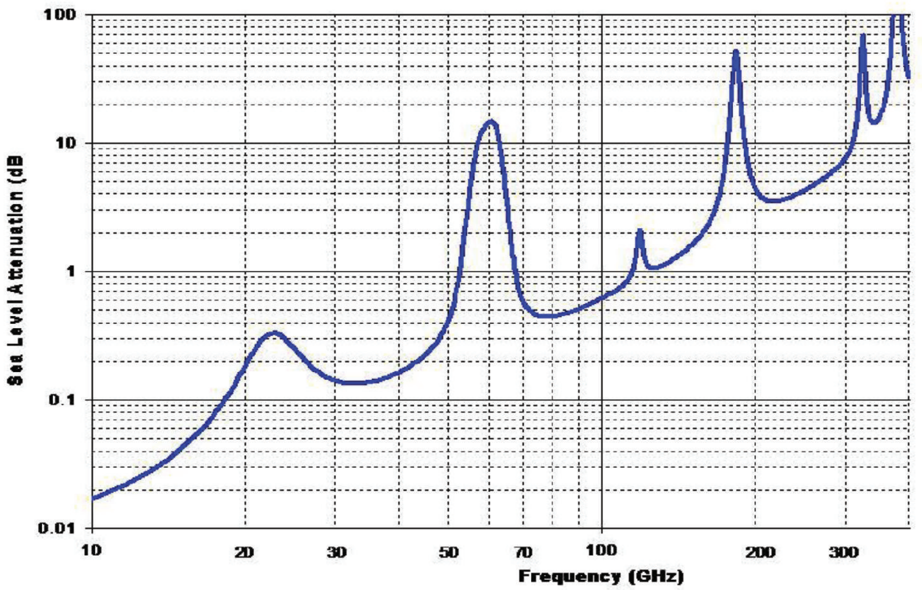

Figure 2. Atmospheric and molecular absorption in millimetre-wave bands.

In the microwave frequency bands up to 38 GHz, the attenuation due to the atmosphere at sea level is low – 0.3 dB/km or less. A low peak is seen at 23 GHz, followed by a high peak at 60 GHz. This is caused by absorption of the radio wave due to water vapour and oxygen molecules, respectively. The effect at 60 GHz in particular, where absorption increases to 15 dB/km, significantly limits the achievable link ranges at this frequency. Above 100 GHz, numerous other molecular absorption effects occur, limiting the effectiveness of radio transmission. An atmospheric attenuation window can be seen in the spectrum from about 70 GHz to 100 GHz. In this area, low atmospheric attenuation at a rate of approximately 0.5 dB/km occurs, close to that of the microwave frequency bands lower down. The portion 70-100 GHz, in which the E band is located, is therefore very favourable for radio transmission. It allows terrestrial links of a range of up to several kilometres.

With the expected deployment of 4G/LTE architectures in the near future, particularly by mobile network operators, there will be an increased need for links of high data transmission rate over short ranges. The E-band technologies available today, with their extremely large data transmission rates (up to several gigabits per second) could cater for the high data rates generated by the use of smart devices coupled with bandwidth-hungry applications. The need for small-cell network architectures will be greatly enhanced by the use of E-band equipment. Similarly, many other high-capacity, short-range linking needs could be satisfied by E-band technologies.

2.1 Interference considerations and implications for licensing

E-band transmission requires line-of-sight transmission. Due to the very short wavelength, the first Fresnel zone – which effectively defines the active propagation volume – requires that the antenna maim be significantly narrower than at lower, traditionally-used, microwave frequencies. However, adverse propagation phenomena in the E band are very similar to the lower microwave frequencies. Due to the "pencil-beam" characteristics of the transmission, multipath fading (selective fading) is never an issue. Flat fading due to rain is the main limiting factor and causes link ranges to be lower than at the lower microwave frequencies. It causes practical link distances to not be more than about 4 km normally.
With the extremely narrow beamwidth (<1˚) of dish antennas at these frequencies, the transmission in E band is exceptionally directional. The "pencil beam" of the transmission causes mutual interference with random, uncoordinated deployment, to be highly unlikely.
Because of the very high antenna gain and high directivity, possible from small antennas in this band, many links can be deployed in a given area. Mutual interference between links is highly unlikely.
The unique characteristics of the narrow-beam propagation of E band radiation ease frequency planning. Regulatory agencies in different countries have found the above characteristics to be enabling factors in the simplification of the licensing process.
Because of the above considerations, many countries, such as the UK and USA, do not require frequency coordination and full licensing of E-band links. They deploy a "light-licence" scheme. This simply involves registration of the link, with no requirement for frequency coordination with links already deployed. Light-licensing (self-coordination) seems to currently be the international preferred practice for the E band.

1. **Do you think light licensing would be an appropriate approach for the E band in South Africa?**
2. **Are there any other licensing approaches that should be considered by the Authority for the E band?**

2.2 E-band deployment scenarios

The equipment currently available with large data transmission rates, using large radio-frequency (RF) bandwidth in the E band (sometimes using up to 5 GHz of RF bandwidth), allows for data applications with very high capacity. Many point-to-point links are operated in this band elsewhere in the world, with ranges of typically a few hundred metres to a few kilometres.

Commercial deployments of communications technology in the 71-86 GHz band include, but are not limited to, the following applications:

> Mobile backhaul: Backhaul and aggregation for mobile networks including for 2G and 3G, as well as 4G next-generation mobile service;
> *Fixed Networks:* High-capacity business services, including cellular, Wi-Fi and WiMAX backhauling, fibre backbone extensions, redundancy fibre overlays, municipality mesh backbones and temporary connections;
> *Healthcare:* Secure campus connectivity, off-site medical offices and lab network access, real-time connectivity for imaging applications, redundancy fibre overlays and disaster recovery; and
> *Education:* High-performance campus and off-site location connectivity, Wi-Fi hotspot and security camera backhauling and connectivity to service providers' fibre-optic networks.

With the increasing availability of low-cost user devices, data usage has hit the mainstream and traffic volume growth in townships is higher than the average growth rate countrywide. We are seeing the high growth rate of WI-FI access points in the townships and new innovations from operators where nontraditional ("shipping container") base stations covering approximately 1.5 km are rolled out. The proliferation of these "small cells" increases demand for short high capacity links. Where fiber is not cost -effective and traditional microwave links bands are not fast enough the solution becomes the E-band. This approach free up traditional microwave radio links that can then be used for longer hops.
Today we have a situation where laying of the fiber is more expensive than the cost of the fiber itself. Often a wireless connection for last mile connection is far more easy to deploy and less costly than an environmentally destructive trenching of a conduit underground. Internet service providers in townships and informal settlements can benefit from wirelessly connecting to fiber nodes.

Figures 3 to 5 show some examples of uses.

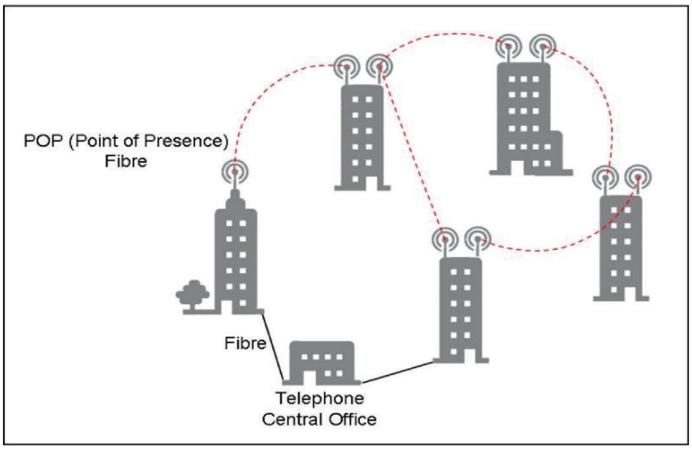

Figure 3. A campus local area network

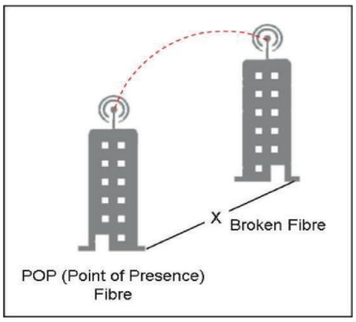

Figure 4. Network recovery for broken fibre-optic cable

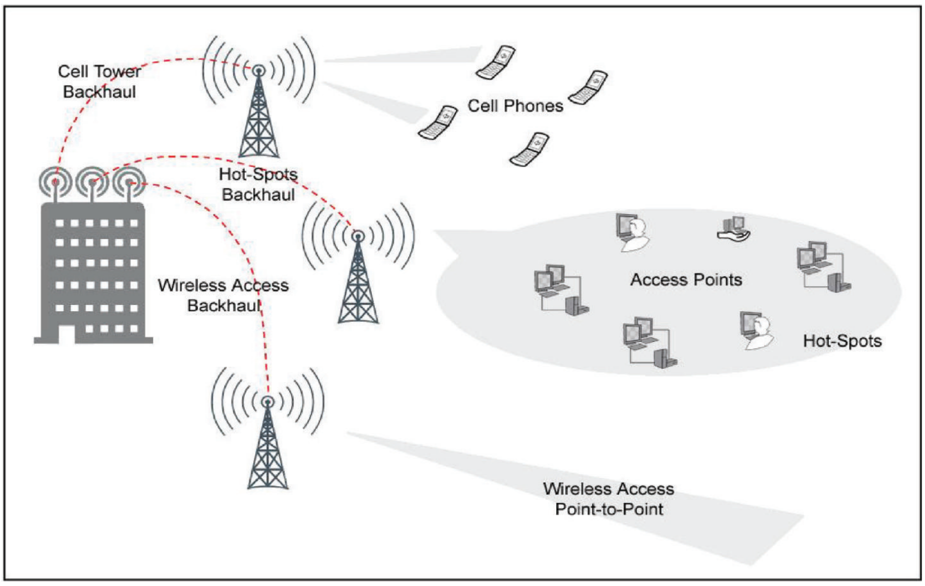

Figure 5. Wireless backhaul

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

2.3 The E-band channel arrangements.

The ITU published Recommendation ITU-R F.2006 that defines the arrangement of specific radio-frequency (RF) channels for channel size ranging from 250 MHz to 4500 MHz. The arrangements are flexible, permitting time-division duplex (TDD) and frequency-division duplex (FDD) applications with 10 GHz as well as 2.5 GHz duplex separation. Recommendation ITU-R F.2006 specifies the channel/block arrangement as multiples of 250 MHz with 125 MHz of guard band on each side. That makes 2 × 19 basic 250 MHz channels within the bands 71-76 GHz and 81-86 GHz available (see figure 6).

The Authority understands that there is a range of different demands for the spectrum, with some users demanding carrier-grade, quality (i.e. very high availability) links (e.g. for microcells). These users are concerned about the risks of the self-coordinated approach from the point of view of link availability. Government security agencies also require exclusive channels to cater for their safety-of-life operations. To cater for all these requirements, the Authority may consider band segmentation, similar to what has been implemented by Ofcom in the United Kingdom.

Figure 6. Typical RF-channel arrangements

Table 1 shows how the band may be used for different RF bandwidths, *viz.* 250 MHz, 500 MHz and 1000 MHz.

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

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

Table 1. RF channels for E-band at various RF channel widths

250 MHz			500 MHz			1000 MHz		CH
81000	71000		81000	71000		81000	71000	GB
81250	71250	1	81375	71375	1	81625	71625	1
81500	71500	2						
81750	71750	3	81875	71875	2			
82000	72000	4						
82250	72250	5	82375	72375	3	82625	72625	2
82500	72500	6						
82750	72750	7	82875	72875	4			
83000	73000	8						
83250	73250	9	83375	73375	5	GB	GB	
83500	73500	10						
83750	73750	11	83875	73875	6	84125	74125	3
84000	74000	12						
84250	74250	13	84375	74375	7			
84500	74500	14						
84750	74750	15	84875	74875	8	85125	75125	4
85000	75000	16						
85250	75250	17	85375	75375	9			
85500	75500	18						
85750	75750	19						GB
86000	76000		86000	76000		86000	76000	

3. THE V BAND

The use of frequencies in the V band dates back to the 1990s, when the FCC adopted rules for licence-exempt (termed 'unlicensed' in the USA) operations in the band 57-64 GHz (a 7-GHz wide band). This is a very wide RF bandwidth, making this spectrum very desirable for high-capacity uses, both for networking equipment indoors and for short-range, outside links. Applications include:

- streaming lag-free high-definition (HD) video from a Blu-ray video player or tablet to a television set;
- peer-to-peer (P2P) fixed operations outdoors;
- providing broadband access to adjacent structures in commercial facilities; and
- extending the reach of fibre-optic networks.

The radiowave propagation in the V band is significantly affected by attenuation due to oxygen absorption. In particular, the central 57-64 GHz portion of the band exhibits higher attenuation than frequencies below and above (see figure 1).

Typical link ranges in the abovementioned frequency band are a few hundred metres. The field-strength of the transmitted wave beyond this distance would normally drop to unworkable levels, making linking impossible.

The combination of the high oxygen attenuation, combined with the very narrow beam transmitted, creates the opportunity for uncoordinated use. To illustrate the difference between systems using V band, as compared with those using the much lower 5.8-GHz band: At 60 GHz a 25-cm dish antenna can achieve 40 dBi of gain with a half-power beamwidth of 1.4 degrees. At 5.8 GHz, an antenna of the same size would have a beamwidth ten times that – therefore at least 10 degrees. The narrow beamwidth at 60 GHz allows multiple radios to be installed on the same roof-top or mast, even if they are all operating at the same frequency. All that is required to avoid mutual interference is that the radios must be spaced apart on the roof and/or should be aimed respectively in slightly different directions.

The small beamwidth, combined with the high attenuation rate, facilitates the deployment of a large number of short-range digital fixed links in a relatively small area, without having to frequency-coordinate their use.

The 60-GHz links are unique in the RF world in terms of offering licence-free operation without the mutual-interference risks associated with lower-frequency licence-exempt links. The combination of narrow antenna beamwidths (< 1.5 degrees) and the link-protection effects of the 60-GHz oxygen absorption make it highly unlikely that links randomly deployed will interfere with one another; they could therefore be allowed to be deployed licence-exempt.

The ITU Radio Regulations (RR) No. 5.547 identifies the 55.78-59 GHz band, as well as the 64-66 GHz band, as being available for high-density applications in the fixed service (FS). The radio-frequency channel and block arrangements of V Band for Fixed Services are defined in ITU Recommendation ITU-R F.1497.

3.1 V-band deployment scenarios

Two services normally using this spectrum are Intelligent Transport Systems (ITS) and Multi-Gigabit Wireless Systems (MGWS). MGWS was an initiative from the European Telecommunications Standards Institute (ETSI) for a system specification for wireless local area networks (WLANs) and wireless personal area networks (WPANs) with a very high data rate whereby several gigabits per second apply. MGWS encompasses applications for wireless digital video, audio and control applications, as well as multiple gigabit WLANs operating in the 57-66 GHz band on a licence-exempt ('unlicensed') basis. ECC REPORT 114 concludes that indoor WLAN and WPAN applications of MGWS may be deployed in 57-59 GHz and 64-66 GHz bands without significant risk of interference to point-to-point Fixed Service (HDFS) links – even links deployed at relatively high geographic density.

Both of the abovementioned services are normally used in a mobile/nomadic way. There are usually also other competing services in some, or all, of the V-band spectrum. Some of these are short links for the provision of relatively high-transmission-rate connectivity.

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

3.2 Interference considerations

The question arises as to whether mutual interference is of major concern. Compatibility studies carried out by the ECC – results of which can be found in ECC REPORT 113 – conclude that, if unwanted emissions from ITS are limited to -29 dBm in the lower 200 MHz of the FS band, no interference problems are to be expected. It is therefore not necessary to try and frequency-coordinate systems in this band. For this reason, the band can be used licence-exempt, as long as certain technical criteria are adhered to. The V band is regulated as licence-exempt ("unlicensed") in the majority of regulatory jurisdictions across the globe.

One factor for users to consider is that this spectrum is not allocated solely to the Fixed Service by the ITU. Regulators that have implemented a regime for the band usually allow the other services allocated by the ITU as well.

The perceptions about mutual interference of some users, especially large operators, would sometimes cause them to refrain from using the V band for high-reliability links. Despite the fact that the likelihood of interference is low, operators, because of the mere theoretical risk of mutual interference, are sometimes reluctant to use the band for backhaul links that have to be highly reliable. They would demand spectrum that allows spectrum use in a more secure way. For these operators, the E band, if regulated appropriately, is potentially a solution.

7. **What technical sharing criteria should apply in a licence-exempt environment?**
8. **What principles should guide the allocation of spectrum for V band services?**
9. **As a general principle with, 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.**

3.4 V-band channel arrangements

The CEPT Recommendation ECC/REC/(09)01 provides a number of flexible options for high-power, point-to-point, fixed wireless services in this band, including the options of either not having a specific channel plan or adopting a channel plan. Figure 7 shows plans for channelisation in FDD and TDD mode.

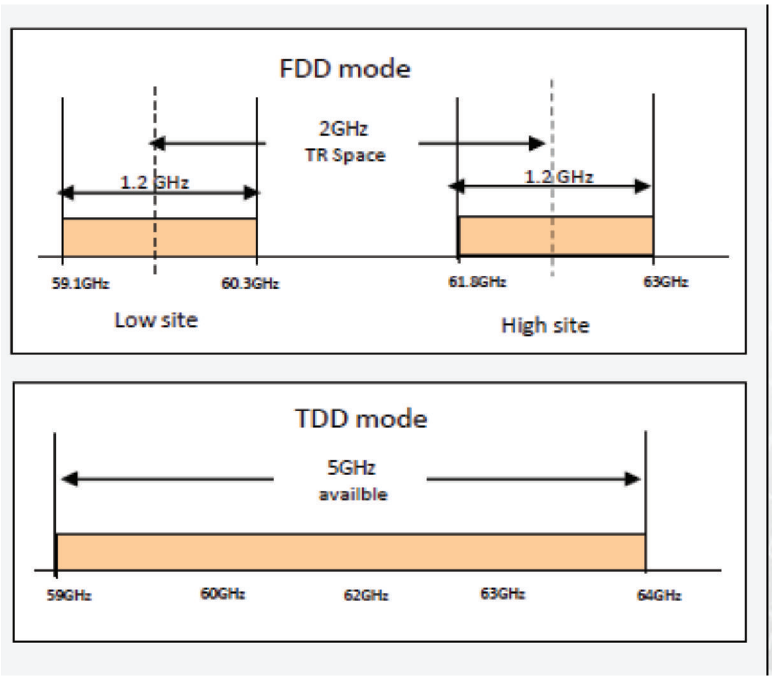

Figure 7. CEPT Recommendation ECC/REC/(09)01

4. SUGGESTIONS FOR REGULATORY FRAMEWORKS FOR E BAND AND V BAND

4.1 Need for regulatory frameworks

Wireless links in the 60-GHz band (V band) and the 71-86 GHz band (E band) have emerged internationally as the preferred solutions to provide linking over short distances; links in these bands provide speeds of several gigabits per second. They are often used to connect sites that would otherwise need to be connected by means of fibre-optic networks.

V-band technologies have emerged as ones convenient for high-data, transmission-rate, indoor use and short-range outdoor links of typically not more than a few hundred metres. E-band is mainly used for outdoor links up to a few kilometres long. The introduction of regulatory arrangements supporting the use of both the V band and E band would facilitate the use of a range of new, high-bandwidth, short-range services.

In view of practices followed elsewhere, there are four possible approaches that the Authority has been considering for regulating the E band and V band. These are:

- a self-coordination approach (coordination done by the user);
- a regulator-coordinated approach;
- an approach of regulator-coordinated with fixed channel assignments; and

- A licence-exempt approach.

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

4.2 The proposed E-band framework

4.2.1 Unsuitability of conventional licensing

Lower frequency, licensed microwave radio links typically require a licensing process that can take weeks to complete and is also expensive. Following a licensing regime similar to that used for these bands for the V band and the whole of the E band, is expected to impede rollout. It is against this backdrop that the framework described in the next sections is suggested.

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

4.2.2 The need for band segmentation

The Authority proposes that the E band should be segmented into two parts, one for a conventional, regulator-coordinated approach and the other for a self-coordination, light-licensing approach. It is proposed that the band is segmented as indicated in figure 8. This means that the band 73.375–75.875 GHz, paired with 83.375-85.875 GHz, is set aside for self-coordination and the band 71.125-73.125 GHz, paired with 81.125-83.125 GHz, is set aside for conventional frequency coordination, frequency assignment and spectrum licensing. We term the former approach a light-licensing approach and the latter approach a full-licensing approach.

Figure 8. Diagrammatic representation of E-band segmentation

Table 2 also shows the bands segmented, together with the proposed RF requirements associated with

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.

13 Do you agree with the segmentation as proposed?

each segment.

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

4.2.3.1 Registration on an online database

For light-licensing to work, use has to be made of an automated, online database maintained by the Authority. Links authorised in terms of this framework must be registered on the database. Users must plan their own links taking cognisance of existing, registered links in the band.

The user of the new system needs to respond to an interference complaint from an existing user, without the Authority having to intervene. In the event of interference, priority is given to the link with the earliest registration date.

While E-band links – in the range 71-86 GHz – lack the extra interference protection provided by oxygen attenuation at 60 GHz (V band), these links achieve their interference protection from their narrow antenna beamwidths. However, provision has to be made for users to analyse how interference may be occurring, should another user's link in the vicinity be causing such interference. There is therefore a need for the details of links deployed to be recorded in a database. For this reason, and also for the purpose of allowing the Authority to bill the user for the licence fee, it would be compulsory for the user to register his or her link on the database. This has to be done within a certain time period after deploying it. A period of 14 days is viewed as being reasonable.

The parameters required in the online database will be those given in Annexure 1. Once the user has the data at hand, it should typically take less than fifteen minutes to register the details on the database.

The Authority is considering putting in place a publicly available, web-based registration database, with the parameters on how to be registered given in Annexure 1. The database will be similar to that used by other regulators, for instance, the one used by the FCC in the United States.

14 Will online registration be feasible?
15 Will a 14 day registration requirement be effective and practical?
16 Is there another approach that should be considered by the Authority?

4.2.3.3 Benefits of this approach

This approach affords a great deal of flexibility to users with regard to the very rapid deployment of links, including temporary links. It eliminates delays caused by a licensing process. The Authority's burden will also not increase due to frequency coordination and the rest of the licensing process.

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

4.2.4 Regulator-coordinated spectrum portion of the band

4.2.4.1 Per-link application, coordination, assignment and licensing

This approach will involve the Authority coordinating, assigning and authorising each link in the part of the E band designated for that. The link is authorised by means of a spectrum licence, prior to its operation, in the regular manner applying to links in the lower, licensed frequency bands.

Coordination is done with all deployed links in the area of concern in that part of the band allocated for this type of licensing, so as to avoid mutual interference. This is similar to the practice currently followed by the Authority with applications for links in the lower frequency bands.

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?

The Authority has taken note that, although the majority of regulatory authorities that have already implemented a regulatory regime for E band (originally adopted for a self-coordination approach), some are in the process of reviewing their approach. A different approach is now being considered that favours dedicated, fully coordinated spectrum for at least part of the E band. The reason is that some users (mainly large network operators) prefer a regulator-controlled approach (a licensed approach) to safeguard their mission-critical services. To that end, the United Kingdom regulator Ofcom, for instance, is currently reviewing its originally adopted self-coordination approach to make provision for operators who require a guaranteed availability of links. Hence, there is a need to have part of the E-band for licensing for exclusive, dedicated frequency spectrum. Ofcom, as a result, is planning to segment the E band into both a component for self-coordination and a component for coordinating spectrum use in a dedicated, licensed manner.

The Authority proposes that an annual licence fee per point-to-point link will apply in the case of providing the user with a licence for the exclusive use of spectrum.

19 Do you have any views as to whether the self-coordination approach or the regulator-coordinated approach is preferable?
20 Do you think an annual licence fee per point-to-point link is an appropriate approach whereby the licensee has exclusive, protected spectrum?

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

4.2.5.1 Pre-assignment followed by notification of links

A variation of the approach in 4.2.4.1 is for a frequency channel, or perhaps more than one frequency channel, to be pre-assigned to the user on a countrywide basis. The channel could be assigned in that portion of the E band earmarked for regulator-coordinated use. This arrangement is meant for users who have large countrywide networks and who will make intensive use of E-band links.

In this case, the user, who may deploy links without first having to apply for a frequency channel, will be required to inform the Authority, on a regular basis, of all the links deployed. Details will have to be provided, as per annexure 1, for each link deployed.

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

4.2.5.3 Non-exclusivity of the frequency channel

The use of the pre-assigned frequency channel will not be exclusive to the user of the channel, especially in the longer term. As it becomes evident that the spectrum in other parts of the regulator-coordinated E band may have become congested in the areas of concern, the Authority may authorise other users' links on the pre-assigned channel. Such use will be frequency-coordinated, by the Authority, with the already-deployed links; there will therefore not be the threat of possible mutual interference. So, as a condition of pre-assignment of one or more RF channels to a user, the user will have to accept that use in the longer term might not be exclusive to him or her. There may be a point whereby, especially in congested areas, the Authority will have to assign spectrum in the user's pre- assigned channel/s on a first-come, first-served basis.

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?

4.2.6 Technical requirements

The technical requirements proposed for the E-band is as given in the CEPT band plan [ECC REC/(05)07]. The key parameters are:

- maximum transmitter output power: 30 dB;
- maximum e.i.r.p.: 55 dBW; and

- minimum antenna gain: 38 dBi.

These parameters are given in table 2, for each of the two segments of the band.

4.2.7 Channel arrangements

Although much of what is presented in terms of managing the E-band spectrum is based on channelisation, the Authority does not yet have a final view on channel arrangements.

The Authority would appreciate comments on:

23 **Whether the Authority should specify channels;**
24 **If the Authority should specify channels, whether they should be for FDD or TDD or both;**
25 **How the channels should be specified, also considering RF bandwidth.**

4.2.8 Protection of the Square Kilometre Array (SKA).

The Authority should be especially cautious in its consideration of the light- licensing approach with regard to radio astronomy and passive services making use of radio waves. The following aspects are relevant:

- According to the ITU Radio Regulations footnote No 149, it is advised that steps be taken to protect radio astronomy observations from harmful interference when planning the allocation of other services in the 76-86 GHz band;

- The band 86-92 GHz is allocated to passive services and, in particular, to the Earth Exploration Satellite Service. For the protection of this service, as required by footnote 5.340 of the ITU Radio Regulations, the unwanted emissions of Fixed Service systems shall respect the limit mask specified in the European standard EN 302 217-3.

As South Africa is one of the prime hosts of the Square Kilometre Array (SKA) – the international radio astronomy telescope to be built in the Karoo and its South African forerunner – the Authority should ensure that control measures are in place to protect radio astronomy; the same applies to passive services.

The necessary control can normally be exercised through a licensing process, as frequency coordination has to be effected for licensing. By not licensing systems too close to the SKA core area, interference can be prevented. However, in the case of light-licensing the Authority will have to specify an exclusion zone. In this zone users will not be allowed to deploy an E-band system. Such an exclusive zone may form part of the final regulations the Authority publishes for implementing a regulatory regime for the E band.

4.3 The proposed V-band framework

There is a great need to put a regulatory framework in place for this band (57-64 GHz) on the basis of the need for certain technologies, such as ITS, MWGS and short-range, high-capacity links.

The Authority's view is: To make the band licence exempt would best satisfy the needs of users. There would therefore be no need for users to apply to the Authority for a spectrum licence, in this instance.

In practice, the Authority would require certain technical requirements to be adhered to. Equipment would need to be type-approved and used according to these requirements. The approach that the Authority favours for this band is similar to the approach followed for the currently used 2.4-GHz and 5.8-GHz bands.

The Authority does not view any of the other three approaches mentioned above as feasible options for the V band.

26 Please indicate if you agree with the Authority's view.
27 What other considerations should guide the Authority's decision in this regard?

4.3.1 Exemption from licensing

In line with common practice followed elsewhere, the Authority's view is that the V band should be made licence-exempt, on the basis of the need to deploy technologies such as ITS, MWGS and short-range, high-capacity links, without unnecessary financial burdens and delays caused by licensing. The Authority has already proposed the use of MWGS to be licence-exempt, in the draft Radio Frequency Spectrum Regulations published in Government Gazette 38300 on 08/12/2014.

The Authority proposes that there should be no need for link registration in this band.

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?
29 Do you think there may be benefits to requiring link registration in this band and that this should be considered?
30 If you think that links should be registered, would you consider that to be compatible with MWGS to be licence-exempt?

4.3.2 Technical requirements

For the V band, the Authority proposes that the following parameters, as in ECC/REC/ (09)01, be compulsory:

- Maximum transmitter output power: 10 dBm;
- Maximum e.i.r.p.: 55 dBm; and
- Minimum antenna gain: 30 dBi.

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

4.3.3 Method of implementing the framework

The Authority proposes that the above requirements be implemented by modifying the Radio Frequency Spectrum Regulations so as to include the V band in the table of licence-exempt frequency bands. The technical requirements could be specified by means of referencing ECC/REC(09)(01).

5. CONCLUSION

The Authority has attempted to, in this discussion paper, voice its views on the use and licensing of the V band and E band. It is requesting feedback on its proposals. The Authority aims to regulate the E band and V band in a manner which is effective and also spectrum-efficient. The Authority aims to keep licensing delays to the bare minimum, by proposing licence exemption where feasible and light-licensing where full exemption is not feasible. The V band is proposed to be licence-exempt. Light-licensing and full-licensing is proposed for the E band.

The Authority is looking forward to receiving views on its proposals and views and wishes to clarify that the proposals and views given are not final.

Table 2. Segmentation of the band 71-76 GHz paired with the band 81- 86 GHz (E band)

<table>
<tr><th>Segment</th><th>Block Size</th><th>Frequency range</th><th>Maximum channel bandwidth</th><th>Channel Plan</th><th colspan="2">Transmit Power</th></tr>
<tr><td rowspan="3">Self-coordination block</td><td rowspan="3">2.5 GHz</td><td rowspan="3">73.375–75.875 GHz
paired with 83.375-85.875 GHz</td><td rowspan="3">2.5 GHz</td><td rowspan="3">CEPT band plan [ECC REC/(05)07]</td><td>Maximum e.i.r.p.</td><td>55 dBW</td></tr>
<tr><td>Maximum transmitter output power</td><td>30 dBm</td></tr>
<tr><td>Minimum antenna gain</td><td>38 dBi</td></tr>
<tr><td rowspan="3">Frequency band pair coordinated by the Authority</td><td rowspan="3">2 GHz (limited to 1 GHz in the first instance)</td><td rowspan="3">71.125-73.125 GHz paired with 81.125-83.125 GHz</td><td rowspan="3">1000 MHz</td><td rowspan="3">CEPT band plan [ECC REC/(05)07]</td><td>Maximum e.i.r.p.</td><td>55 dBW</td></tr>
<tr><td>Maximum transmitter output power</td><td>30 dBm</td></tr>
<tr><td>Minimum antenna gain</td><td>38 dBi</td></tr>
<tr><td>Frequency band pairs separating the self-coordination blocks from the blocks coordinated by the Authority</td><td>250 MHz</td><td>73.125-73.375 GHz paired with 83.125-83.375 GHz</td><td>-</td><td>-</td><td></td><td></td></tr>
</table>

Table 3: Examples of regulation of the V band

Country	Specification	Licence type	Transmitter output power	e.i.r.p.	Frequency band
Australia	F2011C00543	Exempt	13 dBm		59-63 GHz
Bahrain		Licensed			
Brazil		Exempt			
Canada	RSS 210 Issue 8	Exempt			57-64 GHz
Chile		Exempt			
China	SRRC rule no. 82 low power	Exempt			
Columbia		Exempt			
urope	ECC/REC(09)01 EN 302 217				
Japan		Exempt	10 dBm		59-64 GHz
Korea		Exempt			57-64 GHz
Oman	TRA Decision No. 133/2008	Exempt			
Russia	ECC/REC(09)01	Exempt		55 dBm	59-63 GHz
Singapore		Exempt		25 dBm	
Tanzania		Licensed			
Turkey	Fixed Service only				
UAE	ER0047935/10	Registration fee			
Ukraine	EEBC	Licensed			
UK	Ofw48, IR2078 ECC/REC(09)01 EN 302 217	Exempt	10 dBm	55 dBm	57-64 GHz
USA	Part 15.255	Exempt		82 dBm (derated)	57-64 GHz

Annexure 1: E-band link registration database fields

The following Table gives the fields that needs to be completed in the proposed online link registration database.

Licensee name	
The Authority's serial reference number	
Date of link registration with a time stamp	
Province	
Path length (km)	
Bandwidth (MHz)	
Bit-rate (Mbps)	
Receiver sensitivity	
Polarisation (H, V or H &V)	
Duplexing method (FDD /TDD)	
Site A	Site B
Geographical coordinates (dd:mm:ss)	Geographical coordinates (dd:mm:ss)
Ground Height (m ASL)	Ground Height (m ASL)
Antenna height (m AGL)	Antenna height (m AGL)
Equipment manufacturer	Equipment Manufacturer
Equipment Model Number	Equipment Model Number
Equipment type approval number (TA number)	Equipment type approval number (TA number)
Antenna manufacturer	Antenna manufacturer
Antenna model number	Antenna model Number
Antenna maximum gain (dBi)	Antenna maximum gain (dBi)
Antenna elevation angle (degrees)	Antenna elevation angle (degrees)
Antenna azimuth angle (degrees)	Antenna azimuth angle (degrees)
EIRP (dBW)	EIRP (dBW)
Transmit frequency (MHz)	Transmit frequency (MHz)

List of abbreviations

CEPT	European Conference of Postal and Telecommunications Administration
ECC	Electronic Communications Commission
ETSI	European Standards Institute
FDD	Frequency Division Duplex
FS	Fixed Services
GHz	gigahertz
HDFS	High Density Fixed Service
ITS	Intelligent Transport Systems
ITU-R	International Telecommunications Union Radiocommunications Sector
LTE	Long Term Evolution
MGWS	Multi Gigabit Wireless Systems
MHz	megahertz
TDD	Time Division Duplex
WLAN	Wireless Local Area Networks
WPAN	Wireless Personal Area Networks

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