SqwidNet comments on the Second draft radio frequency spectrum assignment plan for the frequency band 825-830 MHz and 870-875 MHz for public consultation ("*consultation document*" hereafter)

Date: 20 October 2017

SqwidNet is a wholly owned subsidiary of Dark Fibre Africa (Pty) Ltd, an ECNS licenced operator.

SqwidNet would like to thank the Independent Communications Authority of South Africa (ICASA) for giving the opportunity to stakeholders to express their views on the Second draft radio frequency spectrum assignment plan for the frequency band 825-830 MHz and 870-875 MHz for public consultation ("consultation document" hereafter).

SqwidNet, as an open access Internet of Things (IoT) operator in South Africa, is grateful to share its view on the future 2x5 MHz spectrum to be allocated to IMT850 technology, in particular its impact for the adjacent users such as new Internet of Things networks operating in the adjacent range 863-870 MHz. SqwidNet has indeed noted with interest the statement of the provision 9.5 of the consultation document:

> *"The Authority recognises that there may be issues with respect to interference that may be experienced by typical applications using apparatus in the 863-870MHz band which may operate on an licence exempt basis (in line with Radio Frequency Spectrum Regulations Government Gazette 38754 (Notice 386 of 2015) and Spectrum Reallocation for RFID GG 31127), adjacent to the Mobile services."*

It is worth recalling the vital importance of spectrum availability for IoT which is by nature is almost totally based on wireless connectivity, either in dedicated spectrum or in shared spectrum. Detailed guidance and clear policy roadmap from administrations in charge of spectrum is a critical enabler for the IoT market as it increases the industry confidence in the regulatory environment.

SqwidNet is grateful to ICASA to the recognition of the potential issue of interference to the users of the 863-870 MHz and would like with this contribution to provide more information on the IoT usage in the band.

Furthermore, SqwidNet would kindly request ICASA to consider, before the entry into force of this regulation:

1. the assessment of the risk of interference to the 863-870 MHz band from those new services in the adjacent band, and
2. the identification, as appropriate, potential mitigation techniques which will improve the adjacent band compatibility between IMT850 and 863-870 MHz users.

SqwidNet is willing to contribute to such study.

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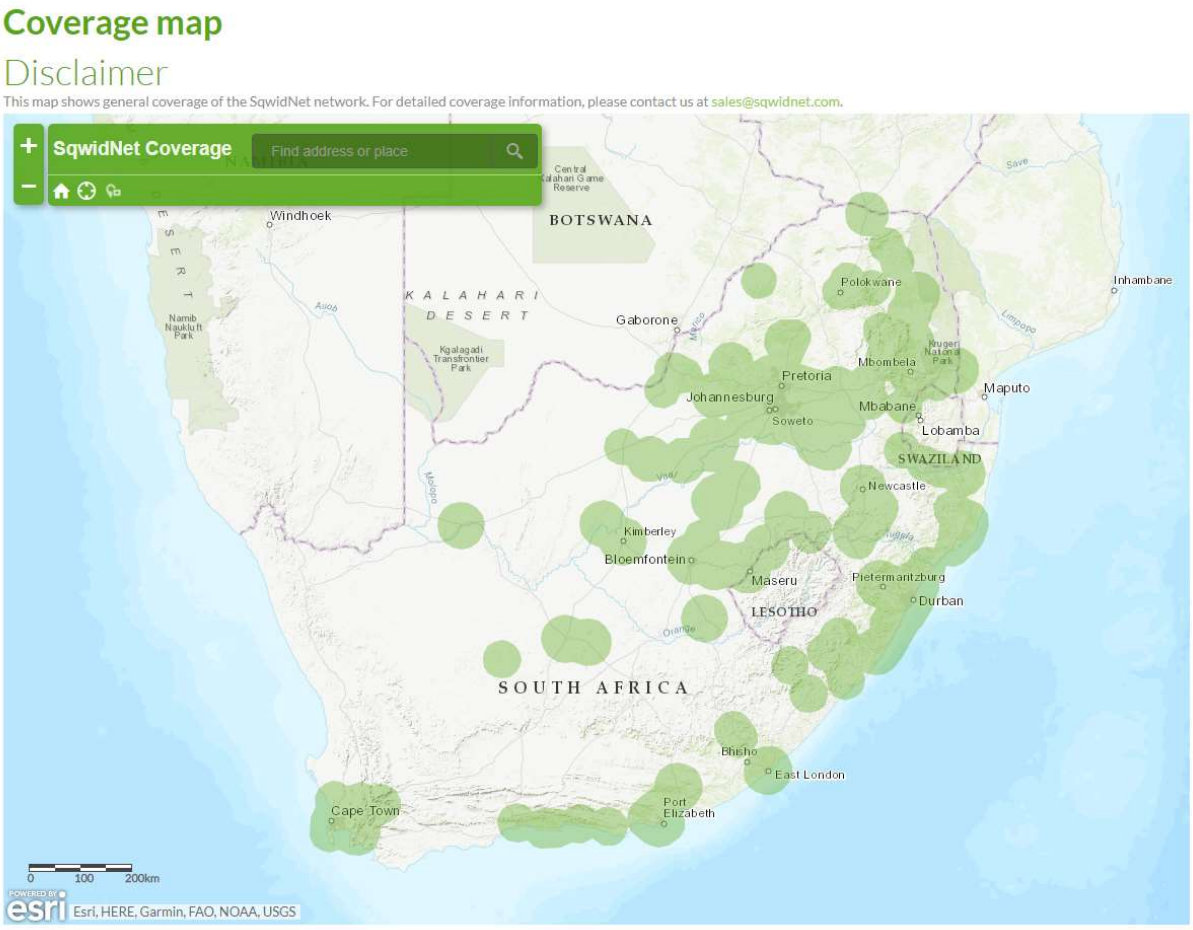
2. SqwidNet Internet of Things in South Africa

SqwidNet is the Sigfox Operator in South Africa and has been operating a wireless network in the IoT 863-870 MHz licenced-exempt band since November 2016. The SqwidNet IoT network offers low-cost access to IoT solutions in South Africa, creating opportunities for businesses, small and large to create innovative solutions. SqwidNet is a wholly owned subsidiary of Dark Fibre Africa, the premier open-access fibre connectivity provider.

Below is our coverage map and a list of cities and towns and suburbs that have SqwidNet Coverage



Huhudi	Majeje	Krugersdorp
Richards Bay	Vlakfontein	Ibhayi
King William's Town	Upington	Morningstar airfield
Mmakau	Dimbaza	Kimberley
Stellenbosch	Empangeni	Klerksdorp
Irene	Randfontein	Sebokeng
Phokeng	Hibberdene	Pietermaritzburg

Klapmuts	Standerton	Kudube
Bela-Bela	Seshego	Ennerdale
Silwane	Kwa Nobuhle	Somerset West
Lichtenburg	Bronkhorsspruit	Welkom
Park Rynie	Oudtshoorn	Richmond
Ladysmith	Modimola	Soshanguve
Qadi	Newcastle	Bethelsdorp
Phuti	Mmabatho	Vanderbijlpark
Evander	Khuma	Melkbosstrand
Kutloanong	Orinoco	Thabanchu
Eshowe	East London coast nature	Kempton park
Summerstrand	Ndleleni	eMalahleni
Ga-pila	Rustenburg	Fish hoek
Kanana park	Ermelo	Inchanga
Ebika	Secunda	Mpumalanga
Kanana	Emalangeni	Centurion
Queenstown	Bethal	Osizweni
Umgababa	Kwaggafontein	Bellville
Butterworth	Acornhoek	Uitenhage
Kabokweni	Meloding	Umkomaas
Bothaville	Phuthaditjhaba	Nigel
Lusikisiki	Ekangala	Kroonstad
Mondlo	Mkhuhlu	Tzaneen NU
Harrismith	Malmesbury farms	Kwambonambi
De Aar	Polokwane	Mount Ayliff
Schweizer-Reneke	Taung	Ladismith
Meqheleng	KwaGuqa	Johannesburg
Piet Retief	Embalenhle	Durban
Akasia	Tongaat	Cape Town | Cape Town International Airport (CPT)
Allanridge	Kriel	Springs

Aliwal North	Elim hospital	Tembisa
Humansdorp	Paarl	Benoni | Oliver Reginald Tambo International Aiport (JNB)
Wolmaranstad	Wellington	Pretoria
Kokstad	Carletonville hospital	Bloemfontein
Malmesburry	Dundee	Atlantis
Giyani	Matsulu	Kingsborough
Jozini	Cullinan	Newton park | Port Elisabeth International Airport (PLZ)
Mtubatuba	Itoseng	Fourways | Lanseria International Airport (HLA)
Carletonville	Hunters retreat	Tongaat beach | King Shaka International Airport (DUR)
Sasolburg	Lumko	Philadelphia
Westonaria	Despatch	Katlehong
Hlabisa	Hambanathi	Boksburg
Jan Kempdorp	Sundumbili A	Soweto
Brits	Knysna	Tsakane
Port Shepstone	Mossel Bay	Fourways
Margate	Phakamisa	Fisantkraal
Meyerton	Viking	Botshabelo
Lebowakgomo	Mhluzi	Daveyton
Stinkwater	Gordon's bay	Orange Farm
Rayton	Nkabini	Middelburg
Tafelkop	George	Stellenbosch NU
Mount Frere	Lourens river	Musina
Plettenberg Bay	Siloam	Wolseley
Villiers	Mdantsane	Komga
Lephalale	Worcester	Deneysville
Koster	Eldoraigne	Cape Peninsula
Shaka's rock	Tonga	Saulsville

Sun City	Mawoni	Swalala
Victoria west	Mamelodi	Motherwell
Makhado	East London	Stanger
Heidelberg	Khayelitsha	Ezakheni
Cathcart	Grahamstown	Driekoppies
Delareyville	Delportshoop	Bizana
Mokopane	Heidelberg-GP	

The SqwidNet network will give nationwide coverage for the Internet of Things allowing millions of sensors and devices to send small packets of data, for analysis, immediate action, and record keeping. The network will span the entire country by 2018 and to date cover 70.8% of the South African population.

SqwidNet has solutions in the Smart Industry; Smart Agriculture/Environment; Public Sector; Utilities; Smart Home & Lifestyle; Smart Automotive & Fleet; EHealth and Smart Retail. There are existing Souths African IoT ecosystem for chip & module vendors; device makers; platform providers and vertical channel partners that we engage to support our end-end IoT solutions. Sqwidnet has launched a program for start-ups to stimulate the IOT ecosystems and solutioning industries in South Africa

Regarding spectrum, SqwidNet relies on the licence-exempt radio frequencies 868-868.6 MHz and 869.4-869.65 MHz for the deployment of the ultra-narrow band network developed by Sigfox. SqwidNet complies with the technical conditions set in the Annexure B of the "Radio Frequency Spectrum Regulations 2015" (see extract below).

868 – 868.6M	Non-specific SRDs	25 mW ERP < 1% duty cycle or LBT.	EN 300 220 EN 301 489-1,3 EN 60950	CEPT/ERC/REC 70-03 CEPT/ERC/DEC (01) 04
869.4 – 869.65M	Non-specific SRDs, including RFID	500 mW ERP < 10% duty cycle or LBT. 25 kHz channel spacing.	EN 300 220 EN 301 489-1,3 EN 60950	CEPT/ERC/REC 70-03

3. The engagement of public authorities to promote the IoT

In the world, a growing number of public stakeholders are working toward a supportive framework for the Internet of Things as it is seen of the utmost importance in major policy objectives such as United Nation sustainable development goals. IoT is also considered as an enabler of the Industry 4.0 or the digital transformation for which IoT could bring solutions for saving natural resources, improve industrial processes or secure assets.

3.1. International Telecommunications Union

The ITU has set IoT as a high priority topic as resolved by the Plenipotentiary Conference in 2014 (PP Resolution 197 "*Facilitating the internet of things to prepare for a globally connected world*") who has been at the initiative of actions taken at the ITU sector level, such as:

- **ITU-T** - The adoption by the World Telecommunication Standardization Assembly in 2016 the WTSA-16 Resolution 98 "*Enhancing the standardization of Internet of things and smart cities and communities for global development*" which has led to the new study period 2017-2020 started by the ITU-T Study Group 20.
- **ITU-D** - In the context of the next World Telecommunication Development Conference 2017 a report on WTDC Resolution 9 (Rev. Dubai, 2014) on "*the participation of countries, particularly developing countries, in spectrum management*" recognizes the increasing role of Low Power Wide Area Network under the license-exempt spectrum for the IoT.
- **ITU-R** - The Resolution ITU-R 54-2 was updated at the Radiocommunication Assembly 2015 to recognize the role of SRDs in the Internet of Things. ITU-R studies under Resolution ITU-R 66 on the Internet of Things are underway on the technical and operational aspects of radio networks and systems for IoT. An urgent part of this work is related to the preparation for the World Radiocommunication Conference 2019. The item 3 of the Annex to Resolution 958 (WRC-15) calls in particular for spectrum availability considerations for IoT, including license-exempt band.

3.2. European Union and CEPT

The European Union considers the IoT as the next step towards the digitisation of the society and economy, where objects and people are interconnected through communication networks and report about their status and/or the surrounding environment. According to a European Commission study the market value of the IoT in the EU is expected to exceed one trillion euros in 2020. A set of supporting policy actions[1] have been adopted by the European Commission to accelerate the take-up of IoT and to unleash its potential in Europe for the benefit of European citizens and businesses.

Some recent initiatives from European regulatory bodies could be highlighted as they promote license-exempt spectrum availability for the IoT development (in particular, within the range 863-876 MHz).

- The European Commission Decision on the technical harmonisation of radio spectrum for use by short range devices has been revised in August 2017 to introduce new spectrum opportunities for SRD, in particular for the IoT;
- The RSPG, the European Commission advisory group, has published in February 2017 an opinion on IoT which recognizes the importance of the license-exempt band 863-870 MHz;

[1] E.g. Alliance for Internet of Things Innovation (AIOTI) launched in March 2015; the European Commission staff working document "Advancing the Internet of Things in Europe" published in April 2016; etc.

- The CEPT, a European technical committee, has studied additional spectrum harmonization approach for the bands 870-876 MHz and 915-921 MHz in the Addendum to the CEPT Report 59.

3.3. Africa

The SMART Africa Manifesto describes SMART Africa as "*a bold and innovative commitment to accelerate sustainable socioeconomic development on the continent and usher Africa into the knowledge economy through affordable access to Broadband and usage of Information and Communications Technologies (ICT)*".

The SMART Africa Strategic vision identifies the Internet of Things as a key investment target and one of the "*Future Potential Flagship Projects*" because this technology with big data and artificial intelligence offers today almost unexploited opportunities.

4. ITU Region 1 status of the IoT in 863-876 MHz licenced-exempt band

The Short-Range Devices (SRD) regulation in Region 1, initiated by European bodies (European Commission, CEPT and ETSI), has identified for many years the band 863-870 MHz for the use of short range and low power devices. This regulation opens the band to any stakeholder who complies with the technical parameters allowing the sharing of the band among various systems (RFID, Alarms, non-specific SRD, etc.) and the interference free environment.

Recently, this regulation has seen growth in the SRD usage and also the development of innovative solutions such as low power wide area networks (LPWAN). This band has become vital for those ecosystems.

4.1. Low Power Wide area networks (LPWAN) in 868-870 MHz

Various analysts expect LPWAN will play a key role to the development of Internet of Things (IoT) applications connecting devices across a wide range of vertical markets (utilities, industry, agriculture, environment, health, building, etc.). Globally, the market for IoT applications is expected to grow significantly. Strategy Analytics, for example, forecasts over 1 billion of LPWAN connections globally by 2018 and more than 5 billion by 2022, these forecasts are based on all LPWAN technologies that Strategy Analytics expects to be available in the market.

Non-cellular LPWAN networks operating in unlicensed spectrum such as the one under the SRD regulation, count more than 155 networks that are under trial, planned, or in commercial operation[2].

Under SRD regulation, some LPWAN are deployed in 863-870 MHz which is preferred for to reach long-range capabilities:

- Sigfox LPWAN is using Ultra-Narrow Band (UNB) technology for low power and low duty-cycle IoT devices operation intended for carrying a low volume of traffic per end-point energy constraint devices. Sigfox covers today 36 countries under LPWAN deployments (17 with a nationwide coverage)
- Telensa supplies public lighting control and monitoring equipment operating in this SRD band. Telensa equipment operates using a combination of sensitive receiver designs and Ultra Narrow Band transmissions to achieve communication distances in cities of typically 3-4km, and further in rural areas.
- LoRa Alliance is using Spread Spectrum Technology to address the IoT market

4.2. Ongoing studies to extend the SRD spectrum within 870-876 MHz and 915-921 MHz

Further to core UHF band for non-cellular LPWAN (863-870 MHz), the recent addendum to CEPT Report 59 address the spectrum requirement for new technologies under the SRD regulation in the bands 870-876 MHz and 915-921 MHz.

This report has concluded on the possibility to technically harmonise the bands 870-876 MHz and 915-921 MHz for the introduction of technically advanced RFID solutions as well as new short-range devices enabling new types of machine-to-machine and IoT applications.

Those studies have been supported by many companies and stakeholders as summarized below.

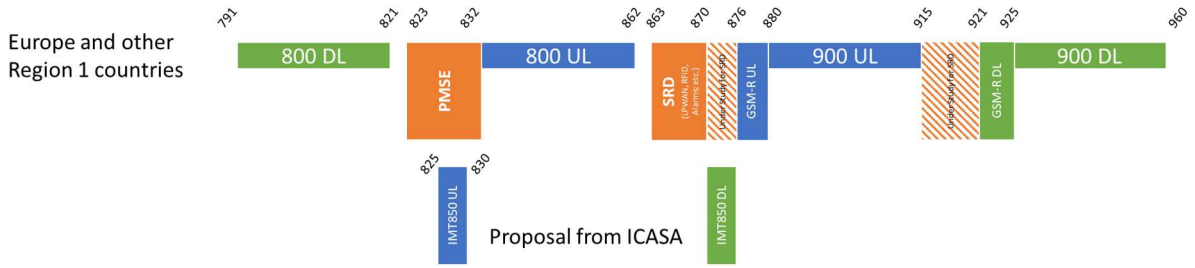
[2] ABI Research – Non-Cellular LPWAN update: challenges and opportunities (Feb. 17)

- IEEE 802.11ah that addresses possibilities of achieving energy efficient wideband communications in M2M and IoT use scenarios. The industry has supported the possibility of deploying new wideband M2M/IoT applications in sub-1 GHz bands, such as those provided for under IEEE 802.11ah (see also ECC Report 246);
- Mesh Networks (e.g. Wi-Sun Alliance) expressed an interest to add new SRD spectrum availability for their technology
- Non-cellular LPWAN stakeholders saw an interest in accessing new spectrum for long term capacity purposes but also to benefit from worldwide harmonisation in the 920 MHz range, as it is widely used in Regions 2 and 3 countries.

5. Comments on the Second draft radio frequency spectrum assignment plan for the frequency band 825-830 MHz and 870-875 MHz for public consultation

SqwidNet notices that the proposal from ICASA will introduce a channelling plan corresponding to a segment of the A.1 of the Recommendation ITU-R M.1036 which is not implemented in the majority of the ITU-R Region 1 countries as it overlaps with the channelling plans A3 (800 MHz) and A2 (900 MHz) implemented in the ITU Region 1 and forbids alternative usage such as PMSE or SRD.

The following figures summarizes the band plan implemented in Europe and show the usage of the 800 and 900 MHz interplan and duplex gaps which has supported the definition of the SRD regulation.



As stated by ICASA in the provision 9.5 of the consultation document, the proposal to introduce 2x5 MHz IMT850 may bring interference which will be experienced by apparatus in the 863-870MHz band.

Then the introduction of a new high-power system in the adjacent band of the 863-870 MHz need a careful assessment as the radio spectrum can only be used in an optimal manner if interference is minimised between users and radio systems in the same or adjacent frequency bands.

As an illustration in early 2000's, the possibility to introduce in Europe new mobile service (PMR technologies)[3] above 870 MHz in Europe has been carefully assessed by CEPT:

- ECC Report 013 on "*Adjacent band compatibility between Short Range Devices and TETRA TAPS mobile services at 870 MHz*"
- ECC Report 040 on "*Adjacent band compatibility between CDMA-PAMR mobile services and Short-Range Devices below 870 MHz*"

Furthermore, in other Region 1 countries the frequencies between 800 MHz, 900 MHz and GSM-R plans (870-876 MHz and 915-921 MHz) are under discussion for SRD band (863-870 MHz) extension to (1) safeguard this core Region 1 band by avoiding the introduction of new adjacent high-power services, (2) ensure long-term spectrum availability to IoT and SRD usage growth and (3) align SRD spectrum with other ITU Regions (915-921 MHz is available in Region 2 and in major Asia-Pacific countries of Region 3).

To conclude, SqwidNet is grateful to ICASA to the recognition of the potential issue of interference to the users of the 863-870 MHz and would kindly request ICASA to consider, before the final adoption and the entry into force of this regulation:

1. the assessment of the risk of interference to the 863-870 MHz band from those new services in the adjacent band, and

[3] It is worth mentioning that the mobile service was set above 870 MHz as an uplink where ICASA proposal is to set a downlink.

2. the identification, as appropriate, of potential mitigation techniques which will improve the adjacent band compatibility between IMT850 and 863-870 MHz users.

Finally, Sqwidnet would like to stress the importance of the 863-870 MHz band for the shared usage of multiple stakeholders and innovative services and strongly advise ICASA to ensure its long-term usability for example by introducing a guard band between SRD and new high-power services.