

Consultation Paper No. 001/2022

Telecommunications and Post Regulatory Authority

**Consultation Paper On
Auction of Spectrum in the 800-MHz Band**

27 February 2022

Notes:

Written Comments on the Consultation Paper are invited from the stakeholders by the 23rd of March 2022. The comments may be sent, preferably in electronic form, to TPRA, on the email ID elsadig@tpra.gov.sd Director General of TPRA with CC to mekamil@tpra.gov.sd Technical Director

For any clarification/ information please contact Mr. Majdaldeen Musa at Email ID: majdaldeen.musa@tpra.gov.sd Spectrum assignment Section.

Contents

INTRODUCTION..... 4

Spectrum Auctions..... 4

800-MHz Band **Error! Bookmark not defined.**

Figure 1: ITU Regions (Image from Article 5 of RR) 5

Band Ecosystem: 5

Band Plan..... 6

Figure 2: A3 channel arrangement 6

SPECTRUM AVAILABILITY in the 800MHz Band 6

Figure 3: 800-MHz Spectrum Assignment 7

Auction Spectrum Lot Sizes 7

License duration..... 7

Timing of Auction 8

Obligations to Roll-out Network..... 8

The valuation and reserve price of the spectrum 8

Reserve Price Estimation 9

Payment method: 10

INTRODUCTION

The Telecommunications and Post Regulatory Authority (TPRA), through its letter No ج ت ا ب / م / 6/3/1/50/ع dated 11/ November 2021 Informed mobile service operators that the TPRA is planning to auction the rights to use a part of spectrum in 800-MHz Band in an auction planned to be held in the course of 2022.

The Telecommunications and Post Regulatory Authority (TPRA), has consistently been committed to ensuring fairness and transparency in discharging its statutory responsibilities as specified in the Telecommunication and Post Regulation Act 2018 and ICT Policy of Sudan.

Pursuant to its principal objective of facilitating entry and competition in the Sudanese telecommunications market, the TPRA is empowered to allocate slots in the electromagnetic frequency spectrum to Licensees to operate telecommunication networks and/or provide telecommunication services.

However, in ensuring optimum level of competition, especially in the market segment that utilizes wireless technology, the most critical consideration has been the scarcity of the applicable spectrum and how to assign it in a fair and transparent manner. In the light of this, TPRA has decided to resort to competitive means of assigning the spectrum through the auction process.

Based on its understanding of the demand for spectrum, relative to availability, the Authority has decided to award 3 lots of paired FDD 5 MHz (2x5 MHz) in the 800-MHz Band to be used on a country-wide basis, to further advance the development of telecommunication services in |Sudan.

This Consultation Paper gives a detailed background information about the 800-MHz Band, which is proposed to be assigned through the first spectrum auction in Sudan, noting that previously assigned frequency bands have been awarded through administrative procedures.

TPRA would like to receive comments of stakeholders on reasonable reserve price, the size of the lots of spectrum to be auctioned and associated conditions for auction of spectrum in this band.

Spectrum Auctions

Auctions were proposed as a spectrum license assignment mechanism in the 1950s but were not embraced until the 1990s. Auctions have become the dominant mobile spectrum assignment mechanism over the past three decades. The central advantage is that licenses are awarded to those who value them most and are thus more capable of recouping their investment by competing to provide good quality of services with good coverage.

The emergence of competitive telecom markets created the need for public policymakers to design a mechanism for assigning mobile spectrum licenses. This is necessary when the demand for spectrum – both in terms of the number of applicants and how much spectrum they each want – exceeds the amount of spectrum on offer. Given that the spectrum is a critical and scarce natural

resource, and the amount allocated for mobile use is relatively small, auctions have been used as a means of efficiently assigning frequency spectrum.

Issue for consultation

Q1. What are the key issues to be kept in mind in the design and conduction of the proposed spectrum auction?

800-MHz Band

In accordance with Resolution 223 of World Radiocommunications Conference (WRC) 2007, the band 790 - 862 MHz has been allocated for mobile service on a primary basis in Region 1, which broadly comprises Europe, Africa, Russia, Mongolia, and the Middle East. (The ITU regions 1, 2 and 3 in the World map are defined as per Figure 1).

Many countries around the world, including African and Middle East countries, have assigned this band for the implementation of IMT services, which implies that there is a global harmonization in the 800-MHz Band. Based on this fact, the 800-MHz Band is reserved for the deployment of IMT services in Sudan in the National Frequency Allocation Table (NFAT) and national spectrum plan.

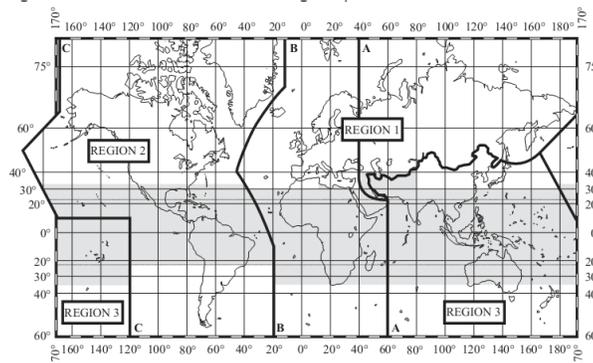


Figure 1: ITU Regions (Image from Article 5 of RR)

Band Ecosystem:

The 3GPP B20 (800-MHz) LTE Band is the second most popular band used by public mobile operators for LTE network deployments in a number of countries in Middle East, Europe and Africa regions. As the GSA LTE ecosystem reports showed, the 800-MHz Band is a significant coverage band (below 1 GHz), and is used for the deployment of LTE globally due to excellent propagation characteristics that assures its suitability for wide area coverage in sub-urban and rural environments, for in-building coverage, and represent an important digital dividend arising from the shift by TV broadcasters to digital transmissions. Operators have flexibility to deploy LTE using band 20 as a single band or as part of a multi-band network. LTE-Advanced or LTE-Advanced Pro technologies can be deployed using carrier aggregation to combine various bandwidths of band 20 with different carriers.

Operators have deployed band 20 in their networks for a number of strategic and tactical reasons, these include:

- To shorten time to market entry
- To reduce cost-of coverage particularly in rural environments
- to serve hard to reach locations e.g. mountainous terrain
- to serve users in coastal waters
- to enhance indoor coverage
- To use for coverage fill-in in urban areas

The coverage benefits of 800-MHz are crucial, often enabling operators to comply with regulatory conditions for coverage, or achieve competitive advantage. The excellent coverage footprint achieved with band 20 together with its robust user devices ecosystem enables new services to be offered.

Issues for Consultation

Q2. In your opinion, considering the area of Sudan, and the way that Sudan population is distributed, how do you think the band will be important for your network enhancement in term of coverage, QoS... etc?

Band Plan

A harmonized frequency arrangement facilitates economies of scale resulting in the availability of affordable equipment. Therefore, it is essential to follow an internationally harmonized band plan in each of the frequency bands.

The 800-MHz Band is planned in Sudan according to Recommendation ITU-R.M1036 band plan, A3 channel arrangement, and 30MHz spectrum (FDD/paired) .as shown in Figure 2

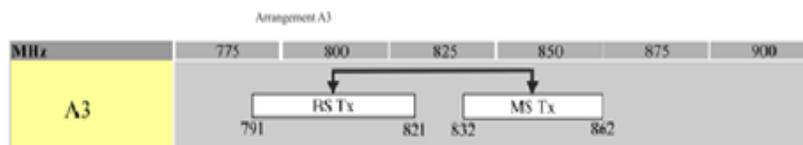


Figure 2: A3 channel arrangement

SPECTRUM AVAILABILITY in the 800-MHz Band

Out of the 30 MHz (FDD/paired) spectrum -, 15 MHz (FDD/paired) has been assigned to SUDATEL, 10 MHz (FDD/paired) as a compensation for CDMA switching off to clear the 800-MHz Band for IMT utilization, and the other 5 MHz (FDD/paired) has been assigned administratively for SUDATEL at cost.. The remaining 15 MHz (FDD/paired) (806-821 MHz for downlink and (847-862) MHz for uplink) spectrum, as shown in Figure 3, is now available for the forthcoming auction

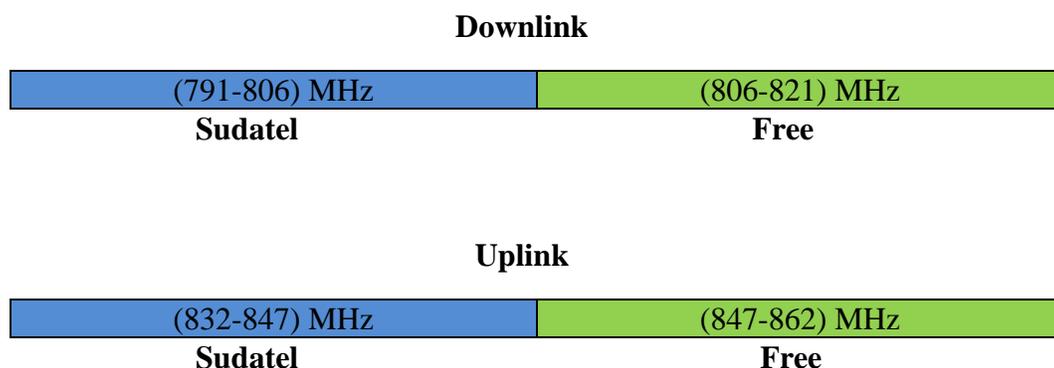


Figure 3: 800-MHz Spectrum Assignment

Auction Spectrum Lot Sizes

LTE network can operate in a wide range of spectrum block size (1.4, 2.5, 5, 10, 15, or 20 MHz), also It is worth mentioning that several countries around the world have auctioned spectrum in the 800-MHz Band for deployment of IMT purpose, as 6 lots with lot size of 2*5 MHz

TPRA proposed that the lot size or the minimum quantity of spectrum to be bid for by Existing Licensee, in 800-MHz Band is 2*5MHz in order to ensure networks quality of service and cost effective network deployment.

Issues for Consultation:

Q3. Do you agree that the minimum quantity (of 2* 5 MHz) for bidding in 800-MHz Band is acceptable? If not, what should be the reasonable block sizes? Please justify your response.

Q4. Will amount of 5MHz (paired spectrum/FDD) be technically reasonable for network rollout (please give detailed explanation)?

License duration

The duration of a license defines the time an operator will be allowed to use the awarded spectrum and may thus give more or less predictability to the operator. As such, it is a key characteristic of spectrum licenses.

Reviewing the experiences of other international and regional countries which have held auctions for spectrum in the 800-MHz Band, particularly with respect to license duration term, we concluded that the most commonly applied license durations vary from 10 to 15 years.

The remaining license duration of mobile service operators in Sudan vary, during the previous frequency spectrum awarding processes to operators, which were granted in an administrative method. The licensed frequency was awarded for the remainder of the duration of license.

This time, the TPRA plans to not follow the previous methods with regard to the determination of license duration, as it is proposed that the license be granted for a duration of 10 years, starting from the date of granting the frequency.

Issue for Consultation

Q5. Do you think that the license duration should be 10 years, or it should be awarded for the remainder of the license duration?

Timing of Auction

It is important to point out that, the choice of appropriate time to hold spectrum auctions through consultation between the regulator and stakeholders is a key issue for auction success, since there are many administrative and financial preparations that have to be done by both regulator and stakeholders, in order to prepare well for organizing or participating in the auction, as the awarding of spectrum through an auction is completely different from administrative awarding methods, since administrative methods do not require participation of more than one stakeholder at the same time but the main reason for auction success is competition, so setting an agreed time for auction holding is essential.

TPRA in its reference has mentioned that, it is planning to auction rights to use of spectrum in 800-MHz Band in the next auction likely to be held in the second quarter of 2022.

Issue for Consultation

Q6. Do you think the planned time for holding the spectrum auction is suitable for you? If not please indicate when the auction should be carried out? (Please give your response and the justification).

Obligations to Roll-out Network

Given the fact that spectrum is a limited resource and should be used in an effective and efficient manner, roll-out obligations are mandated for the spectrum assigned to the mobile operators.

Keeping in mind the primary objective of increasing broadband penetration in rural areas and reducing the urban-rural divide, the special focus should be given for the coverage in larger towns and villages. As the lower frequency spectrum waves travel longer distances due to lower propagation losses, these are suitable for extending mobile broadband coverage to uncovered/remote areas.

Issue for consultation:

Q7. Should this spectrum be awarded with roll out and coverage obligations? If yes which kind of supports do you expect from TPRA in order to meet the agreed coverage obligations?

The valuation and reserve price of the spectrum

The supply of the spectrum is limited because of its scarcity, rivalry in use and excludability in consumption as spectrum is also used for other purposes of national interest such as defense, space applications etc. The demand for the spectrum for telecom services is derived from the goods and

services that require spectrum as resource. Demand for spectrum is an important element to decide the value of the spectrum as the demand depends on certain external factors such as willingness to buy, requirement and paying capacity of the spectrum user i.e. the telecom service provider who uses it for providing wireless telecom services to consumers of such services.

Thus, interplay of demand and supply of spectrum results in revelation of market value of the spectrum through auction process, which ensures the most efficient allocation of spectrum as scarce natural resource, justifying the principle that spectrum is acquired through auction by those who value it the most. Due to limited availability of spectrum, its valuation and efficient allocation is a big challenge for its custodian.

It is well recognized that the economic valuation of spectrum depends on a number of variables. In functional form, one may posit that valuation of spectrum is a function of available Market Information, Technological Factors, Macro and Micro Economic Variables.

Based on the factors mentioned above, TPRA used benchmark carefully with countries in region which are quite similar with respect to economic situation and telecom market, as well as the prices of spectrum adopted in the past to arrive at spectrum value estimates.

Reserve Price Estimation

With regard to auction of spectrum, the term reserve price (RP) refers to the minimum amount that the owner of spectrum will accept as the winning bid in an auction. RP is the starting point for an ascending price auction and bidding is a means to price discovery. The Reserve Price should encourage aggressive participation from new entrants to increase competition. The traditional auction theory is based on the premise that the RP is used for two reasons: (i) to ensure the minimum amount that the owner of an item would get from the bid (ii) avoidance of collusion. The RP prevents the auction bid to be won at a price lower than the minimum price the owner is intending to accept. It is important to note that RP set lower than the expected value of the object will enable price discovery and the final bid price is likely to be higher than the RP depending on other factors such as supply and demand situation, amount of availability of that item in future etc. On the other hand a high reserve price for spectrum is likely to reduce spectrum demand and it also reduces the opportunities for price discovery. Some of the objectives for the Auction and use of RP are as under:

- Obtain a market determined price of Spectrum of various spectrum bands through a transparent process;
- Ensure efficient use of spectrum and avoid hoarding;
- Stimulate competition in the sector;
- Promote rollout of the respective services;
- Avoidance of Collusion;
- Maximize revenue proceeds from the Auctions within the set parameters.

It's important to point out that in year 2017, the TPRA, with the assistance of a spectrum pricing expert from the International Telecommunication Union, studied the telecommunications market in Sudan, with involvement of stakeholders in some sessions, for estimating the price of the spectrum in 700MHz and 800-MHz Bands.

The report of the expert estimated the price of an amount of spectrum 2*5 MHz (FDD/paired spectrum) in 800-MHz Band per year is **2,500,000.00** (2.5 million) USD.

Consider the current economic situations in the country TPRA has revaluing the price of 800-MHz Band through a careful bench marking with countries in region which are quite similar with respect to economic situation and telecom market, in order to insure the estimated price is matching the current economic situation in the country as well as ensuring affordable service for the community, and to facilitation of deployment ICT services & technologies in the band.

The estimated price has submitted to TPRA board of directors for further consideration and approval, after review and examine the estimated price by the board, they approved the price for amount of 2*5 MHz (FDD/paired spectrum) per year in 800-MHz Band is 1,800,000.00 (**1.8 million**) USD.

Issues for Consultation

Q8. Do you agree that the estimated reserve price is reasonable? If not please propose an alternative reserve price and support your proposal by studies.

Payment method:

The upfront spectrum fee is usually paid once when the license is granted, but sometimes it can be paid in installments over an agreed period of time.

Issues for Consultation

Q9. Should the payment of the spectrum fee be upfront, or you prefer deferred payment of the equivalent?

Q10. If deferred payment schedule method is preferred, what should be the duration of the payment period?