

The Sudan Multi-Band Spectrum Auction

An insider review of the Sudanese multi-band spectrum auction and the learning for other regulators seeking to award spectrum to support the development of mobile broadband

August 2023

Insights from the Sudanese multi-band spectrum auction

Coleago offers an insider's view of the 2023 Sudanese spectrum auction

Introduction

The National Communications Authority (NCA) of Sudan conducted a multi-band and multi-round spectrum auction that concluded on 10th January 2023. Coleago was advising one of the bidders on their auction bidding strategy and is therefore able to provide an insider and first-hand account of the auction. Confidentiality concerns restricts the amount of information we can share, and this paper is based only on information that exists within the public domain. The NCA adopted an appropriate auction design, but its implementation created some significant flaws which could have led to a chaotic, lengthy and highly strategic auction.

Spectrum to be auctioned

The NCA auctioned spectrum in the 800, 1800 and 2100 MHz bands as shown in the exhibit below. The spectrum was awarded in lots of 2 x 5 MHz and there were three lots of 800 MHz, two lots of 1800 MHz and one lot in the 2100 MHz band available.

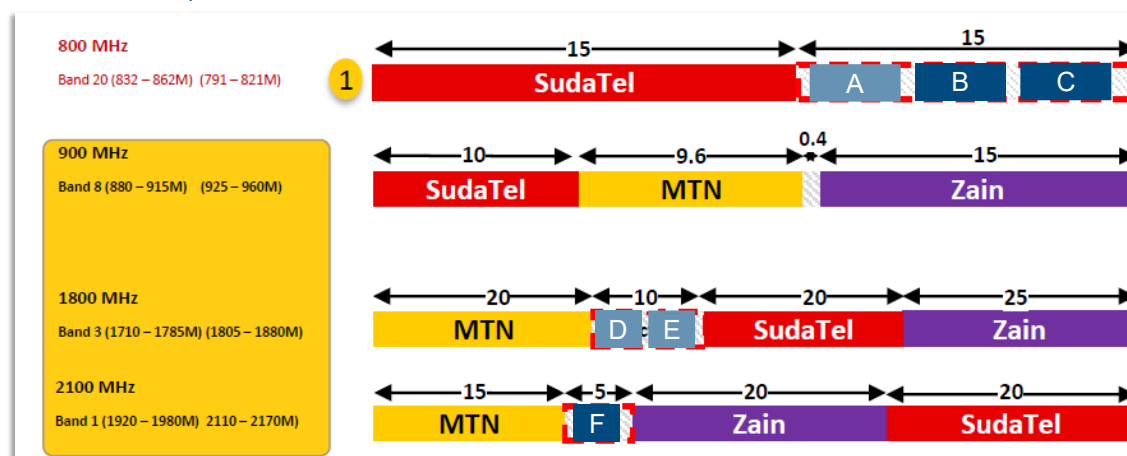
Exhibit 1: Spectrum to be auctioned



Source: Sudanese regulator

The lots were specific and related to pre-identified positions within the existing band plan for the three bands. The band plan and the lots, labelled from A to F are shown in the exhibit below.

Exhibit 2: Band plan



Source: Sudanese regulator

Spectrum caps

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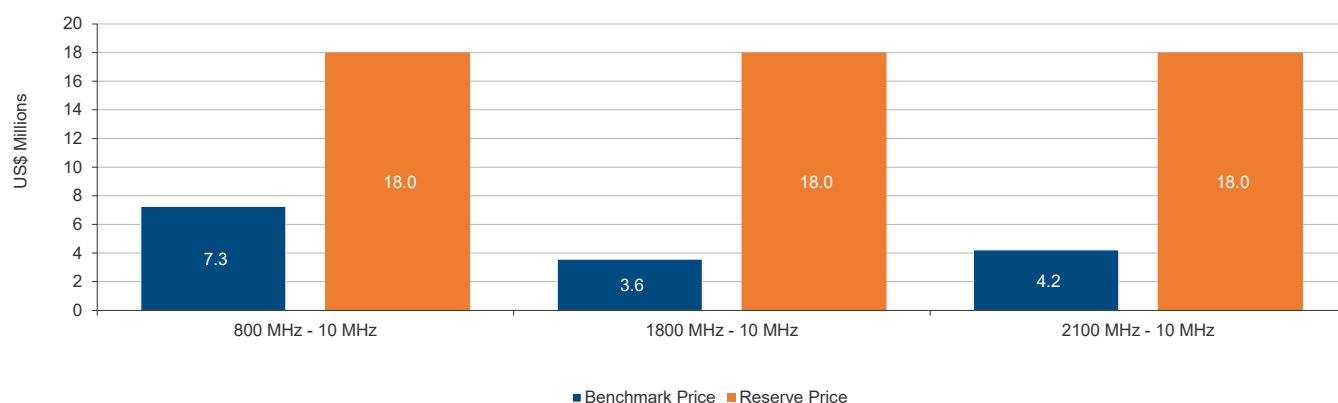
Reserve price levels

The minimum bid or reserve price was the same for all lots and was set at US\$ 18 million per lot. Normally reserve price levels vary between bands to reflect the difference in value between, for example, sub 1 GHz spectrum compared to mid band spectrum, with the former typically being valued more highly. The uniform nature of the pricing suggests that the NCA had not attempted to align reserve price with the value of the spectrum.

Reserve price levels were high which increased the risk of auction failure

A comparison of the reserve price levels versus the results of an auction benchmarking study performed by Coleago reveal that the reserve price was set at a significant premium to auction benchmarks. Best practice is generally to set a low, but material reserve price but this approach was not followed in Sudan and the regulator faced the risk that some or all of the spectrum might have gone unsold. However, bidding was such that all the spectrum was sold. The NCA gambled on a high reserve price and was fortunate to sell all the spectrum, whereas in many other African markets, high reserve prices have resulted in partial or complete auction failure. We generally advise regulators to avoid the risk of auction failure and set reserve prices at a discount to estimated spectrum values.

Exhibit 3: 700 MHz



Source: Coleago spectrum auction database

Coverage and quality of service obligations

There were no coverage or quality of service obligations

There were no coverage or quality of service obligations attached to the spectrum and this would have maximised the value of the spectrum to bidders. The absence of any obligations would have supported the decision to set reserve prices at high levels.

Timings

The timeline for the auction was very short

The timeline for the auction was very short. The Information Note announcing the auction and auction rules was published on 12th September 2022 with a closing application date of 6th October of the same year. The auction itself was then scheduled to commence on 24th October, less than three weeks later. This allowed bidders less than a month in which to perform their spectrum valuation exercise, seek board approvals and prepare their application. There was then only a short window in which to develop their bidding strategy, bid limits and seek the appropriate approvals. This was an exceptionally tight timetable and created significant risk for bidders.

A valuation exercise typically takes at least six to eight weeks and approvals often require an additional two weeks. We generally recommend that a minimum of two months is allowed and ideally three months or more.

Auction design

The auction format choice was appropriate but the detailed auction rules contained significant flaws

The auction format was a form of Simultaneous Multi-Round Ascending Auction (SMRA) which meant that all the lots were auctioned simultaneously and prices had the potential to increase each round, depending on demand. There was a simultaneous stopping rule which stated that all lots remained open to bids until such time that there were no more new bids, at which point the auction ended simultaneously for all lots. This is a common auction format and was an appropriate choice for the auction in Sudan.

Unfortunately, the implementation of the auction was poor and the detailed auction rules contained a number of significant flaws. These were:

- there was no concept of a single Standing Highest Bidder at the end of each round described in the auction rules which meant that if two bidders bid the same amount and the auction ended in that round, then there would be two winners for a single block of spectrum;
- there were no activity rules which meant that bidders were not compelled to bid each round which meant that bidders could conceal their demand in order to either

reduce the overall price paid and / or to allow them to bid strategically which could lead to inefficient outcomes;

- there were no eligibility rules which meant that bidders could increase or decrease demand on a round-by-round basis which also added to the possibility of strategic bidding; and
- bids were not fully binding in the sense that a winner could renege on their final auction bid price and forgo the lot and suffer a relatively modest penalty of US\$ 360,000 per lot.

These flaws created significant risk for the regulator as well as making the task of developing and implementing bidding strategy more complex for the operators. The absence of eligibility and activity rules can result in chaotic auctions that continue for very long periods.

Results of the Sudanese auction

Despite the flaws, the auction progressed relatively efficiently

Despite the flaws, the auction progressed relatively efficiently and bidders bid as if they were subject to sensible eligibility and activity rules. The regulator also introduced the concept of a Standing Highest Bidder following feedback from the bidders which improved the design. The auction concluded after several days of bidding with all spectrum being sold although the final allocations were somewhat surprising and indicated potential bidding errors by some participants.

Summary of key insights

The auction was successful but the final outcome, which we cannot disclose, was somewhat surprising

The NCA's spectrum auction was successful and resulted in all spectrum being sold despite the NCA gambling on uniform and high reserve prices. The choice of auction design was appropriate, but the detailed implementation contained some significant flaws. However, the auction was successful as bidders did not seek to exploit the flaws. In future awards the NCA should allow operators more time to prepare for the auction and pay closer attention to the detailed auction rules.

How Coleago can help

An understanding of spectrum from an operator's perspective is key to developing appropriate spectrum management strategies

Coleago has over 20 years of experience in advising both operators and regulators on issues related to spectrum including spectrum management strategies, roadmaps, pricing and award process design and implementation, including auctions. We can provide regulators with the "operators' perspective" to ensure that our recommendations take account of the practical real-world realities faced by mobile operators to ensure that our regulatory advice will achieve the regulator's objectives.

About Coleago Consulting Ltd

Graham Friend, M.A., M.Phil., (Cantab), ACA, is an economist, an award-winning author and the Managing Director and Co-Founder of Coleago Consulting. Coleago is a specialist telecoms strategy consulting firm and advises regulators and operators on issues relating to spectrum, regulation and network strategy. If you would like to discuss any of the issues raised in this paper, then please contact Graham.



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