

# The Nigerian Communication Commission's 3500 MHz spectrum auction

A review of the NCC's 3500 MHz spectrum auction and the learning for other regulators seeking to award spectrum to support the development of mobile broadband and 5G

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## Insights from the NCC's Nigerian spectrum auction for 3500 MHz spectrum

### Introduction

*There is much to applaud in the recent and successful Nigerian auction of 3500 MHz spectrum*

Africa has a, sometimes, troubled history in relation to the award of mobile spectrum. Whilst many regulators are increasingly selecting auctions as the basis for assigning spectrum, their execution has often been poor. However, recent awards have gathered praise from industry stakeholders. The 2018 award of 700 MHz spectrum by the Tanzanian Communications Regulatory Authority (TCRA), an award process designed and implemented by Coleago, was praised for its transparency, simplicity of design and the professionalism of its execution. There is also much to applaud in the recent and successful Nigerian Communication Commission's (NCC) auction of two lots of 100 MHz of 3500 MHz spectrum.

In this paper we offer a review of the Nigerian auction and identify the many elements of best practice that were captured in the process and design but we also highlight some of the issues and the future challenges the NCC will face when it seeks to award the remaining spectrum within the band. As so often is the case in Africa, the choice of Reserve Price features strongly in our analysis. Coleago supported one of the successful bidders in the auction and is therefore well placed to provide a commentary on the auction. We hope this paper will provide valuable insights for other regulators when designing their own award process.

### Overview of the NCC's 3.5 GHz spectrum auction

*The NCC auctioned two of the five lots within its 3.5 GHz band plan using a clock auction format*

The Nigerian 3500 MHz band plan comprises five lots of 100 MHz of spectrum ranging from 3400 MHz to 3900 MHz of which two, non-contiguous lots were offered for auction in December 2021. The NCC indicated that the remaining lots would also be auctioned within the next two to three years. The NCC selected a simple clock auction format based on generic spectrum lots which was then followed by an assignment stage. The reserve price was set at US\$ 197,400,000 per lot.

Three bidders submitted applications and qualified for the auction: incumbents MTN and Airtel and a new entrant, Mafab Communications Limited, which was only incorporated in 2019 and does not have an existing mobile operation in Nigeria.

*Incumbent MTN and newcomer Mafab were the eventual winners*

The auction took place on the 13<sup>th</sup> of December 2021, using an electronic auction bidding system and concluded after 11 rounds of bidding. The clock stage of the auction concluded after Airtel made an exit bid of US\$ 270,000,000 and MTN also exited in the same round but with a bid of US\$ 273,000,000 which was sufficient to beat Airtel and secure a Lot. It is interesting to note that Mafab was the only participant prepared to accept the clock price of US\$ 275,904,886 in the final round – it is unusual for a new entrant to outbid a large incumbent. MTN then went on to win the assignment stage with an additional bid of US\$ 15,900,000 which allowed it to select its preferred lot.

### Simple pre-qualification criteria

*Simple and objective pre-qualification criteria were used to encourage participation*

The first element of the NCC's process to be applauded was the adoption of simple and objective pre-qualification criteria. The criteria required the applicants to be a company incorporated in Nigeria, independent of other applicants, up to date with any regulatory commitments (in the case of existing operators) and applicants were required to prove they had paid their "intention-to-bid" deposit.

In selecting simple and objective pre-qualification criteria the NCC ensured the widest possible participation in the process. The use of objective criteria ensured transparency and reduced the risk of any legal challenges arising from any applicant's potential exclusion from the process. In addition, the simple criteria relieved applicants of the

time-consuming and expensive task of preparing long and detailed “bid books” and the NCC also avoided the lengthy and risky task of reviewing and performing a subjective assessment and scoring of business plans which are often out-of-date by the time the spectrum is actually awarded.

*The NCC recognised the trade-off between demanding licence obligations and auction proceeds*

### **Not trying to have your cake and eat it**

Regulators often face trade-offs when setting licence conditions and the starkest of these trade-offs is with the potential revenues that can be generated from the auction. Licence conditions often include coverage and quality of service obligations and demanding obligations, which require operators to extend coverage into deeply rural areas for example, are very costly and reduce the value and hence the price that can be charged for spectrum.

It is interesting to compare the approaches adopted by the Tanzanian regulator, the TCRA and that of the NCC. The TCRA imposed extensive coverage obligations which were designed to significantly expand mobile broadband coverage into rural areas in order to realise the socio-economic benefits that greater digital inclusion bring. However, recognising the cost associated with increasing coverage and the resulting reduction in the value of spectrum, the TCRA set a low reserve price. In contrast, the NCC imposed relatively low coverage obligations which did not materially impact the value of the spectrum and which allowed the NCC to set a high reserve price. Although we will discuss our concerns in relation to the Nigerian reserve price later in this paper, we commend the NCC for recognising the trade-off between licence conditions and auction prices and not seeking “to have its cake and eat it!”

*The selected auction design was appropriate and well designed*

### **Appropriate auction design**

Achieving an economically efficient assignment of spectrum, where spectrum is assigned to those that will generate the greatest socio-economic value from the use of spectrum, is a common objective for many regulators. It is possible to show that a well-designed and competitive auction can achieve an economically efficient outcome and it is primarily for this reason that auctions are often regarded as best practice for the assignment of spectrum. Auctions also have the additional benefits of being transparent, objective and, if managed well, fast and efficient and relatively low cost (certainly compared to subjective “beauty parade” or comparative assessment processes).

The NCC should be congratulated for selecting an auction in the first place, but they should also be applauded for selecting an appropriate auction design which was fit-for-purpose. Overall, the NCC auction design was very good and borrowed many of the features from the Tanzanian auction which Coleago designed.

There are many different auction formats to choose from and for each format, a myriad of different rules that can be applied. The NCC selected a simple clock auction format for generic lots. In this format a “clock price” is announced at the start of each round and bidders indicate if they are prepared to acquire a lot at this price. If demand exceeds supply, then the auction proceeds to another round and the clock price increases and the process continues until demand is equal to or less than supply.

During the clock stage, bidders are simply bidding for a 100 MHz block of spectrum – they do not know which specific block they will be assigned. In order to ensure that bidders could fully express their willingness to pay for the spectrum, bidders were also entitled to make an “exit bid” during any round where they could no longer justify the clock price. The auction also included clear rules for managing tie breaks and there was also an unsold lot round. Whilst a small number of criticisms could be made of the detailed rules, the overall clock stage was well designed. The assignment stage, where winners from the clock phase, could then bid for the right to choose their preferred lot, was also well designed although the choice of pricing rule could be debated.

*The Information Memorandum was clear and well written*

### Clear and well written Information Memorandum

Coleago has supported mobile operators in more than 150 spectrum award processes. In many cases the Information Memorandum or Invitation to Apply documents that we have had to interpret on behalf of our clients are often poorly drafted, unclear and sometimes contradictory. When Coleago works with regulators on the preparation of auction documents, we always strive to ensure the documents are as clear, simple and unambiguous as possible.

The NCC's Information Memorandum (IM) was a very good example of a simple, straightforward and well-written document which clearly set out the process and rules for the award of spectrum. A clear and unambiguous document reduces regulatory uncertainty and allows operators to value spectrum with increased confidence resulting in higher valuations and potentially higher auction proceeds. The NCC published a high-quality information memorandum resulting in relatively few clarification questions.

*There was a welcome opportunity to raise questions in relation to the IM but a prior consultation process would have been valuable*

### Question and answer process

The auction process included a 'question and answer' stage where queries relating to the IM could be addressed. The fact that relatively few questions were raised is testimony to the clarity of the document. The questions that were raised were answered on a timely basis and generally resolved most residual uncertainties although a small number of ambiguities did remain but they were not particularly material.

One criticism that is justified is that the NCC did not consult on the content of the IM. We believe that this would have been a valuable additional step as it would have allowed potential applicants to raise a number of very serious concerns related to the auction. Later in the document we highlight some of these concerns.

*Timelines were short but just about manageable, more time would have been preferable*

### Just about feasible timelines

Spectrum auctions often involve very significant amounts of investment which include, not only the auction price, but the capital expenditure required to deploy new spectrum. In a market the size of Nigeria, the level of investment is measured in the many hundreds, if not billions, of dollars. Not surprisingly, large multi-national mobile operators like MTN and Airtel, impose demanding corporate governance processes on their operating businesses. Business plans, bidding strategies and bid limits must pass through a number of lengthy and demanding review processes. The business planning process itself required to understand the value of spectrum is lengthy and typically requires a minimum of six weeks and eight to ten weeks is more common even before the sign-off procedures begin.

In Nigeria, the draft IM was published on the 6<sup>th</sup> of October 2021 and the deadline for applications was originally the 24<sup>th</sup> of November of the same year but this was subsequently extended by a further five days to the 29<sup>th</sup> of November. This afforded applicants a little over seven weeks to complete their business planning, formulate their bidding strategy and seek their approvals.

The timeline put applicants under an enormous amount of pressure and for some, the timelines may have been too short to allow them to make an application. Short timelines also increase the risk of errors in the valuation task or bidding strategy which can compromise the efficiency of an, otherwise, well-designed auction.

The NCC's extended timeline was at the lower limit of what is practically feasible and reasonable for a large multi-national. The timeline was effectively too short and extending the process by an additional month would have been a significant difference to all stakeholders involved in the process. Coleago would suggest that three months is the minimum duration from publication of a draft IM to application submission and that three to four months would be better.

*The use of an electronic bidding platform ensured the auction was successfully executed*

### **Strong auction execution using auction software**

The auction itself was conducted using an electronic auction bidding system. The use of an electronic bidding system provides security, transparency and a clear audit trail in the event of a legal challenge. A well-designed and clear user interface also reduces the risk of bidding errors and improves the efficiency with which the auction can be conducted. The NCC are to be commended on adopting the use of an electronic bidding system.

*The decision to not award all the spectrum simultaneously created significant bidding strategy challenges*

### **Sequential award process and exposure and substitution risk**

As our commentary thus far has shown, there are many aspects of the Nigerian auction which reflect best-practice and deserve congratulations. There were, however, some significant issues arising from the fact that the NCC decided to only auction two of the five lots. The NCC has effectively implemented a sequential series of auctions for spectrum in the same band and this creates two material auction bidding strategy issues which can compromise the efficiency of the auction and create challenges for bidders in formulating their bidding strategies.

Spectrum lots can be either substitutes or complements. Spectrum lots are substitutes if winning one lot reduces your demand for another lot – in other words you want one or the other but not both. In contrast, lots are said to be complementary when winning one lot increases your demand for another lot.

In the case of Nigeria, the spectrum to be awarded in the second, later auction will be either complementary or substitutes depending on which two lots you might eventually end up winning. If a bidder were able to acquire two suitably adjacent lots over the two auctions, then the same radios could be used for both lots and so there would be synergies in winning two lots and their combined value would be greater than the sum of the values of the individual lots. In contrast, if the lots were not suitably adjacent, additional radios would be needed for the second lot and the additional cost would mean that you would either want to win a lot in the first auction, or a lot in the second auction, but not both.

In light of the presence of both substitute and complementary lots over the two auctions, bidders faced challenging bidding decisions.

*Bidders faced both substitution and exposure risk which can reduce the efficiency of an auction*

Bidders faced substitution risk in relation to the substitutable lots. This is the risk where they might have won a lot in the first auction at a high price and then regretted doing so when they later saw that prices were lower in the second auction. Conversely, a bidder may walk away from the first auction but then regret doing so if they have to pay a higher price in the second auction. Substitution risk poses a significant challenge to bidders and can result in inefficient auction outcomes.

The presence of complementary lots gives rise to another auction risk which is called exposure risk. A bidder in the first auction might bid for the first lot based on the combined value of two suitably adjacent lots but then win the “wrong” lot in the later auction which would mean they overpaid for the first lot. Once again, the presence of exposure risk can create significant challenges for bidders and can result in an otherwise, well-designed auction, generating inefficient outcomes.

There are other issues that arise in the context of sequential auctions, such as predatory bidding tactics but in the case of Nigeria, substitution and exposure risk are the two main challenges.

A potential solution that would have addressed some of the problems would have been to auction all the lots simultaneously but using specific lots where the lots differed in terms of when they would become available. This would have avoided the substitution risk issues and would not have required a significantly more complex auction design. Exposure risk is slightly more problematic and is typically solved through the use of package bidding where bidders can bid for a package of two lots where they would either win both lots or no lots but never win a subset of their package bid. Package or

combinatorial auctions are more complex but when only one band is to be auctioned, the increase in complexity is not unduly burdensome.

The NCC did attempt to partly address the concerns over substitution risk by stating in their response to questions, that the final auction price in the first auction would become the reserve price in the second auction. This is a decision that the NCC may well live to regret and the subject of our main criticism of the Nigerian auction.

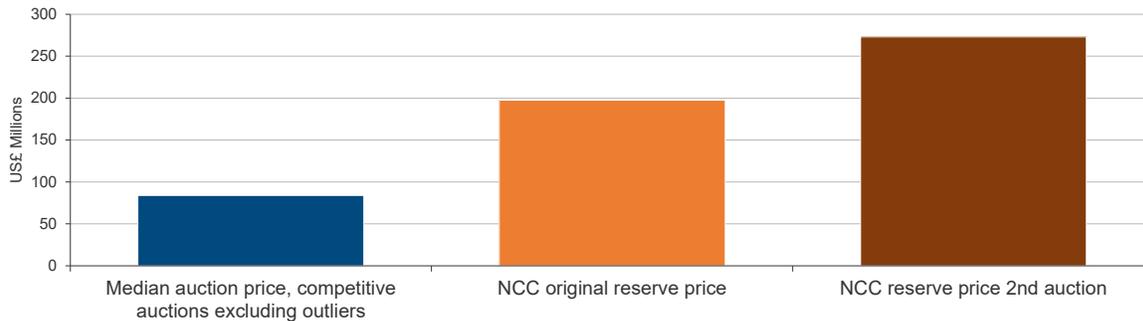
**Reserve price levels and challenges for the future**

*High reserve prices have been the cause of many auction failures in Africa (and elsewhere)*

Auctions have been used previously in Africa but many have failed either partially or completely. A close analysis of the failed auctions reveals that in most cases, the main cause of auction failure was the imposition of a reserve price that was too high.

In the exhibit below, we have compared the reserve price from the first auction and the proposed auction price for the second auction with the median auction price from 28 for 3.5 GHz spectrum, where the price is based on competitive auctions, excluding outliers which have been adjusted for a range of factors to increase their relevance to Nigeria.

Exhibit 1: Auction benchmark and reserve prices in Nigeria



Source: Coleago Consulting Auction Database, NCC

The median auction benchmark price paid for 3.5 GHz spectrum in other auctions was US\$ 84 million. Benchmarks provide a rough guide to the value of spectrum and best practice is typically to set the reserve price at a significant discount to the estimate of market value. In contrast, the NCC set a reserve price that was 2.4x higher than the median price.

A mobile operator will participate in an auction if the value they place on the spectrum exceeds the reserve price. There are a significant number of mobile operators in Nigeria and yet only two incumbents applied which suggests that the other operators either valued the spectrum below the reserve price or they did not have sufficient funds to bid at the reserve even if their valuations exceeded it. It is therefore reasonable to conclude that the high reserve price deterred participation in the auction.

*The same results would have been achieved even without setting a reserve price*

As we highlighted in our overview, the auction was competitive and the final price ended above the reserve after 11 rounds of bidding. If the NCC had not set a reserve price at all, they would have still generated exactly the same level of auction proceeds as Airtel would have continued bidding until the price reached US\$ 270 million, at which point they would have exited. The NCC would have achieved the same outcome but would not be confronted with a significant challenge in relation to the three remaining blocks of 3.5 GHz spectrum that are yet to be auctioned.

*The decision to set the reserve price in the second auction at the winning price of the first auction may well result in low future participation in the second auction*

The NCC's response to the questions raised revealed that the reserve price in the second auction would be determined by the winning bid price in the first auction. According to the press release<sup>1</sup> published by the NCC on its website on the 13<sup>th</sup> of December 2021, the final auction price was US\$ 273,600,000 which will become the reserve price in the second auction. This new price is 3.3x higher than the median auction price. More importantly however, it is higher than the maximum that Airtel was prepared to bid in the first auction. If Airtel maintains the same valuation and bid limit for the second auction (although they may well value the spectrum less as they will have lost a first / second mover advantage) then this means the reserve is above the maximum they are prepared to pay and they would not be able to justify participating. Furthermore, those operators who were not prepared to participate at US\$ 197 million are going to be even less likely to participate at US\$ 273.6 million.

There is a reasonable probability that the only bidders in a second auction will be MTN and Mafab who might seek to acquire a second, contiguous and complementary block of spectrum. However, they may also conclude that the chances of other operators participating is low, that a single block alone confers sufficient competitive advantage and that US\$ 273.6 million is a lot of cash for an industry which faces significant future headwinds. If the winners adopt the second position, then the NCC's attempt to auction the remaining blocks with a reserve price of US\$ 273.6 million could well result in no one submitting an application and the spectrum being left idle. If the winners adopt the first position, then two players will end up with a disproportionate share of spectrum which is critical to 5G, the competitive landscape will be distorted and one block of spectrum is likely to remain unsold.

It will be interesting to follow developments in Nigeria in relation to the 3.5 GHz but we have significant concerns about the success of the future auction given the high reserve price.

### Summary of key insights

*There are many elements of the auction that are worthy of praise*

There are many elements of the Nigerian 3.5 GHz auction to applaud:

- simple pre-qualification criteria;
- an understanding that high auction prices are not compatible with demanding coverage obligations (although greater overall socio-economic welfare may well have arisen if obligations were more demanding);
- an appropriate auction design (subject to our concerns about the sequential nature of the auction);
- a clear and well-written information memorandum;
- timelines that were just about feasible although we would have preferred at least one or two months more; and
- strong auction execution using an electronic platform.

*The sequential nature of the auction and the reserve price levels are the greatest weaknesses*

There are, however, some significant concerns regarding the overall auction process. The first is the sequential nature of the overall award process and the creation of substitution and exposure risk. The second and most significant concern relates to the decision to set the reserve price in the second auction at the price level achieved in the first auction. Once again, the reserve price is likely to play a critical role in the success of the second auction.

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<sup>1</sup> <https://www.ncc.gov.ng/media-centre/news-headlines/1137-5g-mafab-mtn-emerge-winners-in-nigeria-s-3-5ghz-spectrum-auction>

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

### How Coleago can help

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 are able to 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.



Email: [graham.friend@coleago.com](mailto:graham.friend@coleago.com)

Mobile: +41 798 551 354