



Deploying 5G in Nigeria: What Role for the Private Sector?

by

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on the occasion of CITAD Public Consultation
on the NCC Draft Consultation Document for
the Deployment of 5G in Nigeria

Talking Points

- An overview of the Draft Consultation Document
- Health Implication of 5G deployment
- Spectrum for 5G deployment
- The cybersecurity implication of 5G
- The role of the Private Sector in 5G deployment
- Conclusion



An overview of the Draft Consultation Document

- I would like to commend NCC (Nigerian Communications Commission) for producing the comprehensive Consultation Document on the deployment of 5G in Nigeria.



An overview of the Draft Consultation Document

- I also would like to endorse the overall justification for Nigeria going 5G to advance the Digital Economy Agenda of the government for a more prosperous Nigeria as more jobs would be produced through innovative technologies and solutions in the area of:



An overview of the Draft Consultation Document

- (1) Enhanced Mobile Broadband (eMBB) in the gigabit range
- (2) Internet of Things (IoT) connectivity for smart processes including smart city evolution, improved healthcare services, smart agriculture, improved transportation via better fleet management and use of autonomous vehicles, manufacturing, business intelligence, big data analytics and supply chain management; and
- (3) Virtual and Augmented Reality (VAR) for education, training simulations etc.



An overview of the Draft Consultation Document

- The Document requested for public comments in specific areas and those specific requirements are addressed in this presentation.



Health Implication of 5G deployment

As NCC indicated in the document, I fully agree that there is insignificant health implication for the deployment of 5G technologies with respect to spectrum band to be used based on scientific evidence from studies carried out by the Institute of Electrical and Electronics Engineers (IEEE), ...

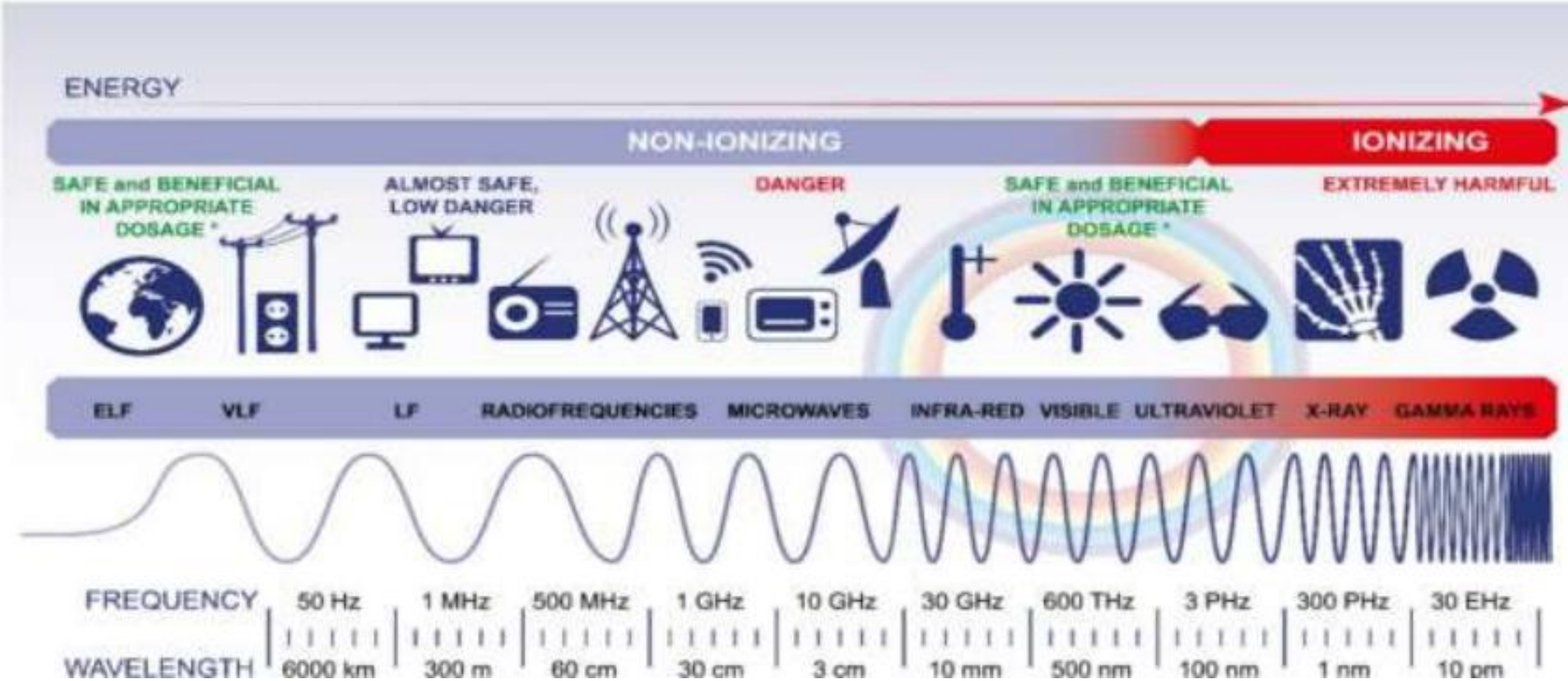


Health Implication of 5G deployment

... the United Nation Environment Program (UNEP) and the World Health Organization (WHO) and the International Commission on Non-Ionizing Radiation Protection (ICNIRP) all show that exposure to radio frequencies are safe and does not cause or initiate the occurrence of cancers.



Health Implication of 5G deployment



Source: Encyclopædia Britannica, Inc.

Outcome of the EMR Test during the 5G Proof of Concept trial in Nigeria

NCC conducted ElectroMagnetic Radiation (EMR) test in November 2019 during the 5G Proof of Concept in Nigeria in accordance with the 1998 International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines for general public exposure to time varying EM fields which were in force at the time of the trials.



Outcome of the EMR Test during the 5G Proof of Concept trial in Nigeria

The results of EMR radiation of the 5G Trial indicated that the highest radiation at 26 GHz millimeter wave at 5m away from source is 4.3 % and at 30m from the source is 0.142 %, while the highest radiation at 3.5 GHz at 5m away from the source is 11.4 % and at 30m away from the source is 1.9 % of ICNIRP Specification of 61 v/m for frequency range 2-300 GHz.

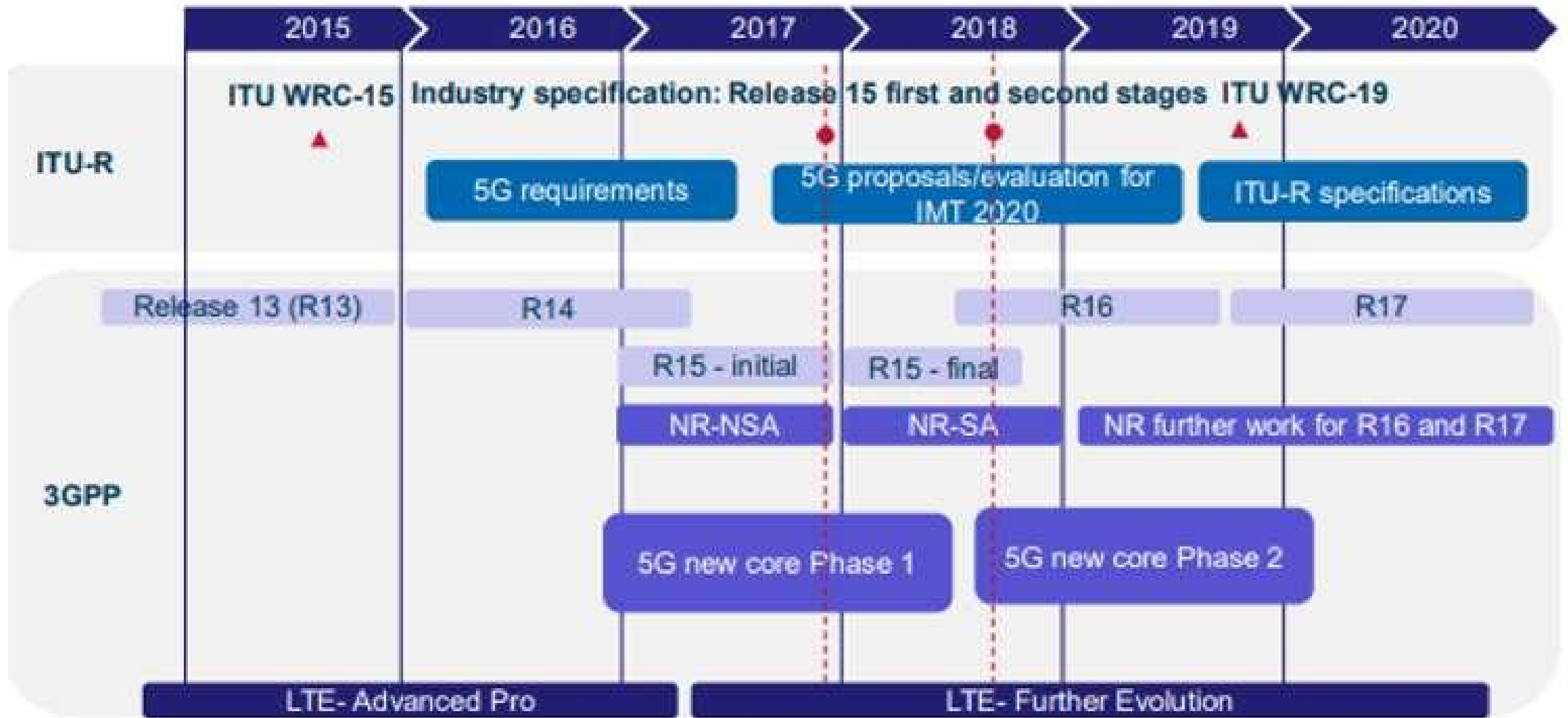


Outcome of the EMR Test during the 5G Proof of Concept trial in Nigeria

These results are far below the ICNIRP specification for protection of members of the public in the Guidelines and therefore suggest that no public health hazards are expected from the use of 5G in Nigeria.



Spectrum for 5G deployment



5G Deployment

Regardless of the core network for 5G, 5G radio is to be deployed using several frequency bands.

The key characteristics of the 5G New Radio (NR) are listed below. These characteristics will drive the spectrum need for mobile operators.



5G Deployment

(1) At least ten times bandwidth increase over 4G (LTE-Advanced). This translates to over 1GHz spectrum for 5G NR deployment per operator for deployments in the mm-wave range.

(2) The use of new spectrum with wider contiguous frequency bands will enable operators to deploy service with better efficiency and lower latency (e.g. multiples of 100MHz carriers in the mid and high bands), low-bands (e.g. 600MHz, 700MHz and 800MHz) including refarming of 2G, 3G and 4G spectrum.



Deployment Planning

According to NCC, the Federal Government will provide an enabling environment for 5G deployment, but the Mobile Network Operators (MNOs) (the Private Sector) will determine their own deployment Strategies subject to alignment to the approved policies and other regulatory instruments in force. However, the obvious strategy at this time would involve a phased approach.



Deployment Planning

Indications suggest that majority of operators in different markets will opt for a phased strategy, involving a Non-Stand Alone (NSA) approach for the early stage, a hybrid approach mid-term, and a Stand-Alone approach long term. This phased approach will accommodate device availability.



Deployment Planning

For the early stage of Nigerian 5G deployment strategy (2020 – 2021), a Non Stand-Alone (NSA) approach will involve deployment of 5G equipment on some existing sites, supported by densified networks of small cells.

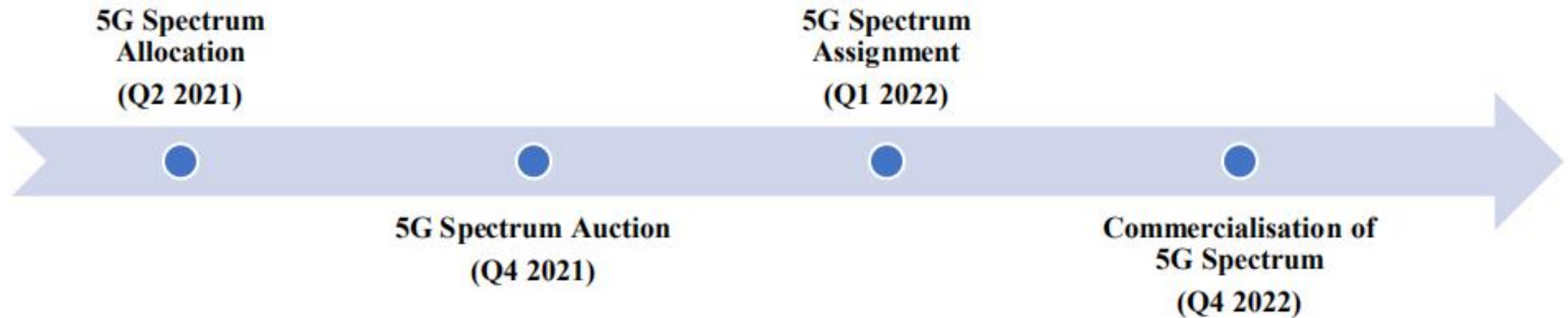


Deployment Planning

The mid-term stage (2021 – 2025) will involve a hybrid approach with new-build 5G sites added to the small cell networks. Depending on demand and ROI, this hybrid scenario may be seen by some as a long-term solution. The long-term stage (post 2025) should see Stand Alone networks deployed and will require the largest infrastructure investment.



Deployment Planning



5G spectrum Allocation Timelines

Deployment Planning - 5G Spectrum

Spectrum use is international and the allocation of frequencies for 5G is backed by treaty and done at the International Telecommunications Union's World Radio Conferences (ITU-RC) level **to take advantage of economy of scale for network equipment and device manufacturers.**



Deployment Planning - 5G Spectrum

Legacy Spectrum

Legacy Spectrum that could be used for Non-Stand Alone (NSA) 5G deployments based on available standards, core, access and end-user equipment support which are:

1. 700 MHz Band: 703-733 / 758-788 MHz
2. 800 MHz Band: 790-821 MHz / 832-862 MHz
3. 900 MHz Band: 880-915 / 925-960 MHz
4. 1500 MHz Band: 1427-1517 MHz
5. 1800 MHz Band: 1710-1785 / 1805-1880 MHz



Deployment Planning - 5G Spectrum

6. 1800 MHz TDD (Time Division Duplex): 1890-1910 MHz

7. 2100 MHz Band: 1920-1980 / 2110-2170 MHz.

8. 2.3 GHz Band: 2.3-2.4 GHz

9. 2.6 GHz Band: 2.5-2.69 GHz

10. 3.3 GHz Band: 3.3-3.4 GHz

11. 3.5 GHz Band: 3.4-3.7 GHz

12. 4.9 GHz Band: 4.8-4.99 GHz



Deployment Planning - 5G Spectrum

Spectrum for Stand Alone 5G Deployment

Spectrum bandwidth requirement for the deployment of 5G system to meet the International Mobile Telecommunications (IMT) - 2020 usage scenarios of enhanced mobile broadband (eMBB), Ultra-Reliable Low Latency Communication (URLLC) and massive Machine Type Communication (mMTC), varies.

A contiguous bandwidth of 80 – 100 MHz per operator is recommended, in the low and mid spectrum bands. While bandwidths of 400-1000 MHz contiguous spectrum are recommended per operator in the high (millimeter wave) bands.



Deployment Planning - 5G Spectrum

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In Nigeria according to NCC, these requirements can be achieved in the Mid Bands with re-farming / re-planning. It can also be met in the High Bands without any further work apart from additional allocation to be made by the National Frequency Management Council (NFMC).

According to Global Suppliers Association (GSA), the bands that are known to be most supported at the moment by announced 5G devices are n78 (3300-3800 MHz), n41 (2496-2690 MHz), n79 (4400-5000 MHz), and n77 (3300-4200 MHz) respectively in that order.



Deployment Planning - 5G Spectrum Newly Identified Spectrum for IMT2020

These are Millimetre wave Spectrum that were identified in WRC-19. They will also be made available for Stand Alone (SA) 5G deployments in Nigeria according to NCC.

- a. 24.25-27.5 GHz Globally harmonised
- b. 37-43.5 GHz Global
- c. 45.5-47 GHz
- d. 47.2-48.2 GHz
- e. 66-71 GHz Global



Deployment Planning - 5G Spectrum

All these are covered by Third Generation Partnership Project (3GPP) Release 15 which provides support for New Radio (NR) Frequency Range 1 (FR1) and Frequency Range 2 (FR2), from 450-7125 MHz and 24250-52600 MHz respectively, except 66-71 GHz to be supported by Release 17 scheduled to be completed in September 2021.

The spectrum listed below are part of spectrum identified in WRC-19 which are globally harmonised for the deployment of 5G:

- a. 24.25-27.5 GHz
- b. 37-43.5 GHz
- c. 66-71 GHz



Deployment Planning - 5G Spectrum

The above bands are available and not assigned to operators at the moment except the 26 GHz band where an operator currently has an assignment of 2 slots of 2 X 28 MHz each in the old plan which is FDD (Frequency Division Duplex). The new plan on this band is TDD so according to NCC, the operator will be vacated and the band licensed based on the new TDD plan.

The first phase of the release of millimetre wave Spectrum in Nigeria will be 24.25-27.5 GHz and lower part of 37-43.5 GHz (38 GHz) starting from 37 GHz to 40.0 GHz.



Deployment Planning - 5G Spectrum

The new plan on the 26 GHz band is TDD. With Guard band of 250 MHz on each side, this will be assigned to 4 (four) operators with maximum of 750 MHz each.

The plan for the 38 GHz band (3GHz) is TDD. With Guard band of 250 MHz on each side, this will be assigned to 4 (four) operators with maximum of 625 MHz each.

Subsequent phases will consider other bands including those not globally allocated as they become more matured and equipment more available.



Deployment Planning - 5G Spectrum

The bands below are not globally harmonised, but identified for the deployment of International Mobile Telecommunications (IMT) by footnote in which Nigeria is included:

- a. 45.5-47 GHz
- b. 47.2-48.2 GHz
- c. 3300-3400 MHz
- d. 4800-4990 MHz



Deployment Planning - 5G Spectrum

Spectrum for First Phase of 5G Deployment in Nigeria

In the first phase of 5G deployment in Nigeria according to NCC, all/some parts of the bands below are prioritized for release, recovery, re-farming and/or re-planning in line with global trends. These bands are:

- a. 2100 MHz Band
- b. 2300-2400 MHz
- c. 2600-2690 MHz
- d. 3300-3400 MHz



Deployment Planning - 5G Spectrum

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e. 3500-3600 MHz

f. 3600-3700 MHz

g. 4800-4990 MHz

h. 24.25-27.5 GHz

i. 37.0 – 43.5 GHz



Deployment Planning - 5G Spectrum

Spectrum for Second Phase of 5G Deployment

The second phase according to NCC shall consider the release of all or some parts of the bands listed below, based on New Radio support, maturity and device availability:

- a. 1427-1518 MHz
- b. 45.5-47 GHz
- c. 47.2-48.2 GHz
- d. 66-71 GHz



The cybersecurity implication of 5G

The deployment of 5G technologies in tandem with Industry 4.0 devices will create an unprecedented cybersecurity threat landscape for cyber attack mitigation.

It is therefore important that NCC uses the instrument of regulation to address this concern through:

1. Effective Supply chain management that disallows Internationally restricted manufacturers' devices on our 5G network.



The cybersecurity implication of 5G

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2. Embrace of the concept of security by design for resiliency
3. Strict equipment type regulation in conjunction with the Standard Organisation of Nigeria (SON).
4. Increased collaboration with the Ministry of Foreign Affairs to boost International cooperation in the area of cybersecurity and the prosecution of cybercrimes.



The role of the Private Sector in 5G deployment

The role of the private sector has been critical in the successful roll-outs in the preceding telecommunication generations.

Estimated to deliver over \$23.2trillion dollars economic output by 2035, the role of smart regulation is indeed key while the active participation of the private sector investment is indispensable.



The role of the Private Sector in 5G deployment

The private sector will be expected to:

1. Invest in 5G spectrum auction
2. Invest in infrastructure
3. Invest in Radio antennae and the associated equipment
4. Invest in the business process for deployment, management and the sustainability of the network; and
5. Create more direct and indirect jobs



The role of the Private Sector in 5G deployment

For the private sector to carry-out its role effectively, NCC shall be expected to

1. Evolve a transparent spectrum re-farming process that is fair to the incumbents
2. Conduct a transparent spectrum auction process
3. Ensure proper training of its staff that would be dealing in the 5G deployment



The role of the Private Sector in 5G deployment

4. Be flexible on net neutrality to enable innovation with respect to specific business model. It may be better to encourage special application for specific business model not in compliance with the net neutrality principle considering need for Return on Investment (RoI) on special 5G roll-out.
5. Apply the Universal Service Provision Fund (USPF) funding to promote deployment to rural / under-served areas.
6. Require periodic (say quarterly) 5G governance audit and the publication of audit reports.
7. Be interested in where the 5G Cloud virtualization networks /data will be located.



The role of the Private Sector in 5G deployment

8. Sustain the designation of Telecommunications infrastructure as Critical National Infrastructure and take necessary policy, legal and security measures to secure same.



Conclusion

The economic benefit of 5G roll-out is huge, so also the associated security concern hence the need for NCC to align more closely with trusted vendors and equipment types so that the resultant digital economic ecosystem is not compromised. It should also enhance its international cooperation to enable ease of prosecution of cyber criminals.



Conclusion

In the face of security challenges in the country, necessary policy, legal and security measures should be taken to secure private sector investments now considered as Critical National Infrastructure.



Conclusion

This submission is an indication that the Private sector as usual is ready to play its role in the 5G roll-out in the country provided there is flexible and smart regulation to guide the process.



Thank you.

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