ATU-R RECOMMENDATION

ATU-R Recommendation

RELATING TO

Spectrum Management Principles on National Broadband Spectrum Plans Including Licensing Roadmaps, and Emerging and Future Spectrum Management

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Contents

PART A: EXECUTIVE SUMMARY

A study published by the International Telecommunication Union (ITU) in 2019, indicates that expanding mobile broadband penetration by 10% in Africa would yield an increase of 2.5% in GDP per capita[1]. With a mobile broadband connection penetration of 34% at the end of 2019, Africa is way below the world average of 83%. It is therefore urgent to accelerate the increase in access to mobile broadband and increase broadband penetration in Africa.

High quality mobile services are vital for consumers and businesses and deliver major socioeconomic benefits. They rely on increasing amounts of spectrum to support faster broadband speeds and rapidly growing data demand. As demand for spectrum continues to grow, especially as a result of the evolution in communications technologies, regulators face pressure to continue to ensure efficient use of spectrum resources. Given there is a limited supply of mobile spectrum, it is vital that governments and regulators' primary goal is to have spectrum management plans that will enable efficient use as technology improvements alone cannot deliver the required capacity.

One of the most notable developments that will affect spectrum demand in the coming years is the introduction of 5G, which is expected to be deployed across low, mid, and high spectrum bands and is driving harmonized approaches to spectrum use worldwide.

With mobile penetration in Africa at about 49% market penetration[2], a significant connectivity gap exists and demand for access to new technological innovations and state of the art technologies is on the rise. This is even as according to the Ericsson Mobility Report November 2020 that mobile data traffic is expected to grow significantly in the next few years and therefore putting more demand on the networks to be responsive. To accelerate the deployment and increase mobile broadband penetration in Africa, African countries should make additional spectrum available in a timely manner, specifically, licensed spectrum in low-band, mid-band and high-band as well as license-exempt spectrum.

Forward-looking national broadband spectrum plans are valuable to all parties who currently make use of spectrum resources or plan to do so in the future. It is therefore recommended for African administrations to develop National Broadband Plans with clear policy statements on Spectrum Management and incorporate flexible approaches to Spectrum regulation to facilitate for better efficiency in spectrum use.

This is an opportune time for African Administrations to consider national broadband spectrum plans which incorporate clear licensing roadmaps, consideration of spectrum demand drivers, and encouragement of efficient spectrum use.

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1 ITU, Economic contribution of broadband, digitization and ICT regulation: Econometric modelling for Africa, https://www. itu.int/dms_pub/itu-d/opb/pref/D-PREF-EF.BDT_AFR-2019-PDF-E.pdf
2 GSMA Intelligence. Refers to market penetration, (i.e., Total unique subscribers at the end of the period, expressed as a percentage share of the total market population)

PART B: BRIEF DESCRIPTION

Mobile broadband is seen as the main medium to access broadband services in Africa, and therefore timely access to sufficient and affordable spectrum is critical. Most of the connection in African countries are still largely driven by wireless technologies which relies on spectrum. African Administrations will need to make enough spectrum available for mobile broadband through a spectrum allocation mechanism for access to affordable licensed spectrum, as well as timely access to additional license-exempt spectrum.

Key to some of the challenges are, outdated spectrum policies that allow little sharing of spectrum and do not promote modern techniques of spectrum management. Regulators can overcome the spectrum shortage by the adoption of appropriate spectrum policies that encourage new technologies which enables much more spectrum sharing

In order to overcome broadband challenges modern spectrum management techniques should be take into consideration, supported by clear policy objectives.

PART C: COLLATION OF PRACTICES

The following outlines some of the case studies which were undertaken by some of the African administrations:

Egypt

- In 2011, the Egyptian Government developed a framework to move the country into the information age, through promoting partnerships of public, private, civil society, and multilateral stakeholders. However, the reform wave has stimulated the Egyptian government to speed up the deployment of services and enhance the broadband infrastructure. The tremendous demand for more bandwidth coupled with consumers' appetite for video-content, news, and multi-media services have led the NTRA to introduce a new ICT strategy for broadband: the "eMisr National Broadband Plan".

- eMisr was a National Broadband Plan that proposed different strategic directives to meet Egypt's broadband service needs. To develop eMisr, NTRA has conducted studies, consultations, workshops and meetings with relevant stakeholders.

- The key strategic objectives of the eMisr Plan aimed to:

    - Recognize Egypt as a frontrunner in digital communications,

    - Increase job opportunities,

    - Stimulate economic growth nationwide and foster social cohesion,

    - Harmonize with other sectors in the Government to improve the quality of life for all citizens, and

    - Avoid an increased digital divide within Egypt.

- In order to estimate the spectrum requirements for broadband in Egypt, the following inputs are considered: geographical status of each city, population density, average spectral efficiency for different technologies, forecasted number of subscribers, and behavior of users (adopting low and high data rate scenarios per user). The current spectrum allocated for 3G mobile networks is also considered.

South Africa - South Africa Connect 2013

- The 2013 South Africa Broadband Policy, 'South Africa Connect', recognised that the efficient assignment and subsequent use of high demand spectrum to meet demand for broadband-dependent innovation and development is vital, and the cost of not making this spectrum available is high. This was especially in view of the increasing reliance on mobile or wireless communications.

- To this end, SA Connect sought for the Department of Communication and Digital Technologies to ensure that impediments to broadband rollout are removed, by issuing the necessary policy directives to the Regulator to expedite the assignment of broadband spectrum. It provided for immediate measures, including the identification of unused spectrum and its reassignment, approval of spectrum sharing between spectrum licensees, the re--allocation and assignment of broadband spectrum, and addressing bottlenecks that were delaying the Digital Migration.

Kenya - National Broadband Strategy 2018

- In 2018, Kenya launched the National Broadband Strategy. The Strategy specified a focus for Government's role in supply-side promotion of broadband, and the creation of an enabling environment to allow optimum market growth of broadband services by leveraging private sector investment in critical infrastructure. To achieve its objectives, the Strategy focuses on five key thematic areas, including 'Infrastructure, Connectivity and Devices', and 'Policy, Legal and Regulatory Environment'. Amongst other enabling Policy and Regulatory reforms, the strategy sought to provide adequate spectrum for mobile broadband services by making provisions for a comprehensive spectrum plan on available spectrum (including the digital dividend), award mechanisms and utilization reports of utilized spectrum.

Nigeria - National Broadband Plan 2020 – 2025

- In March 2020, the Nigerian Government launched a National Broadband Plan that articulated clear policy positions on aspects of Spectrum Management with the objective of encouraging optimal use of spectrum. Furthermore, the Plan assigned tasks to relevant agencies of government and industry stakeholders and set out clear timelines within which the activities should be completed. Amongst other stipulations, the Plan made provision for the development of a forward-looking Spectrum Roadmap, the enforcement of 'use it or lose it' obligations, the clearing of encumbrances in the Digital Dividend bands allocated to mobile, and the adoption of spectrum pricing frameworks to lower the cost of backhaul spectrum.

The following section outlines International case studies:

United States of America

The presented US National Broadband Plan case study was concluded from the "FCC National Broadband Plan, 2010" which sets out the following recommendations:

- Ensuring greater transparency concerning spectrum allocation and utilization

- The FCC should launch and continue to improve a spectrum dashboard, "this is an Internet-based software that enables user-friendly access to information regarding spectrum bands and licenses, including those that may be suitable for wireless broadband deployment".

- The FCC and the National Telecommunications and Information Administration (NTIA) should create methods for ongoing measurement of spectrum utilization.

- The FCC should maintain an ongoing strategic spectrum plan including a triennial assessment of spectrum allocations
- Expand incentives and mechanisms to reallocate or repurpose spectrum
- Congress should consider:
    i. Expressly expanding the FCC's authority to enable it to conduct incentive auctions in which incumbent licensees may relinquish rights in spectrum assignments to other parties or to the FCC.
    ii. Building upon the success of the Commercial Spectrum Enhancement Act (CSEA) to fund additional approaches to facilitate incumbent relocation.
    iii. Granting authority to the FCC to impose spectrum fees on license holders and to NTIA to impose spectrum fees on users of government spectrum.
- The FCC should evaluate the effectiveness of its secondary markets policies and rules to promote access to unused and underutilized spectrum.
- Make more spectrum available for broadband within the next 10 years i.e. 2010 to 2020.
- Increase the flexibility, capacity and cost-effectiveness of spectrum for point-to-point wireless backhaul services
- The FCC should revise its rules to allow for greater flexibility and cost-effectiveness in deploying wireless backhaul
- Expand opportunities for innovative spectrum access models
- The FCC, within the next 10 years, should free up a new, contiguous nationwide band for unlicensed use.
- The FCC should move expeditiously to conclude the TV white spaces proceeding.
- The FCC should spur further development and deployment of opportunistic uses across more radio spectrum.
- The FCC should initiate proceedings to enhance research and development that will advance the science of spectrum access.
- Take additional steps to make U.S. spectrum policy more comprehensive
- The FCC and NTIA should develop a joint roadmap to identify additional candidate federal and non-federal spectrum that can be made accessible for both mobile and fixed wireless broadband use, on an exclusive, shared, licensed and/or unlicensed basis.
- The FCC should promote within the International Telecommunication Union (ITU) innovative and flexible approaches to global spectrum allocation that take into consideration convergence of various radio communication services and that enable global development of broadband services.
- The FCC should take into account the unique spectrum needs of U.S. Tribal communities when implementing the recommendations in this chapter

India

- In India, the Department of Telecommunications (DoT) is the licensing authority that grants licenses to telecom operators for providing communications services. The Wireless Planning & Coordination Wing (WPC) of the DoT develops and manages the National Frequency Allocation Plan. This plan is harmonized as per ITU recommendations for Region 3.

- India's approach towards private telecommunications was announced in the National Telecom Policy 1994 in which only a duopoly between two private cellular operators was allowed. Subsequently, the DoT assigned two licenses via a beauty parade in each of the lucrative metropolitan circles1 for provision of cellular services using GSM technology in the 900 MHz band.

- In 1997, the Government created an independent regulator called the Telecom Regulatory Authority of India (TRAI). With respect to spectrum management, TRAI only has recommendatory powers. TRAI provides non-binding recommendations for the consideration of the DoT, which is the executive body responsible for management of spectrum.

- As part of the new policy of market practices, India also migrated to the Unified Licensing (UL) regime in which there was a single license for all services thus creating a service neutral regime. The UL delinked spectrum from licenses. Migration to the UL regime was not made mandatory by the DoT. While it is mandated that all spectrum auctioned in the future would be delinked from licenses, it was voluntary for existing licenses to migrate to the UL regime.

- Under the trading guidelines, trading was only permitted between telecom licensees for spectrum that was liberalized. Only outright sales were allowed. Leasing was not permitted. Block sizes for trading varied for different bands. A transaction fee of 1% of market valuation was required to be paid to the DoT for all trades.

Australia – AMCA Spectrum Management

Every year, ACMA updates a 5-year spectrum roadmap. The roadmap embodies key principles;

- allocate spectrum to the highest value use or uses
- enable and encourage spectrum to move to its highest value use or uses
- use the least cost and least restrictive approach to achieving policy objectives
- to the extent possible, promote both certainty and flexibility
- balance the cost of interference and the benefits of greater spectrum utilisation.

UK Ofcom - Spectrum Sharing Framework for Mobile Broadband Development

Enabling wireless innovation through local licensing

In July 2019, Ofcom introduced a new licensing approach through spectrum sharing which provides localised access to spectrum bands that can support mobile broadband technology. This allows more people and businesses to use spectrum from a choice of frequency bands all aimed at supporting growth and innovation across a range of sectors.

These are:

- the shared access licence, which gives access to four spectrum bands that support mobile broadband technology.

- the local access licence, which provides a way for other users to access spectrum which has already been licensed to the UK's mobile network operators (MNOs), in locations where an MNO is not using their spectrum.

PART D: PRACTICES AND ASSOCIATED IMPLICATIONS

Administrations should consider developing a National Broadband Plan/Policy/Strategy which embodies strategies that will accelerate broadband penetration.

Typically, a National Broadband Plan will look to clearly state demand-side and supply-side barriers to Broadband rollout and uptake. It should consider making clear policy statements or articulate a strategy aimed at addressing the identified barriers, facilitating broadband rollout and encouraging improved take-up of broadband services.

The recurring feature of regulatory/policy tools aimed at addressing these barriers i.e. factors that hamper the access to and availability of spectrum. African administrations are encouraged to ensure that National broadband plans are formulated with adequate and enabling provisions to make affordable access to spectrum possible.

As African policymakers, regulators, and current and future spectrum users contemplate the appropriate paths to expanding mobile broadband access, appropriate spectrum planning is a key consideration. The following aspects of mobile broadband spectrum planning should be considered and leveraged to maximize broadband opportunities across Africa:

Licensing Roadmaps

The publication of a multi-year licensing or spectrum release roadmap can be an illuminating tool that informs stakeholders of planned spectrum awards, as well as bands under consideration for future awards or changes, and even regulator priorities or workplans for the coming period. Further, publishing such roadmaps for stakeholder feedback enables the regulatory authorities to obtain stakeholder input that can, in turn, shape future planning and roadmaps.

By conducting annual reviews, regulatory authorities enable the incorporation of new information and priorities into national spectrum plans, and African administrations should issue a new and updated spectrum outlook each year containing information on the upcoming multi-year period.

Emerging and Future Spectrum Management

As regulators and policymakers consider spectrum management, two critical components are; the identification of spectrum demand drivers and key bands, as well as maximizing efficient use of limited spectrum resources.

Spectrum Demand Drivers and Key Bands

One notable   challenge related to enabling wireless broadband is ensuring that adequate spectrum is available in a timely manner, and it will be important to make spectrum available across various bands to enable the full realization of benefits of new and emerging technologies such as 5G and (WAS)/radio local access network (RLAN) technologies, including Wi-Fi 6E and 5G NR-U.

Efficient Spectrum Use

Tools that encourage efficient spectrum use include awarding large, contiguous blocks of spectrum, maximizing regional and global harmonization, considering evolution to newer technologies, and embracing technologies and licensing approaches that allow for increased spectrum sharing.

PART E: RECOMMENDATIONS

In order to accelerate the deployment and increase access to mobile broadband in Africa, ATU recommends Member States to:

1. **Develop** National broadband plans with spectrum plans that support the roll-out of mobile broadband. The spectrum plans should have clear objectives which supports the national broadband plan. The following may be considered;

   a. Develop and publish Spectrum Roadmap with an emphasis on articulating a plan to make spectrum available in view of new technologies and existing/future demand for mobile broadband services. Where applicable review the spectrum roadmap annually to keep it current.

   b. Support technology neutrality approach to spectrum licensing to ensure future re-farming of spectrum; and enough flexibility to accommodate new and emerging technologies within existing licensing frameworks

   c. Adopt outcomes of WRCs and regularly review, and update National Frequency Allocation Tables accordingly.

2. **Estimate** the future spectrum requirements for broadband considering geographic status cities, population density, average spectral efficiency for different planned technologies, forecasted number of subscribers, and behaviour of users.

3. **Develop** a 5 to 10 years spectrum outlook to support broadband deployment.

4. **Expand** opportunities for innovative spectrum access models.

a. Expand incentives and mechanisms to reallocate or repurpose spectrum.

5. **Ensure** greater transparency concerning spectrum allocation and utilization.

6. **Plan** for the availability of all mobile broadband spectrum and backhaul spectrum, including low, mid, and high bands in sufficient quantities to support broadband rollout on both the licenced and licence-exempt basis.

7. **Establish** a clear timeline for the release of additional mobile broadband spectrum in the short term, medium term and long term.

8. **Identification** of future technological trends, including those on spectrum sharing mechanisms, and emerging standards, as well as assessment of their impact on spectrum policy and planning.

9. **Establish** programs to monitor the implementation of broadband spectrum plans

10. **Incorporate** flexible approaches to Spectrum Regulation to facilitate for better efficiency in spectrum use by:

    a. Developing a spectrum sharing framework for mobile broadband

    b. Developing modalities for Spectrum Trading

    c. Allowing National Roaming to encourage network deployments, particularly in rural, unserved and underserved areas

    d. Introducing/imposing 'Use it or lose it' or 'Use it or Share it' obligations on spectrum licenses by setting specific time to operators to use the assigned spectrum to guard against unhealthy competition practices

    e. Incorporate principles associated with staggered/instalment payments for settling spectrum fees

11. **Ensure** that National broadband plans accommodate and enable emerging technologies and standards that can extend mobile broadband networks into unserved and underserved areas. With respect to emerging and future spectrum management, ATU recommends Member States to:

12. **Adopt** harmonized standards for reflecting information within spectrum licensing and usage databases (e.g., fields, data formatting), and to the extent appropriate and feasible, make such databases available in order to enable more efficient network planning, promote self-coordination, and facilitate coexistence of existing and emerging technologies.

13. **Harmonize** frequency allocations for wireless broadband regionally to reduce border interference and support common technical standards.

14. **Incorporate** techniques to maximize spectrum efficiency for broadband services, including band planning approaches and the incorporation of innovative authorization approaches and technologies.

15. **Consider** a study on propagation models covering a variety of possible environments in the bands identified for IMT-2020 in rural areas in bands above 3GHz, to accommodate future mobile broadband services while taking into account the characteristics of the cell radius and the antenna parameters.

PART F: ABOUT THIS RECOMMENDATION

Development: This recommendation was developed by an ATU Task Group on Spectrum Recommendations from July 2020 to February 2021. This group was led by the following:

Name (Country)	Role
Dr Mohamed EL-MOGHAZI (Egypt representing North)	Chair – Task Group
Wilson BOKATOLA (Congo representing ECCAS)	Rapporteur – Recommendation 001- 0
Alfred Joseph BOGERE (Uganda representing EACO)	Rapporteur - Recommendation 002- 0
Gabriel KOFFI (Cote d'Ivoire representing ECOWAS)	Rapporteur - Recommendation 003- 0
Dick SONO (South Africa representing SADC)	Rapporteur - Recommendation 004- 0

Validation: This recommendation was validated in a validation forum that was held from 4th to 5th March 2021. The forum was led by the following bureau:

Chair: Valéry Hilaire OTTOU (Cameroun representing ECCAS)

Vice-Chair: Ahmed BORAUD (Niger representing ECOWAS)

Rapporteurs: Stella BANYENZA (Tanzania representing EACO/SADC)

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Official Launch: This recommendation was officially launched on 22 April 2021 by the Minister of Posts and Telecommunications of Cameroun, **Mrs LIBOM LI LIKENG née MENDOMO AWOUMVELE Minette**

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