Regional workshop on guidelines on the smooth transition of existing mobile networks to IMT-2000

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Topic: Bridging the digital divide in Africa using 3G and IMT 2000

Abstract:

Africa is a continent of contrast with deserts in the North, dense tropical rain forests in the Central part, great lakes and rivers in the equatorial zone and high mountains in Lesotho and South Africa. The continent has on average sparsely populated communities with high concentration of people in the big towns and cities. The rural populations have very limited access to telecommunication networks if at all the network is available. In most countries the telephone network is still analogue and in some cases we still have magneto telephone systems in operation. The cost of ownership and usage of the fixed and mobile telephone is still beyond reach of the ordinary citizen in a rural are in Africa. In the big cities and towns the average person has a mobile phone and access to a fixed telephone line at home, in the office or at the public telephone booth. This disparity and digital divide between the city dweller and the rural communities calls for immediate intervention by the administrations, the regulators and the international community under the umbrella of ITU and ATU. In most towns and cities of Africa there are several fixed and mobile payphones that never work due to breakdown. The citizen has therefore no choice of communication apart from the very expensive GSM phone. Whereas we are talking of transition from 2G to 3G at the ITU, Africa has not even reached full implementation of 2G technology.

This paper will look at some hindrances and deficiencies of telecommunication networks and regulatory matters that are of significant importance to the development of telecommunication in Africa. It will also how 3G technologies can be used to bridge this digital divide.

Areas of discussion:

The paper shall therefore focus on the following key areas for discussion:

(A) Challenges in the access Networks in Africa

The majority of access networks in Africa are still based on copper. A very small fraction of access network uses fibre and wireless. Although the wireless technologies such as CDMA 450, CDMA 2000, and Broadband wireless technologies are readily available in the world market, the implementation of these systems in Africa has been very slow. The internet penetration is equally hindered by this lack of last mile connectivity to the users. Moreover, the access network is also prone to manmade challenges such as vandalism, destruction by bush fires, lightning strikes, strong storms and rains, and damage by cyclones along the coasts. As a result school children in Africa still do not have access to the internet and telephones. Distant education through the internet is a mere dream in most countries. Telemedicine and e-health is not available for physicians and patients in the rural areas of Africa where the average distance between the referral hospital and the district hospital is over 100 kilometres. Wireless technologies could therefore solve some of Africa's problems in the access network. Some measures have to be taken in order to implement some of these initiatives such as the IMT 2000 initiative of the ITU.

(B) **Status of candidate IMT 2000 frequencies in the 400, 600 and 800 MHz in Africa.**

Radio frequency spectrum is a very important that should be used by all citizens for communication in a regulated manner. However, in many African countries there are no proper databases for licensed radio frequency users. There are also several illegal operators that are using radio and satellite equipment especially in the countries where there have been civil unrest. As a result of this the whole radio spectrum in some countries are fully occupied by licensed and unlicensed operators. This has resulted in electromagnetic interference and jamming of weak radio signals by those operators that are transmitting excessively high power. There are also cases where some people in Africa use long rage cordless telephones especially the road contractors. The paper will highlight how the 400, 600 and 800n MHz is being used in Africa. It will also analyse technologies that could be easily used by operators in Africa to implement 3G systems in Africa for the benefit of the users.

(C) Deficiencies in frequency licensing models used in Africa

The issue of frequency licensing in Africa is an issue that must be addressed. Many potential investors and operators are unable to rollout networks in Africa due to prohibitive fees and bureaucratic red tape. This has resulted in slow growth of mobile telephone and Internet. The models and procedure used for licensing new operators does not favour the new

comers rather the incumbent operator has the upper hand. The paper shall show some new models of licensing and charging of radio operators.

(D) Competing 3G technologies

It is important to emphasise that there are available technologies that can be used by operators in Africa and other developing countries to provide access to the citizens in the towns and rural areas at an affordable cost. Some of the competing field proven carrier class 3G technologies are:

1. CDMA
   - CDMA 450 FWA with limited mobility
   - CDMA 2000 1x
   - CDMA 2000 1x EV-DO
   - CDMA 2000 1x EV-DV
2. **3G/UMTS**
3. **GSM /GPRS**
4. HSDPA/ HSUPA
5. IP as transport protocol in RAN for end- to end IP network
6. OFDMA and WLAN; WiFi, WiMax, UWB
7. IP Multimedia Sub System IMS

VERSION	**CDMA 2001X**	**CDMA 2000 1XEV-DO**
PEAK DATA RATE	144 TO 153 KBPS	3.01 MBPS
AVERAGE THROUGHPUT	60 TO 100 KBPS	300 TO 600 KBPS
ADVANCED SERVICES	Web browsing Video and audio downloads TV broadcasting Multimedia messaging Push to talk Location based services Entertainment Enterprise solutions m-commerce	Web browsing Video and audio downloads TV broadcasting Multimedia messaging Push to talk Location based services Entertainment Enterprise solutions m-commerce
Device availability	712 models	138 models
Manufacturers	61	
Operators	119	
Due to deploy	22	
Subscribers worldwide	160,000,000	
Average growth rate	5 million subscribers per month	
Operators in Africa	Algerie Telecom, Cell communications Nigeria, Intercellular Nigeria Multi Links Nigeria, Reliance telecom Nigeria, Starcomms Nigerai, Movicel Angola, Telkom Kenya, MTN Uganda	

Source: CDMA Development Group

2. 3 G UMTS

Customers (2004)	**16 million**
Networks	**60**
Technology	**WCDMA**
Countries	**25**
Licences awarded	**More than 125**

3. GSM/GPRS

Subscribers worldwide	**1,200,000**
Networks	**Over 600 in 200 countries**
Technology	**TDMA**
Migration path to 3g	**UMTS**

(E)Transition paths for African countries

Facts about Africa:2005

Technology	**TDMA/GSM**	**CDMA IS 95**
Percentage of Mobile	**95%**	**5%**
Percentage of fixed	**90%**	**10%**
Next step	**?**	**?**
2nd step	**?**	**?**
3rd step	**?**	**?**

Exercise for participants:

Fill this table for your country:

Country name :

Network type	**TDMA**	**GSM/GPRS**	**CDMA IS 95**	**CDMA 2000 1X RTT**
Fixed line Subscribers				
Fixed WLL with limited mobility				
Mobile cellular				
Total	**T1**	**T2**	**T3**	**T4**
Percentage of Grand Total GT=(T1 + T2 + T3 + T4)				

Network Solutions:

1. **Migration Path 3G/UMTS:**
   T1 + T2 greater than T3 + T4

2. **Migration Path to CDMA 1X EV-DO/1X EV-DV:**
   T3 + T4 greater than T1 + T2

3. **Migrate to EDGE and WCDMA:**
   T1 greater than T2 greater than T3 and T4

What is the solution for your country?

(F) Non conducive regulatory Policies.

Most of the regulatory authorities in Africa are government departments. This means they are not autonomous at all. As a result, the politicians and the government have the final word on matters appertaining to frequency spectrum, licensing and usage of the radio networks in the country. Some governments are insensitive to the needs of the citizens as far as universal service obligations are concerned. Some regulators are also not transparent to all the stake holders in the communication industry. Some regulators favour certain technologies and certain standards. The regulatory framework in some countries does not promote investment in the communication sector; rather they hinder investment and growth of the sector by introducing laws and policies that discourage potential local and international investors. Worse still some countries in Africa do not even have national ICT policy documents. The regulators also charge very high license fees and annual frequency fees that some operators can hardly afford. The paper will highlight how this phenomenon can be changed for the good of the operators and the users in Africa.

(G) Conclusion and way forward for IMT 2000 in Africa.

Finally the paper shall make some recommendations and the way forward for a seamless transition from 2 G to 3G and IMT 2000 initiative of the ITU/BDT.