

**3G MOBILE POLICY:  
THE CASE OF GHANA**

This case has been prepared by Chris Addy-Nayo, Consultant, WorldSpace, <[caddynayo@hotmail.com](mailto:caddynayo@hotmail.com)>. Thanks to Deepak Gupta of ArtofCommunications for his contribution on the Market trends for 3G Telephony. *3G Mobile Policy: The Case of Ghana* is part of a series of Telecommunication Case Studies produced under the New Initiatives Programme of the Office of the Secretary General of the International Telecommunication Union (ITU). The 3G case studies programme is managed by Lara Srivastava <[lara.srivastava@itu.int](mailto:lara.srivastava@itu.int)> and under the direction of Ben Petrazzini <[ben.petrazzini@itu.int](mailto:ben.petrazzini@itu.int)>. Other country case studies on 3G, including Sweden, China, Hong Kong SAR, Chile, Venezuela and Japan, can be found at <<http://www.itu.int/3g>>. The opinions expressed in this study are those of the author and do not necessarily reflect the views of the International Telecommunication Union, its membership or the Ghanaian Government.

## TABLE OF CONTENTS

1	Introduction .....	5
2	Summary of the general status of mobile licensing in Africa.....	5
3	Telecommunications in Ghana .....	7
3.1	Historical overview .....	7
3.2	Fixed phone network.....	7
3.3	Cellular (mobile) phone network .....	9
3.4	Reforms and the state of the telecommunication industry .....	9
3.5	Internet connectivity.....	10
3.6	Telecommunications and economic development.....	11
4	Market trends for third-generation telephony.....	11
4.1	GSM market indicators .....	12
4.2	Market for mobile multimedia services.....	13
4.3	SMS usage in Ghana .....	13
4.4	Internet usage in Ghana.....	13
5	Licensing regimes in Ghana .....	14
5.1	Overview of the license regime in Ghana .....	15
5.2	Licensing of networks .....	15
5.3	Spectrum licensing in Ghana.....	16
6	Other regulatory issues for 3G.....	16
6.1	Current roaming agreements .....	16
6.2	Price regulation .....	18
7	Future prospects for 3G in Ghana.....	20
7.1	The infrastructure of the Information Highway .....	20
7.2	Internet and mobile telecom as the prototype of the Information Highway.....	20
7.3	Applications .....	21
7.4	Content development.....	21
8	Conclusion.....	21
	ANNEX 1: Ghana socio-political profile .....	24
	ANNEX 2: Links to relevant websites.....	26

## FIGURES

Figure 2.1: Five-year statistics of fixed-line growth.....	8
Figure 3.1: Internet subscribers by categories .....	14

## TABLES

Table 2.1: National information and communication infrastructure 1995-1999 .....	7
Table 2.2: Five-year financial growth statistics of Ghana Telecom .....	9
Table 3.1: Biggest GSM markets in Africa (in thousands).....	12

Table 5.1: Scancom network of global roaming partners ..... 17

**BOX**

Box 4.1: Commercial arrangement between Ghana Telecom and mobile operators..... 19

# **1 Introduction**

Third Generation is the generic term used for the next generation of mobile communications systems. 3G systems will provide enhanced services to those - such as voice, text and data - predominantly available today. The technology concepts for 3rd Generation systems and services are currently under development industry-wide. 3G is based on today's GSM<sup>1</sup> standard, but evolved, extended and enhanced to include an additional radio air interface, better suited for high speed and multimedia data services. GSM is an established global standard for mobile communications. As a technology, GSM continues to evolve, with high-bandwidth services becoming a reality for the current 2nd Generation technologies. The GSM network will evolve, with wireless, satellite and cordless systems offering greatly expanded services, including high speed, multi-media data services, in-built support for parallel usage of such services and seamless connection with the Internet and wireline networks. This will see the true convergence between various communications means and networks becoming a reality. With 3G, communications have moved from the traditional voice kiosk to a data hypermarket thus making the Internet accessible through mobile devices. The result will be a mobile Internet that allows point-of-sale transactions and location-based services in a way that differs completely from today's Internet. 3G will bring a host of mobile services, which will bring more information and more efficiency.

One of the great things about GSM is that the sheer volume of what's being manufactured and sold has enabled costs for operators to come down to a level where they can run profitably. This has brought telephony - specifically GSM second-generation technology to areas that otherwise have no services, especially in Africa which means there are millions of people who have made their first calls - in fact, their only calls - on wireless and in most cases GSM wireless. 3G will develop as islands of coverage, which will begin in the developed world and gradually spread to more rural areas within developing countries. The technology will provide the types of data communications and multimedia applications that otherwise will not be available with fixed-landlines. This system will enable users of current 2nd Generation GSM wireless networks to migrate easily to the new 3rd Generation services, with minimal disruption.

The development path into the 3rd Generation is clearly mapped out and brings with it possibilities for new age data and multi-media applications in critical need by developing countries. Better, fast and instant telecommunications is behind the worldwide globalisation process. Even though certain progress has been made in the Ghanaian telecom sector in the past, the lack of foresight and good policies have deprived the economy of the maximum benefits it could have derived from the introduction of new telecommunications technologies especially mobile telephony. The sector needs to be analysed, with new policies, programmes and projects designed to position it to take advantage of the opportunities provided by new technologies such as 3G.

## **2 Summary of the general status of mobile licensing in Africa**

Licensing is a relatively new development in many telecommunications markets in Africa. Historically, state-owned incumbent operators provided telecommunication services on a monopoly basis in most markets. Telecommunications operators were treated as part of public administration along with postal services and licenses were not considered as necessary. In many cases licenses for incumbent telecommunications operators were prepared as part of the privatisation process.

With fixed-line infrastructure across much of Africa in disrepair, telecommunication services need to come in the form of GSM networks. The market's potential for GSM is clear from the significant progress over the past 12 months. At the end of 1999 there were almost 6 million subscribers in the region. By year-end 2000 the figure had risen to just over 10 million. In addition, the number of GSM networks continues to increase - 56 live networks at the end of 2000, with a further 33 planned for 2001. This means that more than 90 per cent of African networks now deploy GSM technology<sup>2</sup>. It is expected that whereas subscriber growth in developed countries will peak and start declining by 2004, growth in developing economies and in Africa will triple during that period.

---

<sup>1</sup> Global System for Mobile Communications. European-developed digital mobile standards.

<sup>2</sup> Andrew Mthembu, Chairman of GSM Africa

However, it should be noted that more than 6 million of subscribers are in South Africa. The important point about this market is that only five operators have more than 100 000 subscribers. This has resulted in a shortage of investment and a rollout strategy that tends to be inconsistent with growth targets.

This is clearly far from ideal foundation for business growth, since the first priority for any operator in the early days of a network is to sell its services on the basis of its coverage. However, even when adopting such strategies African operators invariably confront another problem – the lack of a consistent regulatory environment and most often the presence of dominant State monopolies. New entrants find out that the costs of operating in an uncompetitive environment adds considerable costs to their investments. State monopolies are usually given their licenses free of costs whereas new entrants have to pay exorbitant license fees. This reduces the level of competition in the market and gives the few dominant and most often monopoly operators the opportunity to levy high prices on consumers which reflects on expensive rates in most African countries.

Some African Governments had made the effort to partially or fully privatise its Telecom monopolies not only to raise badly needed finance but also to introduce a level of competition in the telecom market. In most African countries licenses may be issued by a regulator with the approval of the sector Ministry. In markets where the regulatory environment is less developed, the issue of licenses is the responsibility of the Ministry Sector, which is normally an extension of its traditional telecommunication role. This is the case in countries like Senegal and Ghana. In environments where the regulatory sector is well developed the Ministry has to approve and issue licenses recommended by the regulator<sup>3</sup>. Such practices can be found in regulatory environments like South Africa.

Licensing mechanisms operated by most countries in Africa is determined by economic factors linked to budgetary needs. Morocco is estimated to have raised close to USD 1billion. Kenya is looking to raise almost USD 500 million from its bidding process. Nigeria raised an estimated USD 300 million. The constraint faced with this process by operators is that due to the unregulated and untransparent environments, within which these bids take place, the final outcome may be subject to political interference, which damages the reputation of the exercise<sup>4</sup>.

Overall the mobile licensing regime in Africa is going through a transitional phase.<sup>5</sup> For African countries to successfully harness the potentials in the growth of mobile telecommunications, the regulatory and licensing environment will need to be further enhanced to guarantee new entrants the further chance of surviving in sometimes the rather difficult African macro-finance environment. This will ensure that the required investments necessary to fully develop the sector can be attracted. In this respect most African Governments determination to further liberalise the telecommunication sector is a step in the right direction.

GSM in Africa will only realise its considerable potential if supported by foreign investment, strategic support from vendors and the availability of a regulatory environment, which protects new entrants from unfair competition. This can be achieved by lobbying Governments to work together to create the foundations of a cohesive regulatory environment across the region and to encourage more competitors into the African market.

ITU and other international organisations like UNDP supported by donor Governments have been helping individual Governments in Africa to establish a conducive regulatory environment which is suitable to the further growth and development of mobile telecommunications and other value-added services on the African continent.

---

<sup>3</sup> Presentation by Mindel De La Torre,/ITU Workshop on Telecommunications Reform, Gaborone, Botswana, May 1999)

<sup>4</sup> In South Africa the regulator was accused of political interference when it issued a third GSM licence to a Saudi -backed consortium Cell-C [www.cellular.co.za/news\\_2000](http://www.cellular.co.za/news_2000)

<sup>5</sup> [www.cellular.co.za/news\\_2001](http://www.cellular.co.za/news_2001)

## 3 Telecommunications in Ghana

### 3.1 Historical overview

Ghana deregulated its telecommunications sector in 1994 when the Government announced a five-year comprehensive restructuring of the industry known as the "Accelerated Development Program 1994-2000 (ADP 2000)." The main policy objectives of the program were formulated with the assistance of the World Bank, consultants and other stakeholders, and aim to:

- Achieve a density between 1.5 and 2.5 lines per 100 people;
- Improve public access in rural and urban areas, through the provision of payphone facilities (public and private);
- Expand the coverage of mobile services;
- Promote Ghanaian ownership and control of telecommunications companies; and
- Retain an overall public regulatory control of the sector through the creation of a single agency: the National Communications Authority (NCA).

The ADP adopted the following strategies to achieve the above-stated policy objectives:

- the authorisation of two national network operators: Ghana Telecom and a new independent operator;
- support of new financing: arrangements which promote investment in new telecommunications infrastructure throughout the country; and
- privatisation of Ghana Telecom through the sale of a strategic stake to an international operating company combined with measures to broaden share ownership in Ghana.

### 3.2 Fixed phone network

As part of the ADP reform program Ghana Telecom was incorporated on June 15, 1995 as a successor to the telecommunications division of Ghana Posts and Telecommunications Corporation (GPTC). The GPTC was established as a public corporation in 1974, and until October 1995, had been responsible for operating the nation's telecommunications and licensing of telecom services. In December 1996, Ghana Telecom privatised its main line operations by awarding a Malaysian-led Consortium (Telecom Malaysia) a 30 per cent stake in the state company with full management control for USD 38 million. The Government plans to sell a further 21 per cent to the public but has not yet made clear how and when. Ghana's cities are connected by microwave radio relay, and the international lines are linked at one Intelsat earth station near the Atlantic Ocean.

A consortium of African Communications Group, led by Western Wireless Company (based in Cambridge, Mass., USA) and Ghana National Petroleum Company, won the bid as the second network operator with an offer of USD 10.1 million. The consortium, which trades under the name (WESTEL), planned to invest between USD 40 million and USD 70 million over a period of five years from its incorporation. The licensing of a second national operator was expected to meet the current backlog of 300 000 telephones lines being demanded by consumers and to ensure efficiency and improved services. WESTEL was required to have 100 payphones in service by the end of 1998, and the company also planned to have 50 000 customers within three years of its incorporation. It is using a Nortel DMS 300 as its international gateway switch connected to a Class B Earth station.

---

**Table 2.1: National information and communication infrastructure 1995-1999**

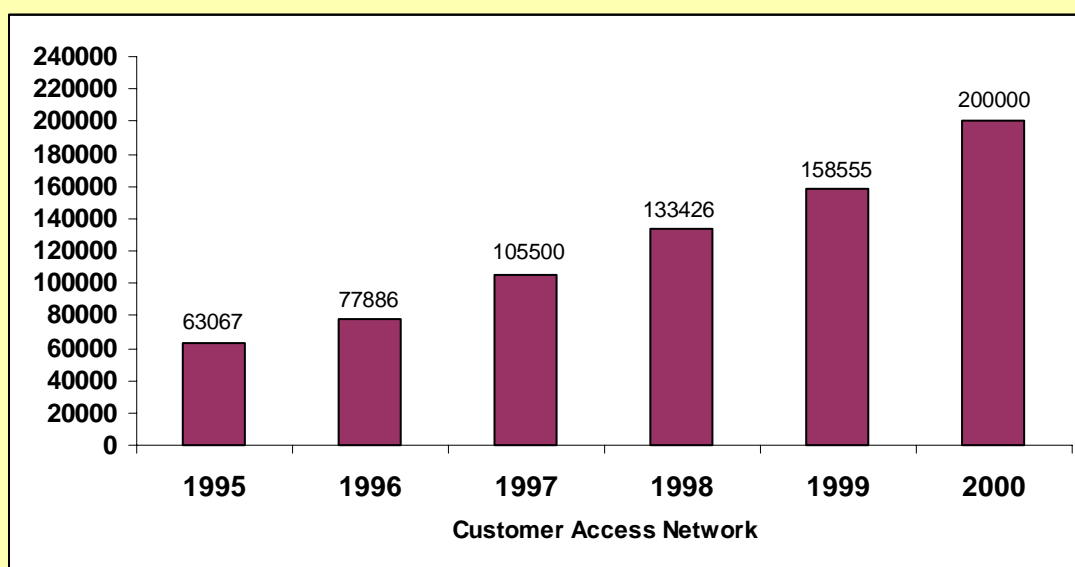
	1995	1996	1997	1998	1999
Telephone lines (in thousands)	63	78	130	144	159
Teledensity	0.36	0.44	0.70	0.76	0.81
Digital main lines (%)	90	91		70	
Waiting list for lines (in thousands)	28			28	
Public telephones	27	453		8,100	

Public telephones per 1 000 inhab.	0.001	0.02		0.43	
Mobile subscribers (in thousands)	6	12		21	70
Mobile subscribers per 100 inhab.	0.04	0.07		0.28	0.36
Mobile subscribers as a % of telephone subscribers	10	16		15	31
Telecommunications revenue (M US\$)	65	100		145.9	
Telecommunications investment (M US\$)		7		7.3	
Investment as a % of revenue		7		5	
Facsimiles				5 000	
Computer(s) per 100 inhab.		0.12		0.16	0.25
Radios per 100 inhab.	23.1		68.10		
TVs per 100 inhab.	4.04	4.49	10.35	11.00	
Home satellite dishes/antennas				15 000	
Internet host sites	6	203	253	241	112
Internet service providers (ISPs)				3	3
Internet subscribers				6 000	13 000
Internet subscribers per 10 000 inhab.				3.13	6.88
Internet users					20 000
Internet users per 10 00 inhabitants					10.16
Internet bandwidth (Kbit/s)				640	640

Source: ITU (International Telecommunication Union), NW (Network Wizards) Internet Host Surveys.

Similar to the situation in most African countries, the distribution of telephones in Ghana is highly skewed towards the urban areas, with Accra, the capital city, accounting for over 50 per cent of all telephone lines. Rural telephony is almost non-existent, even though 70 per cent of Ghanaians live in rural areas. The Accelerated Development Programme was expected to address the above problems by narrowing the gap between the rural and urban areas, and by increasing the number of telephone lines to 500 000 by the turn of the century. This target appears ambitious when one considers that a phone line costs at least USD 200 to install in a country with a per capita of USD 350. After the privatizations of Ghana Telecom, phone lines increased from over 63 000 in 1995 to 200 000 by December 2000 (See Figure 2.1). This means almost a 200 per cent increase in less than 6 years.

**Figure 2.1: Five-year statistics of fixed-line growth**



Source: Ghana Telecom



### 3.3 Cellular (mobile) phone network

Millicom Ghana, a subsidiary of Millicom International, UK/Luxembourg, started its operations in 1991 and was the first cellular network operator. Millicom Ghana uses the ETAC System, and it had over 22 000 subscribers in 1998 with a market share of above 70 per cent of the mobile market. The company has started the installation of a countrywide network by commissioning a new satellite in Kumasi and organizing smaller projects in Tamale and the other regional capitals.

CellTell, owned by Kludjeson International, started its operations in Ghana in 1993 using the AMPS technology, with coverage in Accra and Tema. Onetouch is the cellular arm of Ghana Telecom. It started its operations in 2000 providing nation-wide cellular services. It plans to attract 98 000 subscribers across the country using GSM technology. It also plans to introduce CDMA systems into the network and to change its remaining analogue exchanges to digital. The second national operator, trading under the name WESTEL is undergoing necessary preparations in order to operate a nation-wide GSM cellular service. Scancom started operating in October 1996 using GSM 900 technology, with 15 sites and equipment from Ericsson. The network provides new services and coverage in Greater Accra, Kumasi and Obuasi, with ongoing developments in other regional capitals

### 3.4 Reforms and the state of the telecommunication industry

The National Communication Authority was established by Parliamentary Act 1996 as a central regulatory body to regulate the telecommunications sector and to promote a stable operating environment for all participants, while also promoting fair competition and efficiency. The main task of the NCA includes the licensing and regulation of telecommunications system operators and assigning or allocating systems frequencies. In the same year the Government decided to privatize the incumbent operator Ghana Telecom.

The Ministry of Communications was created in 1997 to facilitate the strategic development and application of the use of the various communications resources - human, material and technological - for effective communications throughout the country. The Ministry (acting on behalf of the Government of Ghana) has since then embarked on a process aimed at formulating a workable national communications policy for Ghana. Ghana may have paved the way in telecoms liberalization, but still faces many challenges getting its telecom infrastructures and facilities up to international standards or to a level where telecommunications can play a major role in national development. The decision to privatize Ghana Telecom in 1996 was groundbreaking, all the more so because Westel was granted a licence at the same time. But in late 1999, at least one of the country's three mobilephone operators, CellTell appeared to be in trouble, Westel was still struggling to make significant headway, and Ghana Telecom was suffering from underinvestment. Local manufacturers complain that telecommunications are a serious infrastructural obstacle to manufacturing. Certainly, there is a widespread sense of disappointment at developments in a sector, which seemed to offer such promise. Ghana Telecom's profit before tax declined from 26.13 per cent in 1995 to a low of negative 1.94 per cent in 1999 whilst total borrowings grew from 53 per cent in 1995 to 79 per cent in 1999 (See table 2.2 for financial growth statistics).

**Table 2.2: Five-year financial growth statistics of Ghana Telecom**

	1995	1996	1997	1998	1999
<b>Operating Revenue</b>	26.13%	92.25%	66.99%	16.70%	10.28%
<b>Profit before Tax</b>	26.13%	108.88%	1143.18%	73.53%	-1.94%
<b>Total Shareholders Funds</b>	--	-0.23%	339.69%	31.56%	24.27%
<b>Total Assets</b>	42.89%	26.11%	31.24%	25.28%	45.38%
<b>Total Borrowings</b>	52.85%	(19.98%)	-79.76%	21.47%	78.98%

Source: Ghana Telecom Annual Report 1999

In its favour, the sector has seen a significant expansion in lines over the past three years. Although teledensity is still less than 1 line per 100 people, mobile-to-mobile telephony is working relatively well and, in Accra at least, landline calls work. But on the downside, people complain that there has been almost no improvement in service and a notable lack of investment in Ghana Telecom, raising questions about whether the Government should not sell a greater stake. Critics doubt whether Telecom Malaysia was the optimal investor.

At the same time, WESTEL, the second operator backed by Western Wireless, has been struggling to compete, held up for around two years following disagreements over its interconnection agreement with Ghana Telecom. The company seems to have underestimated the level of difficulty in setting up a new operation, and complains that it has not been allowed to do what was set out in the terms of its licence. The mobilephone sector is also facing problems interconnecting with Ghana Telecom. This is in part a function of insufficient hardware, but has not been helped by a certain lack of co-operation from Ghana, according to the mobilephone companies. Capital Telecom, which was licensed to develop telecom infrastructure in rural areas, is currently being investigated. The main problem appears to be that, as in so many African countries, telecommunications is such a political issue<sup>6</sup>. Making matters worse, no board has been appointed to the country's telecommunication regulator, the NCA, and the body's rules and regulations have not yet been passed.

Operators consequently complain that, when disputes break out, there is no independent body to take a disinterested stance. The lack of regulation is extremely damaging. The central issue for the industry is the proper establishment of the NCA. Much was accomplished in the early days, but efforts were not sustained in the long term<sup>7</sup>. Despite these problems, progress is being made to get the sector programme on track. A regulatory board should be in place before the end of 2001, and a team of consultants will arrive to assist in the design of its rules.

### **3.5 Internet connectivity**

There are three full Internet Service Providers (ISPs) in Ghana, each with their own independent internal Internet links. The first and the major ISP in the country is Network Computer Systems (NCS) which operates at 384 Kbit/s through F1 Intelsat earth station. NCS was founded in 1988 and is also involved in consulting services, network installation, maintenance and training services. The company was the first to establish a global Internet gateway with full connectivity in Ghana, and it is the top-level domain administrator for the Ghanaian domain name (.gh). NCS has also set up new points of presence (POPs) in the Ashanti (Kumasi) and Western (Takoradi) Regions. A few years ago NCS started an Electronic Data Interchange (EDI) network service. This service has been implemented through collaboration with General Electric Information Services and the International Finance Corporation (IFC). EDI enables inter-business electronic exchange of business documents in a standard format. Such business documents include invoices, purchase orders, bills of lading, etc.

Aside from NCS, there are two other commercial full Internet providers in Accra, each using 128 Kbit/s connections to the US via Ghana Telecom's infrastructure. These are InternetGhana and Africa Online. InternetGhana is a Ghanaian Company providing Internet Services. Incorporated in June 1996, InternetGhana operates a full digital link to the Internet, connecting to the world renowned InternetMCI's Super High Bandwidth Internet Backbone in New York. InternetGhana operates at 128 Kbps, and besides Accra, it has set a point of presence in Kumasi. Africa Online Ghana is a subsidiary of Africa Online, which is the premier provider of Internet communications services throughout Africa, bringing Internet users a level of technical expertise and breadth of service unequalled by any other on the continent. Africa Online has evolved its charter to provide cutting edge Internet services to thousands of successful individuals and

---

<sup>6</sup> In Ghana some of the most powerful and influential figures are closely involved in certain telecommunication companies. Even in the face of the most liberal economic policies government had been reluctant to give up control over the sector because the incumbent telecommunication operator Ghana Telecom is often seen as a cash cow for government to fall upon in times of fiscal difficulties.

<sup>7</sup> The former communication Minister under the previous government of the NDC, Mr. John Mahama was instrumental in pushing through the Westel interconnection agreement with Ghana Telecom. He acknowledged the need for a regulatory body, and concedes that spectrum allocation has been a bit haphazard.

businesses. Africa Online is headquartered in Nairobi, Kenya, with operations in Kenya, Côte d'Ivoire, Ghana, Tanzania, Uganda and Zimbabwe.

Africaonline reached an agreement with the Ghana Post Office to provide free e-mail addresses upon request for use at post offices where the public can send e-mail for about 0.25 US cents per message. In the first two months of the operation, over 30 000 e-mail addresses were issued. There are a large number of small businesses known as 'communication centres' which provides public access telephone services in Ghana. An increasing number of them now provide dial-up and Internet access services. There are 119 Internet host sites in the country. Internet subscribers number around 13 000, which is the equivalent of about 688 per 10 000 inhabitants.

### **3.6 Telecommunications and economic development**

The revolution in communications and computing technology is producing a massive surge in the development of electronic information, education, entertainment and financial services. While these services continue to sweep through developed economies, inadequate telecommunication infrastructures have isolated most African countries from these developments. The situation is most severe in Africa, where the penetration of telephones is the lowest in the world and its sub-Saharan economic growth is at an all-time low. As the developed world begins to move from industrial to information-based economies where the talk is about 3G and wireless technologies, African countries like Ghana face severe constraints in the development of even the fixed-line infrastructure. However, Ghana and other African countries have the opportunity to leapfrog the development of fixed-network into new technologies such as 3G with its massive potential for communication and data transmission.

The development path into the 3rd Generation is clearly mapped out and brings with it possibilities for new age data and multi-media applications useful for developing economies. This system will enable users of current 2nd Generation GSM wireless networks to migrate easily to the new 3rd Generation services, with minimal disruption. Mobile connectivity in Ghana and other African countries requires more than simply developing mobile networks. In the case of Ghana it also requires overcoming specific barriers such as state monopolies, poor local economies and increase in consumer demand to justify the needed investment to upgrade new telecommunications network. It also requires new capital for financing the development of new infrastructure. Advantages for African countries to develop this network include technology and capital transfers to local economies, further integration into the world economy, employment creation and further knowledge development. The failure of African countries to adopt new technologies will lead to a further marginalization of Africa from the world economy with the danger that the current digital divide between Africa and the rest of the world will be further widened. The greatest irony is that African countries have much need of this new technology to provide their citizens with access to information that might improve the quality of their lives.

However, the deployment of third-generation mobile infrastructure will not be without its problems in countries like Ghana. Nevertheless it will make its impact in the same way that mobile telephony has penetrated into different spheres of the African society.

## **4 Market trends for third-generation telephony**

Two market trends are identified as having the most significant impact on the size and nature of demand for mobile multimedia services. (1) The market for fixed networked multimedia (Internet) services is growing and (2) Computer-based communications are being widely accepted and embraced in Ghana and other African countries<sup>8</sup>. The market for business orientated multimedia services is growing rapidly as many businesses and Government institutions develop and implement applications to improve productivity. Lower cost and increasing performance of PCs and availability of low-cost networking technologies, such as the Internet/intranets is facilitating both trends.

---

<sup>8</sup> African Internet Connectivity, July 1999, Mike Jensen, 2000

## 4.1 GSM market indicators

One of the key influences for the take-up of 3G in Ghana and other developing countries is the level of demand necessary to justify the needed investments. Total subscribers of cellular phones in Africa stand at 14 800 000. Of this total 14 250 000 are linked up to a GSM network. GSM networks in Africa achieved a growth of 135 per cent in 2000. The market forecast for GSM growth in Africa is expected to reach a record 33 927 000 by the end of 2003.<sup>9</sup> Higher take-up will be as a result of lower tariffs, lower retail prices of terminals, greater awareness and demand generated by high levels of advertising and marketing. One of the biggest problems to be faced by operators planning to introduce 3G in Ghana is the low level of economic activity and the smallness of the domestic economy which may not justify the financial investment in this new technology. Despite being the 8<sup>th</sup> biggest cellular market in Africa (See Table 3.1 below), Ghana may have some way to go before introducing 3G onto the local mobile market. There are currently 132 000 mobile subscribers in Ghana, up from a figure of 70 000 in 1999. Given a per capita income of USD 390, only few individuals and corporate entities may be able to subscribe to 3G to enable the operators to recoup their investments. Mobile subscribers as a percentage of telephone subscribers are only 31 per cent. Telecom revenues in 2000 total USD 200 million<sup>10</sup>.

**Table 3.1: Biggest GSM markets in Africa (in thousands)**

COUNTRY	Jun-97	Dec-97	Jun-98	Dec-98	Mar-99	Jun-99	Jun-00	Sep-00
Ghana					22	27	111	132
Botswana						15	98	140
Reunion						75	180	197
Zimbabwe						63	250	256
Cote d'Ivoire	21	38	63	90	135	163	240	342
Egypt	58	83	108	197	326	444	940	1,401
Morocco	56	74	95	116	122	150	884	1,530
South Africa	1,111	1,466	2,050	2,553	3,211	3,800	6,100	6,700

Source: EMC Cellular Statistics March 2001

•

The take-up of 3G by subscribers will depend on how much revenue operators can generate from subscribers. It is expected that 3G revenues per subscriber for residential users will stay around USD 50 per month<sup>11</sup>. But as more devices are produced and economies of scale set in, subscriptions will fall to allow more people access to the technology. In business segments, revenues per user will be higher as a result of using value-added services such as mobile multimedia but overall may be lower as these services are accessed frequently or from work. The high cost of subscriptions will not deter those who can justify the added productivity or flexibility that the service offers to their businesses. A typical business subscriber to high-multimedia services package will spend between USD 178- 267 per month. Multinational companies and non-governmental organisations and their employees who need the flexibility that comes with 3G may initially take up subscriptions. Falling costs will encourage more businesses, especially small and medium scale enterprises to apply for subscriptions on the networks.

<sup>9</sup> EMC Cellular Statistics March 2001

<sup>10</sup> ITU (International Telecommunication Union), NW (Network Wizards) Internet Host Surveys and partially adapted from Mike Jensen's Overview of Africa Internet Status [[www3.sn.apc.org/africa/afstat.htm](http://www3.sn.apc.org/africa/afstat.htm)].

<sup>11</sup> Universal Mobile Telecommunications 3G Report, Deepak Gupta, 2000

## 4.2 Market for mobile multimedia services

Content revenues will constitute a significant proportion of total revenues collected for the multimedia service, in addition to revenues retained by the network operator or service provider for the delivery of that service. However, in Ghana and other African countries, content revenues will form a much smaller proportion of the total revenues for the services delivered to business users and other residential users. This is because the market for content development is still in its infant stages in Ghana. Just like the Internet most African countries are more likely to depend on content developers in Europe and America for the time being until capacities and skills are developed to fill in the skill shortage. Such a development has further implications for location-specific content development, which will be one of the critical success factors for the take-up of mobile multimedia services. The success of the World Bank's Country Gateway information<sup>12</sup> and UNCTAD's Trade Point<sup>13</sup> project may help address this content constraint to some extent. Private companies may also help sponsor content providers in Ghana to develop websites and company information on their behalf. In other cases the World Bank may be interested in supporting initiatives on electronic governance specifically targeted at public institutions<sup>14</sup>.

## 4.3 SMS usage in Ghana

The use of the Internet and SMS (Short Messaging Services) in Ghana has become a very popular means of communication in recent years. Mobitel offers free e-mail services on its network. Spacefon, on the other hand, introduced the use of SMS into the mobile industry. SMS messages sent in Ghana are said to have grown from 22 000 to over 130 000 last year<sup>15</sup>. Smart Messaging is a product of Nokia, which makes it easy for the mobilephone user to translate difficult information, like e-mail addresses. They can be downloaded to the menu and appear in a shortened form - for example, the e-mail sender rather than the full e-mail address. It is user-friendlier, with the possibility of sending e-mails more easily. The GSM Short Messaging Service can accommodate up to 160 characters per message and makes it easier for the mobilephone user to translate difficult information, like e-mail addresses. SMS initially took time to catch on. There is a trend from the verbal to the visual variety which provides the basis for 3G. The rise of SMS in Ghana has been fuelled by many factors. It includes the growth of pre-paid services, the development of WAP (Wireless Application Protocol), SMS roaming, interconnection between operators and the different services available to users.

A number of SMS information based services include weather, news and travelling information. SMS is particularly popular with pre-paid customers. In Ghana operators have seen pre-paid customers make as many SMS calls compared to contract based customers. Spacefon offers two types of SMS services. They are SMS-MO (Short Messaging Service- Mobile Originating) and SMS-MT (Short Messaging Service- Mobile Terminating). SMS-MO enables the customer to send short messages to other GSM users. It can be used anywhere in the world where Spacefon has a roaming agreement with a network that supports SMS. SMS is charged per message sent. SMS- MT on the other hand enables you to receive short text messages up to 160 characters in length. This is provided free to all subscribers.

## 4.4 Internet usage in Ghana

In 1993 Ghana had full Internet connectivity. This achievement was brought about by co-operation among several organisations, including Network Computer Systems (NCS), Pipex International, the Ministry of Transport and Communication of Ghana, Ghana Telecom, and British Telecom. The initial method of connection was by dial-up IP to Pipex performed periodically, using a DEC station 5000 model 25 with Morningstar PPP software. With the explosion in the worldwide Internet, it became imperative for the network in Ghana to be expanded. One of the primary constraints facing the expansion of the network was the lack of adequate or sufficient DELs, so it was impossible for NCS to get dial-in lines for subscribers. However, since the beginning of October 1994, there has been an expansion of the national telephone

---

<sup>12</sup> [www.worldbank.org/gateway](http://www.worldbank.org/gateway)

<sup>13</sup> [www.untpdc.org](http://www.untpdc.org)

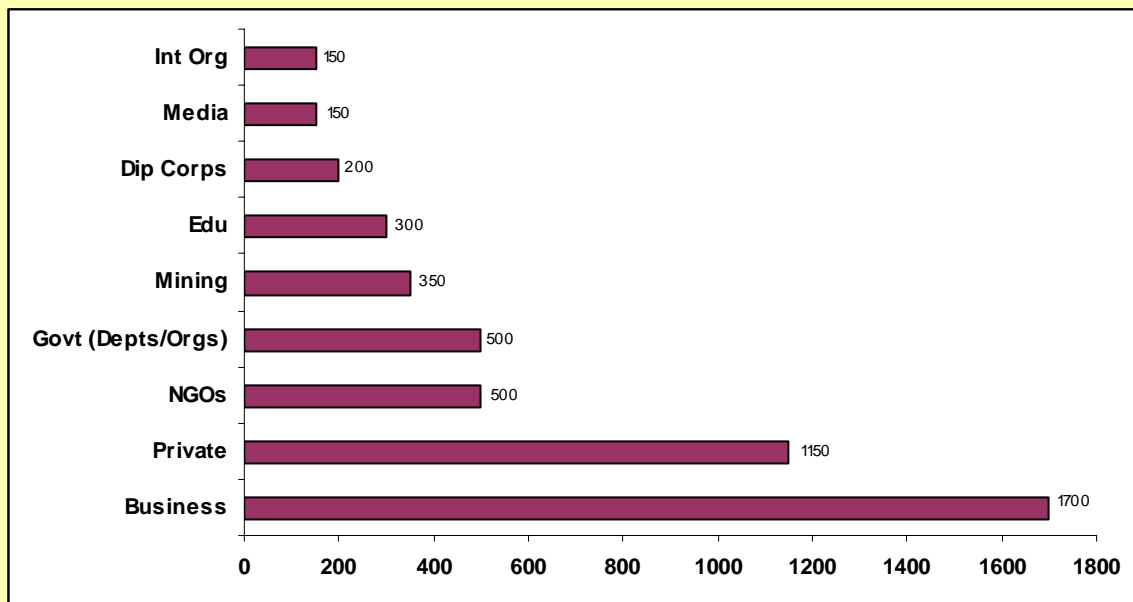
<sup>14</sup> An example of such partnership is the WorldBank's Country Development Gateway. The World Bank sponsors content providers to develop country specific portals for hosting on the Bank's Gateway website [www.worldbank.org/gateway](http://www.worldbank.org/gateway)

<sup>15</sup> African Cellular Statistics 2000.

network by Ghana Telecom. This expansion resulted in the addition of 15 000 lines to the Accra exchanges. This made available additional dial-in lines to subscribers. NCS applied for the top-level domain GH, and its approval in January 1995 thus put further pressure for improvement and expansion of the network.

A steady user community is building up, with a lot of customers being connected every day. Primary mode of connection for dial-up subscribers is PPP and UUCP. One of the new exchanges in Accra has ISDN capability; this will be a future mode of connection for those who want high-speed connections to their premises. Figure 3.1 summarises the distribution of the subscribers. The cross-section includes university professors, Government officials, individuals, universities, international agencies, embassies, corporations, and NGOs. It is an encouragement to see that businesses are the main users of Internet in Ghana. There are over 200 Internet cafes in Ghana. The number is said to be growing daily. Most cafes are concentrated in the capital, Accra. Internet service providers do not need a license to start operations. However they are restricted by the Government from offering any service involving Voice over IP. This does not apply to private individuals with Internet access in their homes. Regulation of Internet services is minimal.

**Figure 3.1: Internet subscribers by categories**



Source: Network Computer Systems Ltd (Ghana)

•

## 5 Licensing regimes in Ghana

Licenses are significant in the context of developing economies because they provide certainty for investors and lenders and with it the confidence that is required to invest in millions of US dollars for the upgrading of telecommunications networks. The Ghana Government had a number of objectives for licensing telecom operators. These include privatisation of the state-owned incumbent, regulation of the market sector, generating government revenue, consumer protection and regulating the management of the radio spectrum.

Historically the state-owned telecommunications operator, Ghana Telecom, provided telecom services in addition to the licensing of telecommunications services as part of public administration. With the liberalisation of telecommunications in Ghana, licenses for operators were prepared as part of the privatization process handled directly by the Ministry of Communication and the National Communication Authority (NCA). Prior to the setting up of the National Communication Authority, frequency allocation and

spectrum management was managed by the Ghana Frequency Registration and Control Board<sup>16</sup>. Because of the structure of the regulatory and administrative Boards, the telecom sector is subject to political factors and conflicting interests which have served to contribute to the difficulties experienced.

## **5.1 Overview of the license regime in Ghana**

As a member of the WTO and signatory to the WTO Agreement on Basic Telecommunications (ABT) of the World Trade Organisation, Ghana had to abide by its commitments under WTO rules which included the liberalisation of its telecommunications market. Previously licenses did not hold much importance to the Government; instead the Ministry of Communication imposed regulatory terms and conditions through decisions, orders and tariff-approval processes. The Government had four main objectives in mind when it embarked on the liberalisation of the telecommunications sector. First it did so as a result of its obligations under the WTO agreements and as part of the World Bank IMF conditions for making loan advances for restructuring the sector. Secondly, the Government used licenses to encourage the expansion of the network through foreign investment. Thirdly, the Government used the licensing process to generate public revenue and, last but not the least, to encourage the provision of certain basic telecommunications, in the public interest<sup>17</sup>. Since 1996, the Government has auctioned and issued licenses for both mobile and fixed-line operators. The Government expected that auctioning licenses for both mobile and fixed line operators would have led to a rapid roll-out of the network and achieve its universal access objectives. Despite some success, the overall outcome of the privatisation and liberalisation process was disappointing. Reasons for the poor results could be found in the way licenses were issued and the prevailing regulatory environment at the time.

## **5.2 Licensing of networks**

Telecom and other service operators in Ghana may or may not need a license, depending on the services offered. Fixed-line and mobile operators require a license to operate, whereas value-added service providers like data processing, transmission and Internet service providers, do not need one. Fixed-line and mobile operators are issued with operator specific licenses, also known as individual licenses. They are usually a customised and detailed license document frequently granted through some form of competitive selection process. These types of licenses are used when a scarce resource such as spectrum is to be licensed and when the regulator or government has a significant interest in ensuring that the service is provided in a particular way. Operator specific licenses were issued to Ghana Telecom, WESTEL and other mobile operators outlining their rights and obligations.

A major issue with the liberalisation process of the telecommunications sector is the sale of 30 per cent of Ghana Telecom to Malaysia Telecom. This involved the detailed identification of existing and new rights of the incumbent, Ghana Telecom. The rights and obligations were adapted to the new sector policy and regulatory regimes. In addition to its existing license, Ghana Telecom was automatically granted a license for the operation of other value-added services such as data communications, ISP and mobile telephony. The main concern according to some analysts was that there wasn't any consultation process amongst stakeholders before the sector was privatised. This would have enabled other operators and the general public to have given their input to the whole process. The licensing of Ghana Telecom involved a process of negotiation between Malaysia Telekom and the Government. Malaysia Telekom wanted to maintain as much exclusivity and market power as possible. This is understandable due to the fact that there was an interest from Telekom Malaysia to be given exclusive management control to determine the direction of their investments. The dominant market power was an opportunity to make quick returns on its investments.

The second fixed-line operator WESTEL was also granted a license to operate fixed-line long-distance and domestic calls. The main difficulty it faced over the years was obstacles placed in its path by Ghana Telecom

---

<sup>16</sup> The Ghana Frequency Registration and Control Board had traditionally been responsible for the allocation of frequencies for broadcasting and other communication purposes. However, due to the strategic importance telecommunication was supposed to play in economic development, spectrum management for telecommunications was made the responsibility of the National Communication Authority in a Parliamentary Act in 1996.

<sup>17</sup> For example licenses for rural telecom services were used in pursuit of the government's universal service obligations.

to frustrate WESTEL's access to its network. The main reason behind this was that Ghana Telecom and its minority shareholder Malaysia Telecom needed exclusivity in the long-distance voice-telephony market to maintain its profitability. This exclusivity period is set to end in 2002.

### **5.3 Spectrum licensing in Ghana**

As part of the individual licensing process the Government auctioned off spectrum licenses. Spacefon and Mobitel were among the winners. Cellular operators were required to use the required spectrum allocated to them as well as operating the cellular networks. Overall, there was public support for the liberalisation of the sector in 1996. One of the reasons for supporting the Government's new directions in the telecommunications sector was the need to arrest the decline of telecom infrastructure and services in the country. Most people welcomed the introduction of mobile telephony because of the mobility, lifestyle and convenience which mobile telephony provided. However, without the necessary consultation process and public awareness by the Government, some concerns were raised. Amongst these was the need for more transparency of the whole process of license allocations, the suitability of the contestants, consumer protection against excessive pricing and billing by operators.

The licensing process for spectrum and second-generation telephony was less transparent than some people would have liked it to be. The public was not consulted prior to the auctions and the terms and conditions were not publicly made known. It was a common belief that the award of the licenses was made to organisations in sympathy with the Government rather than the fair-competitive process. The suitability of the contestants and the winners also came in for strong criticism. The sale of 30 per cent share holding of Ghana Telecom to Malaysia Telecom and its subsequent winning of spectrum licenses came in for criticism. Some analysts were of the opinion that Malaysia Telecom had failed to meet its licensing obligations in other jurisdictions and that the award of the license was not in the best interest of the country. Mobile operators were also concerned that Ghana Telecom had too much control over the management and use of frequencies.

A lot of the criticism of mobile operators is directed at poor services offered and expensive charges. It is often difficult to get through to fixed-line networks and vice-versa. Customers experience congestion on the network during peak-periods. Excessive charges continue to be a concern for consumers who think that the services provided are not worth the price. The dominant mobile operator Spacefon offers customers a choice of having a contract based agreement with a monthly billing or having a pre-paid service. The pre-paid service seems to be very popular with customers. The main complaint lies with the short-duration of the service (usually 60 days) before been asked to renew the contract. Many customers complain that for the amount of money paid, the duration of the pre-paid contract is too short a time to justify the charges.

With hindsight, some of the above problems could have been dealt with. The lack of an efficient and effective regulatory environment and body compounded by the lack of a transparent award process seem to be at the bane of these problems. The convergence of the Internet and mobile telephony is a much more complex process. The success of 3G in Ghana requires more consultation with the public and better regulation and management of the sector. In order for this to be successful, the regulatory body needs to be well funded and made independent from the Government. This will ensure that policies and programmes are not politically motivated and will have the necessary support from all parties. The regulatory body should also be staffed with skilled personnel in addition to the use of competent consultants to ensure that it carries out its duties in the interest of all parties. Consumer protection should also be a priority of any Government policy. This will ensure that operators act responsibly towards their customers.

## **6 Other regulatory issues for 3G**

### **6.1 Current roaming agreements**

Superb voice quality and data transmission are important features of GSM and 3G technology - but pointless if the mobilephone or communication terminal stops working as soon as it leaves the home country. GSM has created a global communication network by establishing roaming agreements all around the world. With GSM - when you have one phone, one number, you are connected to the whole world. You can roam to another region or country and use the services of any network operator in that region that has a roaming agreement with your GSM network operator. This is critical to the success of third-generation networks anywhere because of the need to access Internet information from any mobile network. To be integrated into



the worldwide network, operators need roaming agreements with other network operators in other jurisdictions. Amongst the mobile telecommunications network operators in Ghana, Scancom Ltd. have active roaming agreements with a global network of partners. Table 5.1 shows the current network of Scancom Ltd. global partners.

The platform for technical and billing information is uniform throughout regions where the GSM standard is used, due to the common switching and transmission systems. The challenges and differences in the case of Ghana is the lack of a consistent and concise regulatory framework for interconnection amongst operators, the commercial terms for interconnection and the administrative and operational arrangements between operators. The general policy of the Government and the regulator has always favoured the negotiations of interconnection agreements being left to the operators themselves. The Government and regulator recognised that they might not have the expertise to negotiate the complex financial, technical and operational details of interconnection and pricing arrangements. For this reason, the Government promoted industry negotiation as the main approach for developing interconnection and any pricing arrangements.

**Table 5.1: Scancom network of global roaming partners**

<b>Country</b>	<b>Network Operator</b>
<b>Austria</b>	Max.mobil. Telekommunikation Service
<b>Cote D'Ivoire</b>	S.I.M
<b>Denmark</b>	Sonofon
<b>Egypt</b>	Misrfone Telecommunications Co.
<b>France</b>	Bouygues Telecom - GSM 1800 France Telecom Mobile
<b>Germany</b>	D2 Mannesmann Mobilfunk GmbH
<b>Greece</b>	STET HELLAS
<b>Hong Kong</b>	Hutchison Telecom (HK) Ltd
<b>Ireland</b>	Eircell Ltd
<b>Italy</b>	Telecom Italia Mobile
<b>Lebanon</b>	FTML Service Cellulaire
<b>Luxembourg</b>	P+T Luxembourg
<b>Netherlands</b>	Libertel Netwerk B.V
<b>Norway</b>	Telenor Mobil AS
<b>Portugal</b>	Telecel Comunicacoes ; Telecomunicacoes Moveis Nacionais S.A
<b>Russia</b>	KB Impuls
<b>Slovak Republic</b>	EuroTel Bratislava a.s
<b>South Africa</b>	MTN (Pty) Ltd; Vodacom (Pty) Ltd
<b>Sweden</b>	Comviq
<b>Switzerland</b>	Orange Communications S.A; Swisscom
<b>Togo</b>	Togo Cellulaire
<b>Turkey</b>	TELSIM Mobil Telekomunikasyon Hiz.A.S
<b>United Kingdom</b>	BTCellnet; One 2 One Personal Communications; Orange PCS Ltd; Vodafone AirTouch Plc

Source: GSM Association 1999

As a result of this approach there has been an inadequate, inconsistent, regulatory framework for interconnection and pricing of services among operators. One of the main reasons for the failure of WESTEL

to achieve its growth and profits target was its underestimation of trying to gain access to the incumbent's telephone network. The incumbent sometimes uses its position and monopoly to deny new entrants standard terms for interconnection purposes. It also uses its leverage to deny competitors access to interconnection services and facilities. WESTEL, on a number of occasions, had difficulties interconnecting with the incumbent's network because it was seen as a close competitor in the lucrative long-distance market. As a result of the absence of regulatory guidance in the industry, pricing of telecom services amongst operators had often being adhoc without any consistency. Where it is done, it is often anti-competitive to disadvantage competitors providing similar services

## **6.2 Price regulation**

Government supervises the regulation of the prices of telecommunication services provided by the incumbent. On the other hand prices of services provided by the new mobile operators are free from regulations. The reason for this is because the Government, in most cases, still sees Ghana Telecom as a public asset, which can be used in achieving its social and economic objectives. The regulation of prices is usually characterised by below cost prices for connection, subscription and local calls. The shortfall is usually made up by higher-than-cost international call prices.

Interconnection tariffs which include mobile to fixed, fixed to mobile and mobile to mobile are not made public, however the NCA requires that these tariffs are deposited with it. Operators in Ghana use revenue sharing as the main basis for determining rates for calls from fixed-line networks to mobile networks, mobile networks to fixed-line networks and from mobile to mobile networks. The growth in mobile customers and traffic over recent years is reflected in traffic patterns. In the early 1990s most mobile calls were made to fixed telephone lines, but the proportions have been changing. One operator estimated that - in very round numbers - now 40 per cent of traffic carried on their network was from mobile-to-fixed. Another operator estimated that perhaps 60 per cent of traffic was between mobile and fixed, and 40 per cent between mobile and mobile. However, it should be stressed that no central statistics relating to operators currently exist. As traffic built up, and with new licenses being issued, the need for more detailed technical and commercial arrangements became obvious. The first step in this direction was an agreement between Ghana Telecom and other mobile operators. (See Box 5.1)

Dispute resolution was another focus of negotiation. Most disputes arise over interconnection, pricing and billing issues. As much as possible, operators agreed to resolve disputes amicably amongst themselves but, when this was impossible, the regulator was to intervene, either through the setting up of an arbitration process or by taking the initiative to resolve the dispute on its own in cases where there was a public interest. There is an agreement to revenue-share on long-distance calls where mobile operators either originated or terminated the call and Ghana Telecom provided the long distance trunk transmission network. The revenue split was in three parts, the near-end or originating segment, the middle or trunk segment and the far-end or terminating segment.

#### **Box 4.1: Commercial arrangement between Ghana Telecom and mobile operators**

##### ***Scope***

Interconnecting GT's network to the network facilities of the other party

Supplying requested telecommunications services to the other party

Making available to the other party the services, facilities and information as required by law or as specified in the licenses

##### ***Includes***

Point of Interconnection (the cost of establishment bundled into the interconnection fee)

Delivery of calls depending upon whether they involve near-end or far-end handover.

Interconnection capacity in terms of circuits made available.

##### **Commercial Issues**

Revenue sharing

Near-end and Far-end handover of calls

##### **Billing and Settlement**

Billing period is on a monthly calendar basis

Dispute notification period expires 30 days after date of invoice

Invoice date is the date on which the invoice is dispatched

Billing disputes procedure (these could arise from glitches in software, and mostly involved customer disputes over international calls and call charges).

##### **Other**

Interconnection terms and conditions, which are commercially agreed bilaterally, should be on a non-discriminatory basis. Interconnection agreements with mobile operators would remain confidential, but available to the regulator. (This allows the regulator to ensure the terms and conditions are non-discriminatory).

*Source:* Ghana Telecom

So why and how did this agreement come about and how effective was it? It came about through commercial negotiation between the mobile operators and GT because the mobile operators do not have a national backbone for routing traffic. Revenue sharing is a quick and convenient method to adopt as a means of compensating Ghana Telecom for the use of its facilities, including the cost of provisioning its tandem exchanges with points of interconnection. Cost-based prices are good for simulating the effects of a competitive market, but this was not the case in Ghana. GT has no effective competition in the fixed line market, and although WESTEL was developing a trunk network capability, there was no alternative carrier for the mobile operators.

Even if a cost-based pricing approach had been preferred, simply knowing what the costs were would have been a problem. Incumbent operators do not spend accounting resources on costing every element within their networks unless there is good reason to do so. It is a costly exercise in terms of labour-time and bureaucracy. GT's own accounting requirements only went as far as needing to know total costs and ways of fully allocating them across the different service elements. Under these circumstances, a cost-based approach to interconnection could be problematic insofar as the interconnecting party would be suspicious that the cost allocation method was unjust or arbitrary. This would result in a demand for regulatory intervention. In 1999, the NCA did not have the resources at its disposal to carry out such an interventionist exercise, so it had to rely upon outside consultants. In 2000, it established an arbitration committee to mediate a deadlock. In itself that is not a problem because it is a widespread practice for most regulators, but it is both time-consuming and expensive. Thereafter it also requires the regulator to formulate a process for bringing the parties together and agreeing the cost allocation principles, and, if necessary, the regulator has to be in a position to

make a determination, assuming that the legal authority of the regulator gives the power to do so. It also needs to be remembered that the mobile operator's network was still in the process of build-out, and the market for cellular services was nowhere near maturity. What the mobile operators needed was a timely interconnection arrangement for which revenue sharing was best suited.

## **7 Future prospects for 3G in Ghana**

The debates on the future of next generation telecommunications in Ghana could be focused on three main areas. These are the nature of the new applications, the nature of the development of next generation infrastructures and the organization of information systems and content development.

### **7.1 The infrastructure of the Information Highway**

To a large extent the development of the next generation of information highways is based on expectations of demand for video, entertainment and communication services with their very high bandwidth requirements. However, consensus on the basis of the new highway has shifted substantially since the beginning of the decade. At that time it was generally accepted that cable television operators would install digital transmitters and optical fibre networks to increase their capacity to deliver more channels. The cable operators were expected to use the channels primarily to broadcast a wider range of commercial entertainment programming to those who wanted it<sup>18</sup>. The United States, with its highly saturated cable market, has seen extensions of this development, assisted by government restrictions placed on telephone companies which do not allow them to provide value added services. However, in Ghana, and other less developing economies where cable operators are less well developed and endowed, PTOs should be encouraged to develop networks for the introduction of third-generation services. Already Ghana seems to be amongst the pacesetters on the continent in the development of network capable of carrying 3G services. In 1995, AT&T Submarine Systems announced that they were teaming with Alcatel to construct "Africa One" a fibre-optic cable around the continent. Ghana Telecom<sup>19</sup> has invested over USD 20 million to establish a landing point in Accra and to buy access rights on the network for the delivery of broadband services. Using satellites and local access networks, it hopes to sell excess capacity on its network to landlocked countries like Burkina Faso, Niger and Mali. Ghana's Volta River Authority (VRA), which is the main supplier of electricity in the country, has established a subsidiary company, VoltaCom with the objective of using its electrical infrastructure network as the backbone for the development and supply of fiber-optic cable network across the country<sup>20</sup>. Other companies planning to introduce broadband networks suitable for carrying 3G services include ANS broadband services based in Accra.

While the availability of bandwidth is still limited for most users at the moment, these new networks will enable users in Ghana to connect to others and exchange anything from simple text to full motion video worldwide. Although much of the traffic carried by this new entertainment driven networks may be of dubious value, the markets generated by these services will hopefully assist in driving prices further downward. This will make it more possible for those in less commercial sectors and developing countries to communicate on an equal footing with their counterparts in developed countries.

### **7.2 Internet and mobile telecom as the prototype of the Information Highway**

While the precise nature of national and international information and telecommunications infrastructures have yet to be established, the exponential growth of the Internet and mobile telecommunications indicates that it is the model from which they will evolve. PTOs in Africa are currently supplying Internet backbones as one of their standard services at the same time developing new services in mobile telecommunications. Almost all countries in Africa now have some form of connection to the Internet and mobile networks. Internet traffic and mobile telephony is growing so quickly that it is currently exceeding fixed-line network. If it were to continue at present rates it is expected that it will exceed the world's telephone traffic by 2003.

---

<sup>18</sup> Telematics for Development: Discussion Paper, by Michael Jensen, AFRICAN REGIONAL SYMPOSIUM ON TELEMATICS FOR DEVELOPMENT, UNECA Headquarters Addis Ababa 3-7 April 1995

<sup>19</sup> [www.ghanatel.net/manrev98.htm](http://www.ghanatel.net/manrev98.htm)

<sup>20</sup> [www.vra.com/npower/subsidiaries/voltacom.htm](http://www.vra.com/npower/subsidiaries/voltacom.htm)

### **7.3 Applications**

Many of the applications based on third-generation technology may require more powerful software to run and more investment in network development. But the increased costs of equipment should be considered in the light of any cost savings from reduced training requirements of a worldwide standardized GSM network and the more limited potential of less sophisticated solutions. Also, the continuing decrease in price/performance of hardware shows little signs of easing up and further growth in demand should see prices for higher-end systems falling further and made available to developing economies.

### **7.4 Content development**

Currently there are thousands of commercial and non-commercial content developers hosting multiple databases and delivering network connections for users together with a range of information services. As dedicated connectivity becomes more easily available and prices continue to fall, the role of independent mobile network operators will tend to weaken. They are expected to be taken over by media service providers with the ability to deliver an integrated service, which includes both Internet network delivery, and content provision anywhere on a mobile network. The growth of the mobile telephony companies in Europe like Orange and Vodafone has already forced traditional telecommunications companies like British Telecom and Deutsche Telekom to restructure their business and pricing strategies to meet up with the demands of future 3G users. While there has been substantial growth in the demands of some of the major closed network commercial online services such as Africaonline, which initially started as content providers, the demands of their users have encouraged them to diversify into other Internet businesses. They have so far successfully integrated the provision of online access with a comprehensive range of well-organized information services. In addition, the growth in these commercial services has been outstripped by an even greater growth in LANs (Large Area Networks) and cheap local dial-up public access hosts which simply provides a conduit to remote information services resident on the other four million plus hosts on the Internet. Nevertheless, new alliances between PTOs, mobile network providers and content developers are likely to produce a growing number of competing commercial services which integrate both Internet and mobile network access with information and entertainment facilities.

## **8 Conclusion**

The rapid development of new telecommunication technology and the isolated position of most African countries means that many key decision makers are not yet aware of the value of the new technologies and the contribution it can make to development goals. Users familiar with the technology who can demonstrate its benefits have a vital role to play in sensitizing major policy makers in Government, international funders and potential service providers. The role of telecommunications in overall national development needs be raised to the highest political level.

On a regulatory level, the lack of awareness of the move toward the development of shared broadband multimedia networks based on the Internet and mobile telephony poses serious barriers to their implementation in Africa. Many PTOs and governments have inhibitory policies on the sharing and resale of bandwidth, which are necessary to establish these networks. These problems are exacerbated by inadequate dialogue between public sector users and the PTOs. The users have become frustrated with the limitations and high cost of existing services, and the PTOs have serious constraints in satisfying user demands. Addressing these divergences will be very important in ensuring the smooth evolution toward the development of third-generation technologies in Africa. This should involve the identification of appropriate institutions to carry out further sensitization and support for greater co-operation among operators, service providers and users.

The low economic and development status of Ghana and most other African nations will also continue to be a major problem for telecommunications users and a hindrance to the introduction of new technologies. Adverse terms of trade, ever increasing debt burdens and continuous outflows of capital have reduced local economies in many countries to very low levels. While the demand for telecom services remains largely unsatisfied across the continent, the predominantly rural population has such low-income levels that adequate returns on new investment are unlikely in many areas. Even where telecommunication projects are economically viable, external finance agencies often tie funds to economic factors and policy requirements outside the control of the potential recipient of funds. Multilateral funding agencies lend to governments

directly and must review the entire debt situation of the country regardless of the viability of the particular project.

Because of the small size of individual telecoms markets caused by the low levels of economic development, regional co-operation is a very important avenue, which can be used to improve the situation. Perhaps more than any other continent, Africa could benefit from regional co-operation. If groups of countries can combine their purchases for equipment and services, costs can be cut substantially. Furthermore, scarce expertise and high cost of international links can be shared and appropriate technical standards developed. The successful deployment of third-generation telephony in any environment requires a good level of planning and communications among policy-makers, Internet and mobile network operators and users of the new system. However in most African countries multiple foreign consultants with similar expertise are sent to the same country, different types of equipment are provided for the same tasks and parallel communication links are established. This results in initiatives which waste valuable human and financial resources through duplication of efforts and telecommunication services. The increasing standardization of technology such as GSM, the move toward open systems, and the growing number of electronic and other forums for dialogue is helping to reduce these problems. Funders, governments, operators and other players involved need to actively co-operate to rationalize competing and overlapping initiatives to achieve common telecommunications objectives for all stakeholders. The necessity of ensuring the long-term sustainability of a high-investment initiative such as the deployment of a 3G communications network in an African environment is self-evident, however the methods for doing this are not as obvious. Many projects set up systems which have substantial running costs from the start (such as the rental/license on frequency spectrum and investment in new terminals and networks), but an active user base takes time to establish and any hitches along the way can turn into large cost overruns. A carefully planned and phased approach is therefore necessary so that any problems can be worked out before high operating costs are incurred and sufficient numbers of users are available to share the ongoing costs. Careful planning in the allocation of sufficient resources is also essential. Once a project gets off the ground and is operating reliably, the user base can grow very quickly due to the popularity of the services provided. If this growth is not anticipated, problems can occur with the availability of user support staff, clogged bandwidth and substantial user frustration.

Another problem that needs to be addressed is the high cost of services, which is the largest single barrier to the effective use of new telecommunication technologies in Africa. One way of reducing costs is to increase the number of users on the new network by sharing the cost of expensive international links among greater numbers of users so that the benefits from volume discounts and reduced connection overheads are accrued. Another way is to use the most appropriate protocols for high cost or low quality links. The efficiency of the communications protocol affects the volume of data that can be passed through the link. Some protocols are intrinsically far more efficient at using bandwidth and coping with connection interruptions or satellite delays. Their use can substantially reduce the costs of traffic and improve the capacity to service a greater number of connections. Recovering the costs of transmission from the sender will also assist in reducing costs to users of third-generation services in Africa. The lack of any traffic costs for data transmission on networks such as the Internet has caused substantial problems for many African users who have had to foot telephone bills for overzealous and frivolous communications from users elsewhere (usually in North America) who are unaware of the high costs. Filters can be used to give users at the end of a high-cost link control over which messages they wish to receive over the link and can allow the implementation of billing systems to charge the sender for the cost of delivery.

Ensuring the reliability of services is vital to the long-term sustainability of any new telecommunications project. Users will not be inclined to pay for services that are erratic and unreliable. Strategies for improving reliability range from maintaining the availability of technical and user support, to reducing hardware operating temperatures, maintaining duplicate equipment, keeping off-site backups of data and guaranteeing stable electricity supplies for equipment.

As multimedia services involving the transmission of images, video and sound become more widespread, operators will be faced with growing demands for high bandwidth services involving third-generation systems. Currently, in most African countries, 9.6 Kbit/s is the maximum available for any national or international data line. This is barely enough for a half-dozen simultaneous interactive sessions and can hardly be expected to serve a large population of users. Existing digitization programmes and the deployment of broadband networks will assist in improving available bandwidth but appropriate long term planning will still be needed if the anticipated demands are to be met. If operators are unable to finance

bandwidth improvements themselves, it may be necessary for the State or donor organisations to provide additional funds to assist in establishing these services.

Governments in Africa should adopt good licensing practices to encourage new investments in telecom infrastructures and competition within the sector. Often in Africa it is not surprising to find government interests as the main determinant factor in the telecom market at the expense of competition, innovation and consumer interest. There are however common features, which will help ensure the success of a licensing process. Some of these features are transparency, public consultation, reasonable license fees, and balance of flexibility and certainty on license conditions and effective selection criteria.

Transparency requires that a licensing process is conducted openly and that licensing decisions be based on criteria published in advance. Key features of such a process includes advance publication of a call for applications, rules, qualifications and criteria; separation of qualification and selection process, return of unopened financial offers to applicants who do not meet the published qualification criteria; and public opening of sealed financial offers. Despite the time consuming nature of a transparent process, it instils a level of confidence in investors with the regulator gaining a lot of credibility from all stakeholders.

It is also good practice for a regulator to invite public comment on the approach to be taken in a proposed licensing process. Consultation reinforces the perception of a licensing process and allows the regulator to directly receive the views of operators, and prospective entrants on the new initiative. This allows license terms and conditions to be fine-tuned. The consultation process increases the likelihood that the regulator's approach to licensing will be based on the understanding of all relevant issues and also helps to assure those who disagree with the regulator on certain issues that their opinions have been taken into account.

License fees paid for spectrum use may also include administrative costs to offset the regulator's expenses in administering spectrum resources and the daily administration of the industry. Fees should not impose unnecessary costs on the industry. It should be based on a cost recovery scheme, which allocates the costs among market operators, usually based on percentage revenue of an operator's share of the market. Telecommunication licenses should balance regulatory certainty with the flexibility necessary to address future changes in the market. This is necessary to balance future changes in technology, market structure and government policy. Usually this is done by using regulatory instruments other than licenses but in developing economies like Ghana where the regulatory environment is less developed; it is often necessary to include a comprehensive codification of the basic regulatory regime in a license. This is necessary to provide the certainty required to attracting new entrants and investments. License conditions should be flexible enough to allow integration into the regulatory framework and to also consider future changes in regulatory reforms.

The main priority of most African Governments should be to develop the telecommunications network infrastructure. Trying to maximize license fees for the purpose of budgetary or fiscal objectives will discourage new entrants and the investment needed. First, telecom infrastructure is in such a poor state that operators may need to find extra capital for network development in addition to financing license fees. Secondly, the regulatory environment is sufficiently developed to ensure anti-competitive practices by dominant and incumbent operators. The risk factor in recouping such investment in most African economies may not normally justify the cost in investments. Putting other impediments in the way of investors will only lead to discourage their participation. The most appropriate approach for African Governments is to use a comparative evaluation process in any future licensing process. This will help match the specific sectoral objectives with the capabilities of the prospective operators in its aim to develop a rapid telecommunication network. This will help in achieving the country's universal service obligations and help increase the overall competitiveness of the African economies. Moderate spectrum fees will also ensure that consumers are not unduly penalized through excessive rates. Given the nature of the regulatory environment in most African countries, a comparative evaluation process should be preceded by a rigorous pre-qualification requirement which is thoroughly transparent to prevent the process being hijacked by special interest groups.



## ANNEX 1: Ghana socio-political profile

### *Geographical*

Ghana is located on the West Coast of Africa, 750 km north of the equator on the Gulf of Guinea. The capital, Accra, lies on the Greenwich Meridian. The coastal area consists of plains and numerous lagoons near the estuaries of rivers and the land is relatively flat. The climate is tropical, characterized by moderate temperatures for most of the year (21-32°C), constant breezes and sunshine, with two rainy seasons, between March to July and September to October. The population of Ghana is estimated to be 18.3 million, with 46.5 per cent of the population is under the age of 15 years. With the population growth rate estimated at an average of 3 per cent, the total population will exceed 20 million by the year 2000. The population density averages 77 persons per square km, with most of the population concentrated in the southern part of the country, with highest densities in the cocoa-producing areas. The population data of the regions and their capital (administrative) towns are given below, in Table 1.



### *Social*

There are nine principal ethnic groups (Akan, Guans, Ewes, Dagombas, Gas, Gonjas, Adages, Walas and Frafras) at least 56 dialects. The official language is English, with French and Hausa being the two major foreign languages spoken in the country. There are three main religions in Ghana: Christians (43 per cent), animists (38 per cent) and Muslims (12 per cent). There is complete freedom of religion. There are numerous educational institutions in Ghana that have helped to reduce the illiteracy rate to 22 per cent for male and 40 per cent for females.

### *Political*

A new constitution was introduced in 1992 following 11 years of military rule. Multi-party elections were held shortly thereafter and in 1996. The National Democratic Party won both. In 2000 the Government of the National Democratic Congress lost to the opposition New Patriotic Party (NPP). Ghana had enjoyed a smooth third-term election, conducted with full participation of all political parties and of the Ghanaian electorate, strengthening the democratic institutions. The World Bank has played an active part in Ghana's economic recovery. With 32 active projects, the country portfolio is the largest in Africa and current commitments amount to over USD 1.4 billion.

### *Economic*

The economy is mainly agricultural (35.6 per cent of GDP), with cocoa, coconut, coffee and timber being the main export crops. Mineral exports include gold, diamonds, manganese ore and bauxite. The emerging industrial sector's products include cassava, fruit juices and cocoa by-products. The services sector (39.1 per cent of GDP). Since 1983, the Government launched an aggressive program of stabilization and economic



liberalization. It has sought to reduce the budget deficit and create a market-friendly environment. The economy has been progressively deregulated through the elimination of price controls and investment restrictions; interest rates have been liberalized and banking supervision improved. In the decade that has followed, the growth has averaged 5 per cent and the physical and social infrastructure was largely rehabilitated. Inflation was reduced from 142 per cent in 1983 to around 10 per cent currently. The country still faces severe economic challenges. GDP growth rate is approximately 3 per cent, unlikely to have an impact on poverty given the population growth of 3 per cent. The new Government's current aim is to secure a stable economy, promote private investment and to inspire confidence in investors and the public in liberal, market-orientated policies whilst keeping tight control over public expenditure.

## **ANNEX 2:**

### **Links to relevant websites**

#### 1. Regulatory & Policy Framework

[WTO Reference Paper on Regulatory Principles](#)

[Ministry of Communications\(Gh\)](#)

[The Changing Role of the Regulator](#)

[Convergence and the Regulatory Body](#)

[Ghana ICT Profiles](#)

#### 2. Cellular Market Dynamics

[Africa Telecommunication Union](#)

[ITU Telecommunication Indicators](#) (ICT Home Page)

[Ghana Telecom Company Ltd](#)

[African Mobile Guide](#)

[African Mobile Statistics](#)

[Scancom Ghana Ltd](#)

[Network Computer Systems](#)

#### 3. Licensing Policy

[Status of IMT-2000 \(UMTs\) 3G mobile licensing in Western Europe](#)

[Oftel Documents and Publications on Licensing](#)

[Licensing Policy – ITU](#)

#### 4. Other Regulatory Issues for 3G

[Sixth Report on the Implementation of the Telecommunications Regulatory Package](#)

[GSM/3G Network operators Worldwide](#)

[ITU IMT-2000 Website](#)

#### 5. Telecom infrastructure development and finance in Africa

[ITU Forum on Telecommunication Regulation in Africa and Arab States \(Sept 2001\)](#)

[World Bank sponsored information development projects](#) (infodev)

[ITU Seminar and Workshops in Financing Strategies for Africa](#)

[WorldBank - Telecommunication and Informatics](#)

[OECD - Measuring Electronic Commerce](#)

[World Bank Information and Telecom projects.](#)

[United Nations Trade Point Project.](#)

[Trends in Telecom Reform \(ITU\)](#)

[African Development Bank](#)

[The GIIC – Africa](#)

[Internet Indicators](#)