

Telecommunications infrastructure and its impact on ICTs in Ghana

Africa, like all developing regions in the world stands on the doorstep of a global information revolution that present a lot of opportunities. New technologies like the Internet, VoIP and IPv6 proliferate rapidly elsewhere and even in the developing world. Africa and for that matter Ghana can only take a fare share of this window of opportunities presented by this information revolution if it has adequate telecommunications infrastructure and a conducive environment. This article examines Ghana's telecommunications infrastructure and the impact it has on the country's ICT sector and the way forward for countries like Ghana trying to build adequate infrastructure towards sustainable development in the ICT sector and the economy as a whole.

Over the past few years there have been attempts by governments past and present to improve Ghana's information highways because of the realization of the use of ICT as a tool for sustainable development, which is indeed significant. This has led to some improvements in ICT infrastructure though there is still room for further improvement. The private sector has also been very instrumental in developments in this sector, building some form of infrastructure on their own with great success. This has improved the telecommunications landscape a lot in Ghana.

Modern business especially ICT Outsourcing requires a huge bandwidth to operate. The main telecommunication products and services consumed by any modern ICT business are on offer by Ghana Telecom. These are;

- Voice services
- Data services
- Leased lines which utilize communication pipes.

Ghana Telecommunications Ltd is the incumbent PTT in Ghana and by virtue of this fact owns a large proportion of Telecoms infrastructure in the country presently. Ghana Telecoms network backbone is based on the Asynchronous Transfer Mode (ATM) transport technology, which is fast and reliable. Ghana Telecom also uses microwave, intercity fibre and fibre operated by Volta Communications (Voltacom) owned by the Volta River Authority (VRA) which stretches from Kumasi, Nkawkaw, Accra, Winneba, and Cape Coast and to Obuasi. This network covers about 15 major cities and towns in the southern part of Ghana. These networks are accessed through the copper cables, HDSL, the wireless CDMA and the FCT. The Voltacom fibre optic will be linked further up north of the country and then connected to the SAT-3 network in Accra to form a national backbone infrastructure company which would be a separate entity from Ghana Telecom and VRA. The government has already passed a legislation that allows it to take Voltacom from VRA and has signed an agreement with the Chinese government which would provide a soft loan as well as build the network and hand it over to the Ghana government. The network would be run by a private enterprise on behalf of the government and price capacity at a lower cost for subscribers.

Ghana connects to the global highways using the SAT3 cable and satellite. This SAT3 submarine cable is owned by a consortium of 36 telecommunication companies. Ghana

Telecom is one of the owners of the undersea SAT-3 cable and operates this cable in Ghana. Non-owners can therefore get on the SAT-3 in one of the following ways;

- Buy capacity from Ghana Telecom
- Buy directly from cable's network administrator, Telkom SA, through an Indefeasible Right of Use (IRU), and therefore bypass Ghana Telecom. However the national carrier has the first right of refusal.

The availability of this SAT-3 Submarine Optical Fibre Cable linking West/South Africa and Europe to USA and Asia provides quality phone and high-speed Internet service. Ghana Telecom also has a satellite Earth Station at Nkuntunse. The SAT-3 Submarine Cable and satellite systems are used to provide International Private Leased Circuit (IPLC) with speeds ranging from 64Kbps to 155Mbps. Since the SAT-3 cable is the only undersea cable system that Ghana has access to, it raises concern on the lack of redundancy; particularly with respect to international cable connectivity. Most ISPs receive data on average at a speed of 2Mbps and run it to subscribers at an average speed of 1Kbps. Subscribers face more serious problems since there is inadequate support for them by some ISPs. Telecom redundancy in respect of the SAT-3 link is also a challenge though we have been informed that Ghana Telecom is taking steps to rectify this situation.

Internet Service Providers currently in Ghana operate using Ghana Telecom SAT3 fibre and or their own satellites for International connectivity and for terrestrial connectivity they use leased lines from Ghana Telecom, wireless technologies such as Kasapa CDMA technology, license and license free frequency spectrums. Most ISPs use Ghana Telecoms SAT3 for connectivity to the global Internet. The National Communications Authority (NCA) has granted licenses to many ISPs to operate their own international satellite gateways as well. A few of the Internet service providers use a combination of SAT3 fiber and satellite connectivity while others use the satellite for redundancy.

On the SAT3, 2Mbps connections are available to the ISPs from Accra to Portugal at twelve thousand dollars (\$12,000) but members of the Ghana Internet Service Providers Association (GISPA) negotiated that to five thousand dollars (\$5000). The ISPs build their own networks within Ghana by providing access in some of the other regional capitals using a combination of VSAT, microwave and fibre optic connections for their backbone connectivity. Although the fibre optic ring that links the regional capitals in the southern part of Ghana was intended to help manage the electrical grid, the plan was also to use it as a high speed data backbone for the country. Only a few ISPs like ThirdRail (now DiscoveryTel) and Internet Ghana use Voltacom's backbone capacity. This fibre uses Synchronous Digital Hierarchy (SDH) at 150Mbps. From the research, it was found that the dial-up services offered by some of the ISPs via the old copper cables of Ghana Telecom gave subscribers major problems. Ghana Telecom's former CEO Oystein Bjorge described the network as "probably one of the worst in Africa." About a third to a half of all calls do not complete because of network congestion and poor maintenance. The poor state of the telecoms infrastructure and the drop in international call rates has encouraged a rapid growth in grey market Internet telephony. Ghana Telecom has estimated that this is costing by their own estimates USD15-20 million a year in revenues.

All mobile telephony operators have built their own networks and roll out services to their subscribers using different kinds of technologies. These operators are at various stages of their development rollout, and employ different technologies and equipment to achieve, the same thing, that is, communication.

The term CDMA is used to refer to a family of specific implementations of CDMA pioneered by Qualcomm for use in digital cellular telephony. The IS-2000 version, CDMA2000 is one of such implementations. Kasapa Telecom signed a contract with a Chinese equipment manufacturer ZTE to deploy CDMA20001x which is based on the CDMA2000 technology. This is essentially a third generation mobile technology and is backward-compatible with earlier versions. They deliver increased network capacity to meet the growing demand for wireless services and high-speed data services. CDMA20001x can deliver peak packet data speeds of 144kbps in wireless environments.

GSM (Global System for Mobile) communications is a digital technology developed in Europe during the 1980's and first deployed in the early 1990's. Today it is widely used in Europe and Asia Pacific. Commonly referred to as a second generation (2G) technology, GSM networks serve more than half the total wireless voice subscriber base in the world. There are three GSM operational companies – MTN Areeba, TiGO and GT Onetouch. Westel Telecommunications are getting ready to roll out their services after being granted a license to operate GSM in 2006.

General Packet Radio Service (GPRS) is the next generation data technology for GSM. GPRS can send data at speeds ranging from 9.6 to 57.6 kbps by combining three to six voice channels in the TDMA system. It is widely deployed in Europe.

EDGE (Enhanced Data rate for GSM Evolution) is an evolutionary 3G technology based on existing GSM and EDGE will allow more data (up to 384 kbps) to be transmitted over the TDMA radio frequency once quality improves. GPRS and EDGE technologies are available to all GSM subscribers in Ghana.

Undoubtedly, these efforts by government, the private sector and our development partners to build a formidable and robust ICT network for the country have impacted a lot on the fortune of the country. From the year 2000, telephone density per 100 has risen from as low as 1.01 to 27.2 at the end 2006. There has been a commensurate increase in the number of companies as well. There are currently five licensed mobile operators, four of which are operational. There are two national telecom operators, Ghana Telecom and Westel both of which contribute about 360,000 fixed lines. There is a lot of work to be done by these operators in terms of increasing subscribers.

Apart from directly impacting on the telecommunications sector, it has increased productivity of other sectors – banks and financial institutions, health, public sector, education, agriculture, etc.

Moving forward, it is important for the nation as a whole to look at expanding ICT infrastructure considering the impact telecommunications has had on the fortunes of this

economy. It is important for government to concentrate efforts at completing the national fibre backbone and extending access to this fibre to areas that hitherto had no little or no connectivity. ICTs are too concentrated in Accra, Kumasi and Takoradi and this makes the country's quest to make ICT a tool for development fall short of that vision. As a country, we should be looking at connecting the whole country regardless of how much it costs. It is really good the national fibre will be run by a private company – at least the private guys have proven it time and again they can do it.

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