



The Case for “Open Access” Communications Infrastructure in Africa: The SAT-3/WASC cable

Angola case study

Russell Southwood¹

ASSOCIATION FOR PROGRESSIVE COMMUNICATIONS (APC)

APC-200805-CIPP-R-EN-PDF-0047

ISBN 92-95049-49-7

*COMMISSIONED BY THE ASSOCIATION FOR PROGRESSIVE COMMUNICATIONS (APC)
CREATIVE COMMONS ATTRIBUTION-NONCOMMERCIAL-SHAREALIKE 3.0 LICENCE
GRAPHICS: COURTESY OF AUTHOR*

¹Russell Southwood is a leading analyst of the African ICT market. He is a specialist of Internet, telecommunications, and media developments on the continent.

Table of Contents

1	Overview of report.....	3
2	Background.....	3
2.1	Brief country profile.....	3
2.2	Overview of Angola’s telecommunications industry.....	5
2.2.1	Angola Telecom and its plans.....	6
2.2.2	Other telecoms players.....	8
2.2.3	Internet services.....	9
2.3	History of the SAT-3/WASC cable in Angola.....	10
2.4	The impact of SAT-3/WASC in Angola.....	11
3	Performance indicators – successes and failures.....	12
3.1	Subscription, usage and capacity utilisation.....	12
3.2	Cost and tariffs.....	15
3.3	Traffic.....	19
4	Analysis of access to SAT-3/WASC.....	20
4.1	Legislation and regulation.....	20
4.2	Dispute resolution mechanisms and decisions.....	22
4.3	Investment and business environment in Angola.....	23
4.4	Politicization of the sector.....	24
4.5	Human resource capacity.....	24
5	Conclusion.....	25
6	Glossary.....	26
7	Bibliography.....	27

List of Tables

Table 1: Share of capacity in SAT-3/WASC.....	10
Table 2: Breakdown of Internet subscribers by provider - 2004.....	13
Table 3: Existing and projected growth in voice traffic in minutes (2002-2010).....	19

List of Figures

Figure 1: Angola.....	4
Figure 2: Planned network in Angola.....	7
Figure 3: Growth of fixed and mobile subscribers (1975-2005).....	12

1 Overview of report

This report examines the impact the submarine fibre optic cable known as South Atlantic 3/West Africa Submarine Cable (SAT-3/WASC) has had on the telecommunications market in Angola. It is one of four similar reports commissioned by the Association for Progressive Communications (APC) in November 2006 – the three other countries researched being Cameroon, Ghana and Senegal. A primer that synthesizes the results of the four studies is available for download from APC's website (www.apc.org).

This report focuses solely on the 'Africa section' of the submarine cable - i.e. South Atlantic 3/West Africa Submarine Cable - which also includes a South African-Far East connection (SAFE). (In its entirety, the rather cumbersome acronym for the cable is SAT-3/WASC/SAFE).

The report presents data gathered through in-country interviews with various market players and stakeholders, including performance indicators such as subscriber numbers for different types of services, usage figures, and pricing at the retail and the wholesale level.

Detailed comparisons are made to satellite as an alternative means of access to international bandwidth, and the report identifies how the two mediums have influenced each other in terms of pricing and subscription levels. The report also looks at the environment for access to the SAT-3/WASC cable in terms of regulation and licensing, as well as the general business environment in Angola's telecoms sector.

2 Background

2.1 Brief country profile

Angola is the largest country in southern Africa outside South Africa, with an area of 1.2-million sq km. It is bordered by Namibia in the south, Zambia in the east, and the Democratic Republic of the Congo (DRC) in the north. It is divided into 18 provinces, six of which are situated along the coastline, which is the part of the country with the highest population density. It has a population of 15.94-million, of which around 10-million live in its main towns and cities, with around four million in the capital Luanda. In 2004 Angola had an adult literacy rate of 67%.

The country is a former Portuguese colony and has inherited its legal framework from its past colonial power. At independence in 1975, a civil war started between three competing guerrilla movements: the FNLA, the MPLA and UNITA. This war ended in 2002 with the killing of UNITA's leader Jonas Savimbi. After this, a unity government, led by the MPLA, was formed.

The war wrecked a great deal of Angola's physical infrastructure, including its telephone and railway networks, and disrupted the country's social infrastructure. Only a small part of the country has access to electricity. The civil war also accelerated urbanisation: only 20% of the population were in towns and cities in 1975, compared to 50% in 2005.

Angola potentially has one of the most prosperous economies in Africa. After Nigeria, it is the most significant oil producer in sub-Saharan Africa, producing between 900,000 to one million barrels a day. Most of the oil extracted is of a very high quality and sells well to a wide range of buyers. Oil extraction from offshore and coastal fields between Luanda and Cabinda accounts for more than 90% of its foreign earnings, and escalating oil prices have improved the underlying financial position of the country. The Chinese have formed a close relationship with the Angolan government on the basis of its need for oil. In 2005 the Chinese government gave Angola a US\$2-billion line of credit to rebuild its public infrastructure. There are also plans to build a refinery in Lobito to process oil from across Africa. Besides oil, Angola has mineral resources including diamonds, fertile agricultural land, hydro-electricity potential and marine fish resources.



Figur

e 1: Angola

In the run-up to forthcoming elections in 2009, the government has been investing heavily in restoring the country's infrastructure. This spending has led to annual economic growth of 15%. One example of infrastructural spending is the improvements made to the road connecting Angola to its neighbour in the south, Namibia. The combination of this spending and the effects of oil development on the economy have made Angola one of the most high-cost economies on the continent.

Despite the opening of new shops in the capital, the local market for anything but basic goods remains small. One estimate made in 2004 put the total number of households able to afford anything more than basic food and clothes at only 150,000. While that number

has undoubtedly grown over the last three years, it still remains a relatively small market in terms of available disposable income for consumer goods. That said, a much wider range of people now have access to mobile phones, televisions and cars in the capital Luanda.²

2.2 Overview of Angola's telecommunications industry

At independence in 1975, two entities were responsible for telecommunications: the Post, Telegraph, and Telephone (PTT) agency was responsible for local and national traffic and also dealt with post, and the other (CPRM Marconi) handled all international traffic. The latter was nationalized in 1977 and renamed Empresa Publica Telecommunicacoes (EPTTEL).

In 1980, EPTTEL was separated into two entities, one responsible for telecommunications (Empresa Nacional de Telecomunicações (ENATEL)) and the other for postal activities (Empresa Nacional de Correios e Telégrafos (ENCT)). The latter operated only domestic telecommunications. Legislation passed in 1992 led to the formation of Angola Telecom, after a merger of EPTTEL and ENATEL.

Angola Telecom, which has a presence in all 18 provinces in the country, had a monopoly in the telecommunications market (fixed and mobile) up to April 2001, when the leading privately owned GSM operator, Unitel, started its operation. This was the beginning of the liberalisation of the sector in Angola. Four fixed-line licences were issued, to Mercury Telecommunications Services (now MS Telecom), Mundo Startel, Nexus (now part of MS Telecom), and Wezacom in 2001, with the objective of expanding the base of operators in rural and suburban areas. Six years later, Mundo Startel planned to start operations in Autumn 2007, having been delayed through a combination of changing business plans and a degree of obstructiveness from Angola Telecom. Wezacom is effectively defunct, having failed to raise the required investment finance.

Up until 1999, all policy and regulatory issues in the sector were dealt with by the Ministry of Transport and Communications. Bill 12/99 (June 25, 1999) established the Angolan National Institute of Communications (INACOM) that has both financial and administrative autonomy from the ministry.

² Unfortunately there is no reliable, up-to-date data to demonstrate this, but from a wide range of personal observations (for example, the number of satellite TV dishes) and different interviews, this would appear to be true.

2.2.1 Angola Telecom and its plans

In the early 1980s Angola Telecom set up a network linking all of the 18 provincial capitals, but most of it was destroyed with the renewed outbreak of war in the mid-1990s. In June 2006 Angola Telecom was operating around 100,000 fixed lines (compared to 65,000 in 1999), with a fixed-line teledensity of just 0.68%, well below the African average. Two thirds of these lines are in Luanda, with few subscribers in the provinces: for example, Huambo had only 3,583 subscribers in 2005. Angola Telecom also has both a mobile subsidiary (Movitel) and one offering cable TV services (TV Cabo).

Given the size of Angola and the destruction wrought by war, satellite is the most immediate means available for creating a national backbone. Angola Telecom's subsidiary, Angosat, which uses space rented from Intelsat, provides this backbone using earth stations in each of the country's 18 provinces. About 90% of the Angosat traffic is either to or from the capital Luanda. The rest of the traffic is inter-provincial and currently requires a double hop via Luanda. Where towns and cities are close together, these are joined by microwave link. Examples of this include: Luanda-Ndale-Malange; Luanda-Caxito; and Luanda-Conda-Muambo-Kuito.

The company has a network development plan that runs from 2001-2015. In the initial phases of reconstructing the network, Angola Telecom received donor money from a wide range of sources including France, Italy, Norway and Japan. However, these individual donor contributions do not seem to have been well knitted into an overall plan, despite the existence of an umbrella infrastructure plan. In June 2007 the Government Gazette announced the signature of a US\$167-million contract to complete the entire fibre network shown in Figure 2 below. As the incumbent, Angola Telecom retains a monopoly on the international gateway. Although it has ambitious plans to build a national fibre backbone, these have only slowly been implemented.

Angola Telecom has five major projects that it has allocated US\$200-million to over the next five years (from 2007) and is working with Siemens on the fibre optic routes. It is planning local loop delivery projects using WiMax which it aimed to introduce in 2008. It also planned to introduce public Wi-Fi hotspots in autumn 2007.

The overall aim is to create a fibre network that connects all 18 provincial capitals, using a series of intersecting circles that allows for redundancy. A key route (ADONES) would be along the coast of the country with eight landing points planned for a domestic submarine cable.

Figure 2: Planned network in Angola



Alcatel Shanghai Bell has been responsible for laying the first piece of fibre in the national plan. This fibre goes from the southern coastal town of Namibe, due east to Lubango, before turning south to Ondive, a short distance from Oshikango on the Angolan-Namibian border. The intention is to link up to the Telecom Namibia's fibre backbone, and in this way linking the two countries. This would give Telecom Namibia an outlet to another SAT-3/WASC international landing station (the other being in South Africa). In addition, Angola Telecom has announced that it will help supply 10,740 fixed lines in Namibe province and 6,000 in Huila province in the next three years.

There have been two major investment announcements (US\$300-million with Chinese vendor ZTE in 2005, and US\$82-million with Siemens in 2006). However, Angola Telecom has also installed a soft-switch (through an agreement with Huawei) as part of a plan to upgrade to an IP-based Next Generation Network (NGN). Initially this will become available in Caixito and Lubango, but will later be rolled out to Benguela, Bie, Huambo, Kwanze Norte, Malanje and Uige, offering both fixed lines and Asymmetric Digital Subscriber Line (ADSL). There is also a plan to install a similar NGN network in Cabinda as part of the ZTE agreement. Angola Telecom foresees the potential for using the network to offer multimedia services at some point.

There are plans dating back to 1999 to privatise Angola Telecom in three stages:

- Transform it into a commercial entity, but still wholly owned by the government;

- Sell a 30-40% stake to a strategic equity partner;
- Sell the remaining stake to a combination of the strategic partner and Angola Telecom employees.

The company has been undergoing a change process with the assistance of external consultants, but the privatisation plans seem to be on hold.

2.2.2 Other telecoms players

Mercury Telecommunications Services (MS Telecom) was started in 1997 to develop the communications capacity for the state-owned oil company Sonangol. Having established its own network, it widened its scope in 1999 to offer services to the public sector and then, in 2003, became a fixed-line operator and Internet Service Provider (ISP). It uses its Voice over Internet Protocol (VoIP) network to carry international calls and has two suppliers of IP-voice minutes: Norwegian satellite company Taide and Hong Kong-based New World. It also has a 25% share in Unitel. Angola is therefore in the slightly unusual position of having two state-financed telecoms entities that have shareholdings in all of the major operators.

Mundo Startel and Wezacom have yet to launch their fixed-line ISP operations. Mundo Startel and ZTE signed a framework agreement for the purchase, implementation, operations and maintenance of a NGN during 2005. It is envisaged that the first services will be provided by Mundo Startel's network in the third quarter of 2007. It is building an IP network and will use WiMax to deliver to its subscribers. It aims to get 5,000 fixed-wireless subscribers in the first year, increasing these to 50,000 over five years. It also plans a metropolitan fibre network if Angola Telecom does not open up its network and charge what it considers more reasonable prices. Its plan was to roll out its network initially in Luanda and Benguela, and then to move on to Huambo, Namibe, Huila, Kwanza Sul and Cabinda. Telecom Namibia has a 44% stake in the company, with the rest being owned by local Angolan shareholders.

Portugal Telecom has a minority (25%) stake in Unitel, which operates a GSM network, launched in 2001. Movitel, the second mobile operator in the country, is the mobile subsidiary of incumbent Angola Telecom and operates a Code Division Multiple Access (CDMA) 2000 1X wireless network.³ Unitel is the market leader and claims to have 2.5-

³ GSM is the dominant global mobile operating standard and CDMA is the standard that was adopted by the US and the rest of the world. The issue for Movitel has been the availability of CDMA handsets at a competitive price. Otherwise there are no outstanding interconnection issues.

million subscribers, while Movitel claims around 1.25-million subscribers. Unitel's shareholders include MS Telecom and the President's daughter.

Portugal Telecom has expressed interest in buying a further 25% shareholding in Unitel. However, this was rejected by the government, who said that it wanted Portugal Telecom to sell its current 25% shareholding back to it. It is believed that the government wants to launch a stock market flotation of the company. In what may be a response to this position, Portugal Telecom announced in March 2007 that it wanted to set up a pan-African MVNO.⁴ Its CEO Henrique Granadeiro told the Portuguese newspaper *Visao*: "It doesn't mean that we would make Unitel the centre of the operator, but Angola is a good platform for the launch of a pan-African operator." Part of the original shareholder agreement of Unitel envisaged the company expanding into the rest of Africa.

There have been discussions about introducing a third mobile operator in order to create more competition that will address both price and service issues. Both Celtel and Vodacom have expressed interest in entering the market.

2.2.3 Internet services

Internet services began in Angola in 1996 when Pacomm was licensed to install the Ebonet network (Ebonet was the first ISP in the country). There are now several ISPs, including Angola Telecom, MS Telecom, SNet, Maxnet, ACS and TV Cabo. Of these, four companies (Angola Telecom, MS Telecom, Snet and Multitel) are members of the Angolan Internet Exchange Point launched in 2006. In addition to these ISPs, Movitel offers data services.

MS Telecom's Internet operations are the result of a consolidation in the market. Nexus Telecommunications and Services was the result of a merger between Ebonet, NetAngola (another ISP) and the telecoms operator Telesel in 2003, before it was itself acquired by MS Telecom. The latter has also acquired ACS, one of the largest corporate providers.

TV Cabo is a joint venture between Angola Telecom and the Portuguese company Visabeira de Portugal.⁵ It was started in March 2006, and at its launch it was announced that the company would invest US\$88.7-million in the country. It wants to use this money to expand nationally, but says these plans are dependent on the speed of the roll-out of

⁴ A Mobile Virtual Network Operator (MVNO) is a mobile company that has its own brand, marketing, retail outlets, and phone offerings, but uses another operator's infrastructure (towers and network) instead of building and operating its own.

⁵ Visabeira de Portugal is a holding company (whose activities include telecommunications, construction, tourism, industry and services) which also has a cable joint venture in Mozambique.

Angola Telecom’s national fibre network. Currently it is delivering pay-for cable TV and Internet, but only within the capital Luanda.

2.3 History of the SAT-3/WASC cable in Angola

According to the Construction and Maintenance Agreement for SAT-3/WASC (June 17 June, 1999), Angola Telecom invested US\$24-million in the project, giving it 4% of the shareholding. This is the same level of investment made by Ghana Telecom and Mauritius Telecom, but more than Cameroon’s fixed-line incumbent Camtel, which only invested US\$20-million.

For this investment, it was allocated 805 270 Minimum Investment Unit kilometers (MIU km) (3.69% of the total allocated capacity), of which 62 575 MIU km were assigned immediately and a further 300 000 MIU km were kept as reserve capacity. 442 695 MIU km were put into ‘pool’ capacity that might be taken up at a later stage. This accounted for 4% of the overall pool capacity.

Table 1 shows a breakdown of the assigned capacity, giving some indication of the routes considered most needed by Angola Telecom at the point at which the investment was made.

Carrier	Destination	Connecting point	Capacity in MIU km
	1.USA		7250 (11.6%)
AT&T	USA	Portugal	3625
MCI	USA	Portugal	3625
	2. Europe		45,800 (73.2%)
Portugal Telecom	Portugal	Portugal	36,250
BT	UK	Portugal	3625
France Telecom	France	Portugal	3625
Telefonica	Spain	Spain	2200
	3.Africa		9625 (15.4%)
Telkom SA	South Africa	South Africa	2850
Sonatel	Senegal	Senegal	2200
CI Telecom	Cote d’Ivoire	Cote d’Ivoire	1300
Ghana Telecom	Ghana	Ghana	1125
Nitel	Nigeria	Nigeria	1075
OPT	Benin	Benin	1075

Table 1: Share of capacity in SAT-3/WASC

As with most of the African SAT-3/WASC shareholders, Angola Telecom has a single landing station, located just north of Luanda at Cacuo, which became operational in October 2002.

2.4 The impact of SAT-3/WASC in Angola

The investment in SAT-3/WASC capacity by the Angolan government through its incumbent Angola Telecom was both far-sighted and doomed to short-term failure. Its far-sightedness was to realise that without access to an international fibre landing station, the country would, in the medium-to-long term, bear the disproportionate burden of external costs associated with providing all of its international access through a satellite gateway. Nevertheless, when the landing station opened for business in October 2002, there were a number of factors that were to make accessing its capacity difficult and its use limited.

The first of these factors was that the incumbent retained its monopoly on the international gateway. Because there has been no competition, Angola Telecom has, until recently, kept the prices high for SAT-3/WASC bandwidth. This has meant that in the early years the costs of SAT-3/WASC bandwidth were often the same as or more expensive than satellite bandwidth.

Initially there was also no effective national backbone – and, indeed, no fibre within the capital Luanda, where a large part of international bandwidth demand is found. Therefore satellite was a more effective choice to access SAT-3/WASC, as it could be connected to from anywhere within the country. Even though there is now a national satellite network, the added latency that is an inevitable part of reaching Luanda in this way undercuts the speed arguments of fibre for international access from outside the capital. This factor places a high premium on the roll-out of a national fibre backbone to key urban centres as a way of addressing this issue. But nearly five years after the opening of the SAT-3/WASC landing station, the only piece of operational fibre in the national backbone plan is a route from the southernmost city in the country, Namibe to Lubango, and onwards towards the Namibian border.

The logic of building this stretch of the national fibre backbone first is unclear. By any measure, the first major national markets to be connected would be the country's second city Benguela and its neighbouring city Lobito, and the oil-rich northern cities of Soyo and Cabinda. While there is a plan for a coastal fibre (ADONES) to connect all these main coastal cities, it has yet to be implemented. In a similar way, the West African Feroon System (WAFS) project will connect some of these markets; but, again, its implementation is at least 2-3 years away.

Even if all of the above factors had not acted as barriers to the effective use of SAT-3/WASC, the initial pricing strategy would have acted as a brake on the immediate exploitation of its full capacity. As can be seen in section 3, the initial prices for the capacity were extremely high, often matching or exceeding equivalent capacity over satellite.

Pressure to lower prices has come from a number of different quarters and these are described in more detail in section 3. All carriers, except Angola Telecom, are aware that the cost of the SAT-3/WASC bandwidth is high and that they have no competitive alternative. This message has reached the regulator, INACOM, and it has begun to add its voice to the chorus of dissent. Furthermore, a policy debate has started about the best way to approach the development of infrastructure. Companies like MS Telecom and Mundo Startel have both elaborated on plans to build their own infrastructure. Investment in this direction would be largely unnecessary if Angola Telecom had implemented more of its own infrastructural plans. These issues have risen to the level of government, and it is believed to be looking at how best to address them.

3 Performance indicators – successes and failures.

3.1 Subscription, usage and capacity utilisation

Figure 3 below illustrates a pattern familiar to anyone looking at the growth of fixed and mobile subscribers in African countries over the last ten years. While fixed-line subscribers grew fairly rapidly from 2000 onwards, as Angola Telecom began to restore its local infrastructure, this growth has slowed. Public call boxes increased from a total of 260 in 1998 to 390 in 2004 and are therefore largely irrelevant in terms of providing phone services in the country.

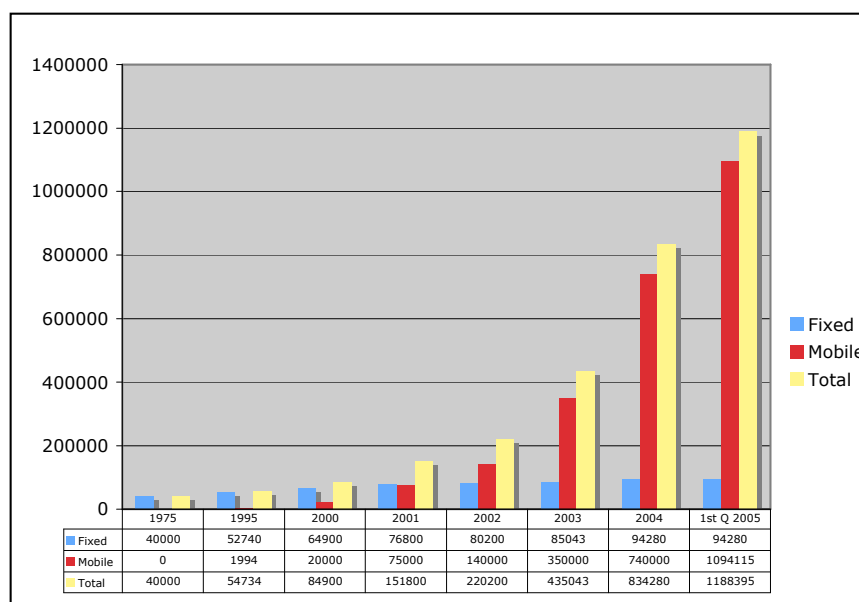


Figure 3: Growth of fixed and mobile subscribers (1975-2005)

Growth in mobile subscribers has been considerable, and the pattern is continuing. In Q1 2007 Unitel was the market leader and claimed to have 2.5-million subscribers, while

Movicel claimed around 1.25-million subscribers, giving a total market of 4-million subscribers. Current teledensity on the basis of mobile subscribers is estimated to be somewhere between 20-25%.

As both mobile operators depend heavily upon Angola Telecom’s national backbone infrastructure, further growth will only be achieved if the incumbent implements more of its national roll-out plan. Its presence in each province is largely within provincial capitals. Movicel currently offers coverage in all 18 of Angola’s provinces, but indicates that some of these cell sites are only marginally profitable because of the small number of subscribers. The entrance of a third mobile licence holder may galvanize another round of growth if the entrant chooses to invest in its own infrastructure.

According to the International Telecommunication Union’s (ITU) World Telecommunications Indicators 2006, the compound annual growth of Internet users between 1999 and 2004 in Angola was 53.1%. However, this high level of growth was achieved from an extremely low base position, as the ITU’s African Telecommunications Indicators 2001 estimated that there were only 750 Internet users in 1997.

There were an estimated 10,500 Internet accounts in 2003, according to INACOM. Angola Telecom launched ADSL services in September 2003, and by December 2004 said it had 205 ADSL subscribers. Its TV Cabo subsidiary was reporting some 500 subscribers in late 2003, only a proportion of which were Internet subscribers. In April 2006, Angola Telecom announced that it was planning to offer ADSL services in Benguela, Sumbe, Lobito, N’Dalatando, Malange, Uige and Cabinda, and that it had provisioned 500 ADSL lines in Luanda.

INACOM gathered the last detailed snapshot of Internet connections in 2004, shown in Table 2.

ISP	Dial-up	Dedicated lines	Total
Angola Telecom	938	513	1,451
Mercury (MS Telecom)	15	231	246
Multitel	600	78	678
Nexus	7,785	485	8,270
SNet	2,200	50	2,250
SRC	185	91	276
Totals:	12,023	1,448	13,571

Table 2: Breakdown of Internet subscribers by provider - 2004

The regulator also estimated that there were 34,000 users of cyber-café and similar facilities. For the same year (2004), the ITU estimated that the country had a total of 27,000 PCs. In other words, almost exactly half of the estimated PCs were connected.

Bringing the figures shown above up to date for Q1 2007, the main changes have resulted from the merger of the ISPs that created Nexus and subsequently became part of MS Telecom. The latter says it has around 6,000 Internet subscribers. The second big change has been the launch of the Movinet service by mobile operator Movitel. It says it has 4,000 subscribers to its CDMA 1X service. Angola Telecom has around 500 dial-up subscribers and 1,000 ADSL subscribers. In addition, independent ISP SNet has 3,000 dial-up subscribers and 1,600 broadband subscribers. TV Cabo estimates that it has 5,250 Internet subscribers. Overall, this gives a total of between 15-16,000 Internet connections. INACOM has not published more recent figures.

Angola Telecom offers Internet access through a single rate national line for residential fixed-line customers. This service is available in 12 out of the country's 18 provinces: Luanda, Benguela, Huila, Cabinda, Kwanza Sul, Zaire, Moxico, Malange, Namibe, Huambo, Lunda Sul and Cunene.

There were an estimated 100 cyber-café in Luanda alone in Q1 2007, and it is estimated that between 20-25 new ones have opened over the last 12 months. As indicated below, a number of these cyber-café are the basis for a thriving grey market in voice. Angola Telecom advertises Internet access points in the following places outside Luanda: Benguela, Lubango, Simbe, Cabinda, Mbanza Congo, Soyo, Lobito, Luena, Malange, Namibe, Huambo, Saurima, Ondjiva, Caxito, Dundo, Menongue and Ndalantando. There are a number of hotel Wi-Fi hotspots in Luanda, including Hotel President and Hotel Marinha.

It is somewhat harder to arrive at a useful estimate of the number of Internet users. The last available figure from the ITU estimated there were 172,000 users in 2004, up from 30,000 in 2000. Using a multiplier of five users per Internet connection, and adding in an adjusted estimated of cyber-café users (around 40,000), the overall total is more like 149,000, even after recent growth.

Overall future growth, whether for voice or data, is dependent on a wide range of local factors. However, three key factors will either encourage or impede growth. The speed of

improvements in the country's education system will drive up literacy levels.⁶ Coupled with continued improvements in economic performance, this will slowly increase the overall wealth levels in the country. Both of these will need to be accompanied by general improvements in infrastructure (particularly roads and power supply) and improvements in the operating efficiency and geographic extent of both the country's national and international backbone routes.

3.2 Cost and tariffs

The overall patterns of pricing reflect broader changes on the continent. Initially, international calling rates were reduced as part of a 'rebalancing' of international and domestic tariffs. Rebalancing was designed to lower high international tariffs and raise subsidised domestic tariffs. But with greater competition in the market and pressure from the grey market, all tariffs have begun to fall. Angola's operators have not been amongst the first movers in responding to these trends, but neither have they been the slowest. Nevertheless, there is considerable strength of feeling within the Internet and telecoms sector that prices should come down further, particularly for international capacity.

According to market analysts BMI-TechKnowledge, in 1998 Angola Telecom was charging US\$100 to connect a fixed-line subscriber and thereafter charging US\$10 per month for line rental. A long-distance call (over 320km) cost US\$0.48 per minute, and the average for an international call was US\$2.96 per minute.

Over the last two years, these voice rates (along with those for data) have been progressively reduced. The main reductions were foreshadowed by a promotion to subscribers in November 2005, when they were offered a range of calls within the country for US\$0.09 a minute.⁷ This was followed at the end of January 2006 by the halving of the fixed-line connection fee from US\$112 to US\$56.

Angola Telecom also re-arranged the geographic boundaries of calling zones. Local calls (under 90km) were reduced from US\$0.14 a minute to US\$0.09 a minute. Long-distance calls (over 90km) went down from US\$0.27 to US\$0.18. Calls to mobiles from a fixed line were reduced from US\$0.37 to US\$0.27. This was described as a rebalancing of its tariffs, but was in effect an overall reduction.

⁶ The male literacy level is 83% and the female level 63%. Source: http://researchafrica.rti.org/index.cfm?fuseaction=home.country_view&country_id=22

⁷ Telinforma November/December 2005 Article entitled Lanca Novos Servicos. The rate reductions were also announced in Angola Telecom's magazine in January/February 2006.

In 1998 international rates were reported to be US\$2.96 a minute. By 2003 Angola Telecom international calling rates had fallen to between US\$1.10-US\$2.50 a minute. In Q1 2007 these rates were around US\$0.90 a minute for more popular calling destinations.

MS Telecom is offering its corporate customers cheaper international calling than Angola Telecom. A call to Washington DC is US\$0.78 a minute and it claims to be 15-20% cheaper depending on the destination. As an IP network it has two external providers, both of whom will be offering it very similar wholesale rates to those obtained by Angola Telecom (see below).

Mobile prices have also been reduced since GSM services were launched, but it was not possible to get early historic data. In 2003, national mobile calling costs were US\$0.24-0.32 a minute and international calling costs between US\$1.70-2.50. According to the ITU's World Telecommunication/ICT Development Report 2006, the cost per minute of pre-paid cellular in 2005 varied between US\$0.16-0.24. However, given that there are two operators with varied tariff structures, these figures must be taken as broad indicators. If inflation adjusted, rates appear to be more or less the same since that date. Pre-paid rates are given as these are the ones used by the overwhelming majority of customers.

Movicel has two charging plans (Normal and Unica) and each offers peak rates (7-21 hours) and off peak (21-7 hours). On-network calls vary between US\$0.18-0.27 a minute. Calls to Unitel subscribers cost between US\$0.18-0.36 cents. There are three international calling zones defined by geography, and calls vary from US\$1.55 to US\$3.48 a minute.

Equivalent rates from Unitel are also structured around two charging plans (normal and economical) and rates on-network vary from US\$0.14 a minute to US\$0.23 a minute. Calls to Movicel subscribers vary from US\$0.34 a minute to US\$0.40 a minute. As with Movicel, there are three geographic calling zones and prices vary from US\$1.49 a minute to US\$3.37 a minute. With the exception of calls off-network, Unitel is clearly the cheaper of the two mobile carriers on advertised tariffs.

Beyond the main voice carriers there is a thriving grey market that operates through the country's cyber-café's or using 'leaky' Private Automatic Branch Exchanges (PABXs). One operator, whose main business is in Luanda, has a monthly average of 60,000 minutes, while his colleague outside the capital does around 35,000 minutes a month.

They are both offering international calls to main destinations for between US\$0.25-0.31 a minute. The main users are business people and expatriate workers. They say there is no line blocking by the incumbent and grey-market operators are numerous. For its part, Angola Telecom says that it has tightened up on grey-market operators since November

2005, putting blocking measures in place. It feels that this, in combination with lower international prices, will reduce the scale of the grey market.

Angola Telecom is paying US\$0.01 a minute to most international fixed-line destinations, although it pays much more for terminating mobile calls. For example, it pays US\$0.14 cents a minute to terminate mobile calls in South Africa. But on the basis of these wholesale rates, Angola Telecom continues effectively to operate a 'high price, low volume' strategy for international calling. Grey-market operators are getting wholesale calling prices of between US\$0.01-0.02 a minute, with higher rates for mobile calls.

According to the World Telecommunication/ICT Development Report 2006, 20 hours per month of Internet usage cost US\$44 in August 2004. As with the mobile rates quoted above, tariff structures of different operators mean that there is a degree of variation from the average cost.

According to the 1998 BMI report, the set-up cost for a dial-up connection was US\$99, with a monthly subscription of US\$75. On this basis, Internet access prices more or less halved between 1998 and 2004. Ebonet were charging US\$450 to set up a leased line, and a monthly subscription of US\$600. NetAngola was offering cheaper prices for individual users: set-up was US\$50, and the monthly subscription was US\$35, on the basis of an annual contract. Corporate users were charged US\$250 for set-up and US\$157.50 on the basis of an annual contract.

Actual costs to users have often been substantially more once phone line costs are included. A 2005 report on a government environmental organisation, the Instituto de Investigação Marinha (FN), noted in a discussion on communications costs for its office in Lobito that:

The system was installed by SISTEC, and is linked to a telephone installed by Angola Telecom. The installation cost of the e-mail and Internet system was US\$6,400, and the monthly subscription is approximately US\$350-1,000, depending on the number of telephone calls and time spent online.

The same report commented on the historic impact of the civil war, and the problems it has caused outside Luanda:

Communications problems are most severe at RC-Namibe. The centre is situated on a hill approximately 2km from the harbour, and is connected to the town by a rough gravel road. Electricity (220v, 60amp) is provided by the municipality, but the supply is erratic. A standby generator (50kHz) starts automatically when the municipal supply fails. A

telephone and fax machine is available, but neither is functional. This is because the cable between the Research Centre and the town of Namibe has failed owing to lack of maintenance for more than a decade. There are only two cellphones available, one for the Director and another for the laboratory. An e-mail facility is installed at the Director's home, about 5km from the centre. This means that e-mail facilities are currently not available at RC-Namibe...

Although this is clearly an historic description of particular problems, it gives a flavour of what it means to receive communications services outside of the capital. In addition, for those of its offices where there is not a microwave or fibre link, the organisation was quoted between US\$487.50-1387.50 a month on the basis of a 12-month contract for a VSAT service to connect it to Luanda. In 2003, VSAT connectivity costs varied between US\$1,720 (32 64Kb/s) to US\$2,456 a month (2Mb/s).

A significant proportion of the market has gone over to either wireless or DSL broadband connections, but prices do not appear to have come down despite reductions in the wholesale price of both national and international bandwidth.

Angola Telecom offers two tariff plans for its ADSL service: ADSL and ADSL Plus. These vary according to contention ratios and download limits. The ADSL service costs US\$99 for a 256Kb/s download speed and US\$149 for a 512Kb/s download speed. The equivalent on ADSL Plus costs US\$150 and US\$250 respectively, while the price for dial-up is a US\$79 set-up cost and a monthly access fee of US\$32.

This puts Angola Telecom in the upper end of broadband prices across the continent. Director of Corporate Services for the company Abdul Santos is quoted in the Angola Telecom publication *Telinforma* March/April 2006 as saying he wants to lower prices, but that it depends on the expansion of both the number of computers in the country and of the company's copper network.

Angola Telecom's cable TV subsidiary TV Cabo is offering three broadband tariffs: Residential, Professional and Mega. These vary between US\$100 and US\$320 per month. It offers Pay TV separately, and there is currently no 'triple play' offer - or bundled services of phone, broadband Internet and TV.

Movicel's Movinet mobile data offer varies depending on whether pre- or post-paid. Pre-paid is the equivalent of a three or six month contract; so it is really aimed at the more affluent customer. There are three download speeds: 150Kb/s (US\$112 a month), 300Kb/s (US\$173) and 1Mb/s (US\$254). The latter is currently only available in the capital Luanda.

Since the launch of its SAT-3/WASC service in 2002, Angola Telecom has reduced the cost of wholesale bandwidth on the fibre route twice; in June 2005 and again in October 2006. The initial price for this bandwidth appears to have been around US\$20,000 per Mb/s per month duplex to Portugal. This means that the first price reduction of 20% took it down to around US\$16,000, and the subsequent reduction of 10% down to US\$14,400.

International satellite prices have also come down in two stages at the same time with a first reduction of 10%, followed by a further reduction of 5%. Satellite prices vary between \$4,000-5,000 duplex, but still appear to be cheaper than fibre in some instances.

Discussions with operators have established that the prices being charged are between \$3,500-12,000 per Mb/s per month, depending on volumes used. The Internet and telecoms sector feels that these prices are high and should come down. This perception is also shared by the regulator and government.

In 1998, a 64Kb/s leased-line from Angola Telecom cost US\$8,100 a month, according to BMI. In 2003 this had gone down to between US\$192 (9,600 64Kb/s) to US\$2,304 (2 Mb/s). In June 2005, a 20% reduction for IP access and a 50% reduction for frame relay were announced.

3.3 Traffic

Angola Telecom has used up the original SAT-3/WASC allocation and is upgrading. It also uses the Columbus 3 satellite for redundancy purposes. As Table 3 suggests, voice traffic has grown rapidly since 2002, and is forecast to continue growing.

2002	98.2-million
2003	98.2-million
2004	98.3-million
2005	195.6-million
2006	284.95-million
2007	347.5-million
2008	393.5-million
2009	425.6-million
2010	447.9-million

Table 3: Existing and projected growth in voice traffic in minutes (2002-2010)
Source: Balancing Act Voice and Data Bandwidth Forecasts (2006-2011), 2007

Overall, requirements for both international voice and data bandwidth doubled between 2002 and 2004, and looks set to continue to grow at this pace over the next three years.

The local Internet exchange point has a consistent pattern of between 200-300 64Kb/s traffic exchanged per month with occasional 'spikes' of 500 64Kb/s. By comparison, MOZIX, the local exchange point in Mozambique, exchanges 6 Mb/s.⁸

4 Analysis of access to SAT-3/WASC

4.1 Legislation and regulation

Angola follows the pattern of Portuguese law with the publication of laws that are then followed by decrees. There are some general laws affecting the sector, as well as specific legislation.

The 'Law of delimitation of the sectors of economic activity (05/02)' defines those areas in telecommunications open to the private sector and those reserved for the government of Angola. The operation of the 'basic' telecommunications network (*rede basico*) is described as a function where the state has an absolute monopoly. Local networks, when an extension to the basic network, are part of the state's monopoly – but this applies only to government organisations or companies with a majority government stake in them. Other telecommunications services may be operated by other companies under licence.

The reality of the sector is slightly different from this framework. For example, both MS Telecom and Mundo Startel are proposing to roll out infrastructure networks. However, as the law stands at present, this kind of infrastructure roll-out would be seen as illegal.

The cornerstone of the sector's legislation is the Telecommunications Act 8/01–11 (May 2001). This reflects the law cited above. Foreign investors cannot currently take a majority share in telecoms operators. It also specifies that only the incumbent operator can run a nationwide public switched network for fixed services ('basic network'). This enshrines the monopoly Angola Telecom enjoys over both international fibre and satellite services.

A Telecommunications White Paper was issued, but although it was approved by the Cabinet's permanent commission, it has not yet been officially gazetted. However, sector policies are closely related to its contents. Rules for access to and provision of public telecommunications services (Decree 44/02– 6 September) define the terms and conditions for setting up, managing, and operating infrastructure and for the provision of telecommunications public services. This decree defines "[s]upport services to public

⁸ Via Africa: Creating local and regional IXPs [Internet Exchange Points] to save money and bandwidth, ITU, 2004.

telecommunications networks” as the provision of transmission or interconnection resources to “transport” transit traffic from/to other public telecommunications networks.

In Article 8.1, the decree states that “fixed nationwide telephony services” and “support services to public telecommunications networks” are a monopoly of the incumbent operator. Rules applicable to public telecommunications services (Decree 45/02) set out the conditions that govern contractual relations between operators and customers, aiming to provide appropriate telecommunications services to all the citizens of Angola (universal service).

There is price regulation based on the ‘price cap’ model that establishes a framework for operators when they set prices. The level of SAT-3/WASC prices has been a discussion point between the sector, the regulator and government since the service was launched, but the regulator has not chosen to intervene. In the earlier years of SAT-3/WASC the government was persuaded by the incumbent’s argument that it needed to recoup its investment in the project. Five years later this argument is much more open to question and the incumbent is under pressure to lower its prices further.

This pressure to lower prices has been increased by the existence of the grey market in international calling that uses VoIP. In legal terms, VoIP is currently in an anomalous position as there is no law or decree outlawing or approving its existence. Both MS Telecom and the shortly to be launched Mundo Startel operate IP networks using VoIP. MS Telecom offer extremely competitive international calling rates on a VoIP service delivered using iWay satellite equipment.

Set up under a Ministry of Post and Telecommunications decree (12/99), INACOM is separate from the ministry, but not wholly independent. Licences are issued by the sector minister or, following his delegation, by INACOM. As the Telecommunications Regulators Association of Africa website (www.acreg.org) makes clear: “Regulator does not act independently of Minister.”

Although the government has discussed privatising Angola Telecom, historic legislation does not really accommodate such a course of action. A succession of different pieces of legislation has slightly amended the definition of the functions reserved for government in terms of infrastructure. But there is a building frustration among operators and users about the relatively slow pace of Angola Telecom’s national infrastructure roll-out and the high international monopoly prices.

The telecommunications law also established the basis for a Universal Service Fund (FADCOM), although it is still not yet operational.

4.2 Dispute resolution mechanisms and decisions

The Telecommunications Act (08/01–11 May 2001) defines the framework for interconnection. INACOM is given the task of determining the “procedures and conditions for the interconnection of the different telecommunications networks in the country”. Article 20 of the Telecommunications Act defines interconnection as being “mandatory” where operators are “functionally compatible.”

Within the terms of the law and regulation, carriers can freely negotiate terms for interconnection. The regulator’s role is to manage numbering and network issues in a “non-discriminatory and transparent manner” and “ensuring compliance with international commitments”. Angola has been a World Trade Organisation member since 1996 and is covered by the GATS services agreement that governs competition in the services sector. There does not appear to be either any commitment or exemption under the agreement, although the government has lodged an exemption relating to capacity reserved for national shipping lines.

Article 22 of the Telecommunications Act gives the state the right to intervene “whenever compliance with the social function of a public telecommunications network is at risk, or when situations that severely affect the rights of its subscribers occur”. It outlines a range of circumstances including “unjustified refusal of requested interconnection”.

INACOM prepared a draft paper on interconnection and, after public consultation, it was approved by cabinet. As elsewhere, carriers are free to negotiate interconnection prices, but if there is no agreement, then INACOM can step in and impose a settlement on the parties involved.

In practice, there have been no disputes over interconnection. The factors that have led to this relatively quiet interconnection regime are two-fold, and both relate to a relative lack of competition in the market.

Firstly, Angola Telecom is the monopoly provider, and it would take a fairly brave operator to mount a challenge. Because it is a monopoly operator that is not yet fully commercialised, it is hard to identify clearly its underlying costs in terms of network service provision.

Secondly, with only two competing mobile operators (each with government shareholders, Angola Telecom and Sonangol), there is not much incentive to challenge the

existing order. Both have been negotiated relatively good interconnection agreements and are content to let 'sleeping dogs lie'.

However, there is a clear understanding that if there were a greater level of competition – particularly at the international level – they would in all probability choose another provider. And, in some cases, operators (including MS Telecom and Mundo Startel) are sufficiently convinced that prices ought to be cheaper that they are planning to self-provision some element of national network infrastructure and offer capacity to others, particularly between Angola's main cities. INACOM has the right to challenge them on this issue.

4.3 Investment and business environment in Angola

The investment environment in Angola has two elements: the legal framework governing investment, and the perception of political risk. Private investment legislation (11/03) sought to create a level playing field between domestic and foreign investors. From an investor point of view, the main risk is that the legislation enshrines the right of the state to nationalise a business, although, as elsewhere, it does guarantee compensation.

However, the Telecommunications Act says that a majority share of foreign private capital is not allowed in public telecommunications and value-added operators (Article 18 says that foreign companies are not allowed to own more than 50%). The public dispute between the government and Portugal Telecom about its minority shareholding in the mobile operator Unitel is perhaps a practical illustration of the difficulties that are inherent in both the framing and the practice of the law.

Although the regulatory framework is becoming more developed, there are a number of areas that are subject to movement, particularly those dealing with market liberalisation. Furthermore, because the regulator is subject to ministerial direction on large decisions (like licensing the services of new foreign investors), much of the power over these decisions lies directly in the hands of the minister. It is hard to create a more open, liberalised sector where so many of the key decisions are directly in the hands of the government. Given this, together with government stakes in the mobile operators, the argument is made that government investment will actually force out private investment.

Another weakness is the shortage of local capital both in the financial and banking sectors. Although there are plans to open a Luanda Stock Exchange, those with access to private capital of any scale are few in number. Without local capital, it is hard for local entrepreneurs to compete with an extremely well-endowed state-owned company like MS Telecom.

To be fair, circumstances are changing, and the present position in the sector may simply be a moment of transition. There are certainly forces in government that would like to see things change, and they may well get their way over the next five years. A defining moment will be if and when a third mobile licence is granted, and how that company is set up. At the same time, there are an increasing number of foreign investors in Angola who enjoy the protection of a legal system, and pay taxes to the government.

4.4 Politicization of the sector

Elsewhere in Africa, the existence of 5-10 independently-owned ISPs usually led to the creation of a vigorous lobbying and advocacy body that articulated the needs of these organisations. Three things have changed the market fundamentally:

- Growth in Internet subscribers has slowed down or stopped completely, leading to a consolidation among ISPs, sometimes with them being bought by other companies like mobile operators;
- Incumbent telcos have increasingly launched their own ADSL broadband products and have wrested back some control over market share and price from independent ISPs;
- With a large number of mobile operators implementing data upgrades on their networks, mobile companies are increasingly taking over what was formerly the territory of independent ISPs. Indeed, some like Orange in Botswana have obtained unified licences and intend to offer both wireless and fixed broadband products.

In these circumstances, what was a particular interest group with an often sharply articulated point of view becomes a much more general interest group representing largely established players with different concerns. This description holds true for Angola where there are now very few independent ISPs. Where they exist, their market share and influence is relatively small.

The formation of an Internet Exchange Point (IXP) is often the precursor for the setting up of an ISP association. The Angolan IXP has four members: Multitel (a subsidiary of Portugal Telecom), Angola Telecom, SNet and MS Telecom. Others are planning to join, including Mundo Startel, Maxnet and ACS. TV Cabo have also been asked to join.

4.5 Human resource capacity

The availability of skilled capacity is a dominant problem both in the telecoms sector and in the wider economy. The most obvious example is the situation in the oil industry where the use of foreign labour means that all the main hotels in Luanda are booked out two

months in advance. Another measure of the same factor is that the researchers were told informally that 15,000 visas a week are being issued for entry into Angola.

The impact of what by any measure was a long civil war has led to the disruption of both the economy and education, two of the main locations for acquiring knowledge, skills and experience. It is only relatively recently that the economy has begun to grow again and provide more jobs locally.

Both the government and regulator have limited capacity in terms of the kinds of skills required to address market liberalisation issues. Specifically in terms of SAT-3/WASC, there is a general familiarity with the debates around pricing, ownership and control, but understandably much less knowledge of specific ways of addressing these issues.

5 Conclusion

As in other African countries, there are a number of external inhibitors to access that may slow down the growth of and access to bandwidth. In Angola, the single overriding factor is the impact of the civil war on the development of the country.

The government is spending very large amounts of money in improving the infrastructure of the country ahead of the next elections. This level of spending cannot fail to have an impact on the lives of people in the country, particularly those in the capital Luanda. But the issue remains whether this public sector-fuelled economic growth will be sustainable in the long-term, and the degree to which it is capable of laying the foundations for the private sector in the country.

Part of the government's difficulty is that in order to be successful with the economy, it needs to open it up to even greater competition, which should bring in private investment outside of the oil sector. For example, a third mobile operator would undoubtedly spur both price competition (leading to a greater number of users) and coverage competition (expanding those who might have access). And the building of a new network would attract significant additional investment.

This kind of liberalisation requires a number of things that are not always in full supply. As the government leaves behind the legacy of a 'war economy', it needs to shed the instincts and attitudes of the planned economy where it was closely involved in every aspect of economic activity. Achieving this shift requires both the political will to make such a transition, but also the capacity to oversee greater levels of liberalisation. Whether the government has the ability to create the circumstances for a more widely liberalised economy remains an open question.

6 Glossary

3G	Third Generation (mobile technology)
ADSL	Asymmetric Digital Subscriber Line
CDMA	Code Division Multiple Access
DSL	Digital Subscriber Line
E1	A bi-directional (full duplex) 2Mb/s link
EDGE	Enhanced Data Rates for GSM Evolution
EV-DO	Evolution - Data Only (CDMA)
FDI	Foreign Direct Investment
FL-LRIC	Forward-Looking Long Run Incremental Costs
GPRS	General Packet Radio Service
GSM	Global System for Mobile communication
HSDPA	High Speed Download Packet Access
IMF	International Monetary Fund
ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
ITU	International Telecommunication Union
Kb/s	Kilobits per second
LAN	Local Area Network
Mb/s	Megabits per second
MIU km	Minimum Investment Unit kilometers
NLOS	Non Line of Sight
PDH	Plesiochronous Digital Hierarchy
RIO	Reference Interconnection Offer

SAT-3/WASC	South Atlantic 3/West Africa Submarine Cable
SDH	Synchronous Digital Hierarchy
SNO	Second National Operator
UAF	Universal Access Fund
VoIP	Voice over Internet Protocol
VPN	Virtual Private Network
VSAT	Very Small Aperture Terminal
WAFS	West African Festoon System
Wi-Fi	Wireless Fidelity
WLL	Wireless Local Loop

7 Bibliography

1. Author/s unknown, 2005, Private solutions for infrastructure in Angola – A country framework report, World Bank, USA.
2. Author/s unknown, 2004, How to invest in Angola – the telecommunications sector, National Private Investment Agency, Angola
3. Azevedo D and Luyeye N, 2005, Upgrade Communication Systems for Angolan BCLME core partner institutions, UNOPS, Switzerland