AC 2007-1974: THE SUBMARINE COMMUNICATIONS CABLE RING IN AFRICA

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Submarine Transcontinental African Cable Ring

The Submarine Telecommunications Cable Ring in Africa "SAT3/WASC/SAFE" (South Atlantic Telecommunications Cable No.3/West Africa Submarine Cable/South Africa Far East), is a high-speed network that links many African countries to the rest of the World. This paper will look into the above cable ring connectivity, ownership/management, capabilities (bandwidth), node locations, technology, benefits, and latest competitor called Infinity Worldwide Telecommunications Group of Companies (IWTGC).

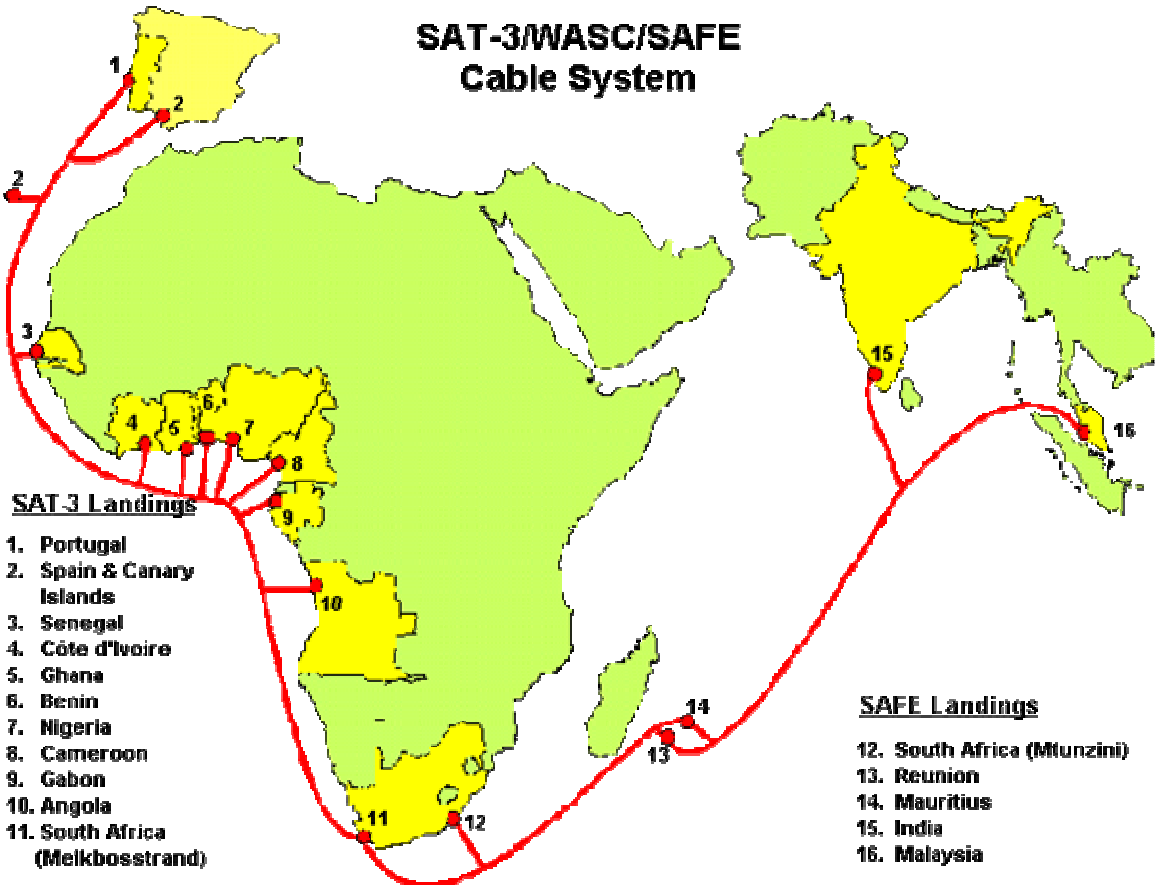
The "SAT3/WASC/SAFE" telecommunications project was historic achievement and has brought the power of high-speed connectivity to link Africa to the rest of the World. About thirty-six countries participated in the fully funded $639 million project that owners have guaranteed the ownership and management responsibilities countries for twenty-five years. The submarine fiber cable has opened a new market and numerous opportunities for African nations as well as international entrepreneurs.
In 1993, the International Telecommunications Union/Telecommunications Development Bureau (ITU/BDT) approached AT&T Submarine Systems to request assistance in developing a solution to Africa's telecommunications needs. A year later, Africa ONE project was announced during ITU Conference with a plan to connect fiber ring around Africa, and to connect to the rest of the world. This concept was promoted and shared with regional telecommunications authorities throughout Africa.
In 1996 the World Bank and the African Development Bank began investigating ways to finance the project, but a year later, Tyco International bought AT&T-SSI and withdrew its support for the Africa ONE project.

In 1996, Telkom South Africa and Telkom Malaysia partnered to create the South Africa-Far East (SAFE) submarine fiber optic cable servicing South Africa, Reunion, Mauritius, India and Malaysia. Telkom South Africa later engineered an agreement with 36 African telecommunication operators to build the South Atlantic Telecommunications cable (SAT-3) and West Africa Submarine Cable (WASC) providing service along western Africa from South Africa to Spain and Portugal. About 40 telecommunication operators around the world signed a construction and maintenance agreement for the combined SAT-3/WASC/SAFE cable. In 2002, Tyco Submarine Systems Limited (TSSL) completed the 13,800 –kilometer SAFE cable in June 2002, which has a capacity of about 130 Gb/s and 6.3 million simultaneous phone calls.
In 2002, France's Alcatel Submarine Systems completed the 14,350-Kilometers SAT-3/WASC segment with total capacity of 120Gb/s and 5.8 million simultaneous phone calls.

The 27850 km fiber communications ring network project is the third of its kind since 1964. The first project was SAT-1which was coaxial cable connectivity that linked South Africa and Europe. SAT-1 was replaced with SAT-2 in 1993. The SAT-2 was designed to work in tandem with an existing satellite system. Safe routing path was very critical for the submarine fiber installation, as such, extensive planning and marine engineering was used to scan the ocean floor to identify areas of activity such as fishing, shipping, mining and etc.

As indicated in figure-1 below, the SAT3/WASC/SAFE is divided into two segments. The SAT3/WASC network segment links Sesimbra in Portugal, Cape Town in South Africa, Chipiona in Spain, Alta Vista in Spain, Dakar in Senegal, Abidjan in Coute d'Ivoire, Accra in Ghana, Cotonou in Benin, Lagos in Nigeria, Douala in Cameroon, Libreville in Gabon, Luanda in Angola and Melkbosrand in South Africa.
The SAFE segment of the network connects Cape Town with Penang, Malaysia with node in Mtunzini in South Africa, Saint Paul in Reunion, Bale Jacot in Mauritius, Cochin in India.

Figure 1 Map Showing Landing Points of the Fiber Cable

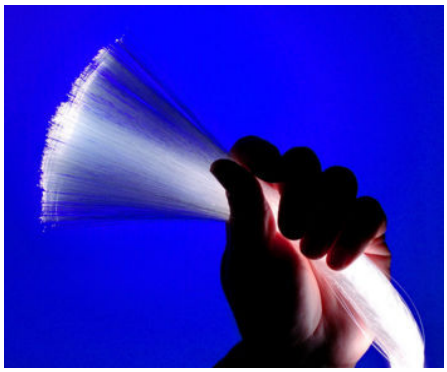


Fiber Technology

The fiber used for this project consists of four strands and each is not thicker than human hair, and as a result of high underwater pressure and other moving objects, the fiber needs to be protected.
To avoid migration of hydrogen atoms into the fiber strands that may affect transmission quality, copper sheath is used to cover the fiber. At specific locations where there is possibility for rock chafing, landslides, and ship traffics, the fiber cable is covered with amour to prevent damage to the cable. Conductors are sometimes run parallel with the fiber cable to provide reinforcement as well as to carry the voltage needed to power the repeater stations.

As signal distortion and attenuation is expected in distance transmission, the submarine cable is not exceptional. As such, over 430 repeaters are placed between 50 km and 80km apart for signal recondition.

Fiber Strands



Wavelength-Division Multiplexing:

The wavelength-division multiplexing (WDM) is a technology that is used in fiber communications to increase the bandwidth of the optical carrier signals by using different wavelengths of laser light. The WDM system uses a multiplexer to combine the signals at the transmitter and de-multiplexer at the receiver to split the signals. It is possible to have a device that does both simultaneously, and function as an optical add-drop multiplexer. Most WDM systems operate on single mode fiber optical cables, which have a core diameter of 9 µm. Other multi-mode fiber cables may have core diameter of 50 or 62.5 µm.

Siemens and Fiber Connectivity in Niger

Siemens Networks is providing Sonitel, the principal telecoms operator in Niger, with a high-speed fiber optics network. The Fiber optic backbone links Niger to the SAT3 undersea cable off the coasts of West Africa connecting Spain to South Africa.
This connectivity has put Niger among the major telecommunications players in the region. In the first phase of the project, Siemens installed a fiber-optic backbone as part of an international link between Benin, Niger and Burkina Faso.

The second phase of the project, a high-capacity access backbone will be installed to provide fiber-optic loop for major customers
of Sonitel. Siemens has recently digitized the DOMSAT (Domestic Satellite) satellite backbone operated by Sonital.

India and Pan-African Fiber/Satellite Communications Project

India n government and the African Union have signed a memorandum of understanding to develop Africa's information and communication technologies by eventually connecting all of the 53 African countries to a satellite and fiber-optic network.
Ethiopia, South Africa, Ghana, and Mauritius will be the initial countries for the Indian government's $1 billion Pan African network project. The project is seen as the biggest Information and Communication Technologies (ICT) project in Africa.
The project will first be lunched in Ethiopia, and will provide online education and telemedicine that will extend to rural areas across the continent. India hopes the investment will help it to sell more telecommunications equipment to Africa, including
very small aperture terminals (VSATs).

South Africa Fiber/Telecommunications

South Africa telecommunications industry is growing rapidly with high capacity, fiber optic cable connected to the continent in recent years. Three companies dominate 95% of the southern African for fiber optics. They are: Aberdare/Corning Cables
(South African and U.S.), ATC (South African), and Malasela Holding (Korean) - South Africa has its own fiber optic link that joins Africa with Europe and Malaysia. African countries save about US$300 million annually, by not having to route traffic through Europe and the United States. South African national telephone company Telkom S.A. Ltd.,
is the largest single market for fiber optic cable in the country. Eskom (the national utility company) and Transtel (a division of Transnet – the transportation parastal) have been increasing their fiber deployment in preparation for the SNO Network.

They have invested approximately US$308 – million on the Second Network Operator (SNO) backbone. The other allocated shareholders include black economic empowerment grouping Nexus Connexion with 19% , CommuiTel and Two Consortium with 13% each. The infrastructure has however been lying dormant as the SNO licence experience a considerable number of delays.

Joint statement by participants at a SAT3/WASC/SAFE workshop in Johannesburg

In Johannesburg, African regulators, policy advisors, operators, businesspeople, civil society delegates, and lobby groups met in July 2006, to discuss the issue of Africa's access to international fiber connectivity. The following statements regarding the communications fiber ring in Africa were made:

- They indicated that, African citizens do not have affordable and sufficient bandwidth access of the fiber connectivity to meet the continent's economic and development needs.
- They indicated that, telecommunications monopolies are not in the best interest of the public, and do not create affordable access for the citizens of the region.
- They expressed that future regulatory decision regarding SAT3 should be in the interest of the industry as a whole and the African consumer rather than in the sole interests of consortium of operators or any single operator.
- They indicated that, the positions of the landlocked countries, countries without landing stations, and those that were not able to invest in SAT3 due to various constraints need to be properly understood before any decision on future of SAT# is made.
- They suggested that interest group of regulators be established to share information on common pricing and methodology.

Figure 2 shows how the Fiber Cable is protected as it arrives at the beach

The SAT3/WASC/SAFE was installed with the aid of satellite positioning and surveillance system.
These technologies are use to identify and locate problems on the cable within meters. In event where the cable sustains serious damage, repairs can take a maximum of one week. During that repair period, all communications traffic is directed through a backup cable or satellite.
As shown in figure 3 below, marine repair ship stationed in South Africa (Cape Town) is prepared to respond to any problem immediately. This standby ship is equipped with engineers/technicians, and latest technologies to detect and rectify problems within the shortest possible time.

Figure 3 a standby marine repair ship ready to respond to any emergency on the cable

Specifications

SAT3/WASC:

- Supply contract in force since March 2000
- Supplier: Alcatel Submarine Networks (France)
- System length: 14350km
- System type: 4 fiber, OA, WDM
- System Capacity: 120 Gigabits
- Equal to 5.5 million simultaneous telephone calls
- Equal to 1.45 million 64kb/s data channels or 2304 television channels
- Landings in Europe, West and Southern Africa
- System design life of 25 years

SAFE:

- Supply contract in force since December 1999
- Supplier: Tycom Submarine Cable Systems (USA)
- System length: 13500km
- System type: 4 fiber, OA, WDM
- System capacity: 130 Gigabits
- Equal to 6.28 million simultaneous telephone calls
- Equal to 1.57 million 64kb/s data channels or 2496 television channels
- Landings in India, Malaysia, Mauritius, Reunion and South Africa
- System design life of 25 years

Ownership/Management

The submarine cable network "SAT3/WASC/SAFE" is owned and managed by different telecommunications operators from about thirty-six countries. Some are own by the government while others are privately owned depending on the country. As a result, bandwidth availability, pricing and management will vary from country –to- country. Ghana Telecom for example, recently have agreed to allow ISPs in Ghana to lease a circuit on the SAT3 cable for $8050.00 per month, and have indicated that VoIP will not be allowed on the network. Most countries sell the SAT3/WASC bandwidth only through the incumbent national monopoly operator that makes it more difficult for telecom service providers to have access to the fiber circuit. Recent consortium meeting in Johannesburg among twelve African members to talk

about management of the SAT-3/WASC and to consider new operators to join the consortium to create competition failed. Many countries/operators have been running the cable system since 2002 when it was launched without any established standards. Some activities of the consortium are kept confidential. However, the way it works is fairly clear. The consortia's shareholders appoint a managing agent who runs it on their behalf, taking care of day-to-day performance and maintenance issues. In the case of SAT3/WASC, Telkom is charged with the maintenance/performance responsibilities. The South African company (Telkom) has the largest amount of traffic among the consortium members. In terms of shareholdings, they can only be sold with the permission of all the other shareholders in the consortium.

There are three recurring issues: the impact of the monopoly on landing stations; the monopoly on the sale of capacity; and the fact that shares in the consortium cannot be traded. In fact, in Africa, there is no continental competition institution and at present, there is only competition legislative in South Africa. In other words, except for South Africa it would be difficult to mount a competition challenge because the legislation does not currently exist.

Legal restrictions

Fishing around the Submarine Cable within a distance of one nautical mile may be prohibited, and such legal restriction is necessary to prevent damage to the fiber cable.

Competition

A company called the Infinity Worldwide Telecommunications Group of Companies (IWTGC) That is owned by a group of Africans/African Americans are in the process of installing submarine cable at the West Africa Coast. This will bring fierce competition to the current SAT3/WASC to give West African customers a choice that badly needed. The company plans to complete the project by 2008, and will ensure at least 10 gigabits of capacity in each country. IWTGC will seek license from each country to enable the company to sell and manage its bandwidth directly to all service providers at much lower

price. The system will cost about $500 million, and it will link West Africa to Europe, the United States and Asia.

Conclusion

The SAT3/WASC/SAFE was a major telecommunications technology development in Africa, and such communications capability will promote regional business, social services, and distance education in Africa. Future competition from Infinity Worldwide Telecommunications Group of Companies (IWTGC) will give Africans a choice to determine the best technology, price, and quality of service. The recent meeting in Johannesburg among some members from the consortium failed to agree and allow new operators to join the consortium. Allowing more operators will mean moving away from the monopolistic management practices, and creating possible competition for the cable market. After four years since the SAT3/WASC became operational, people have not seen any significant change in telecommunications prices.

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