Internet via Satellite in Africa

An Overview of the Options Available

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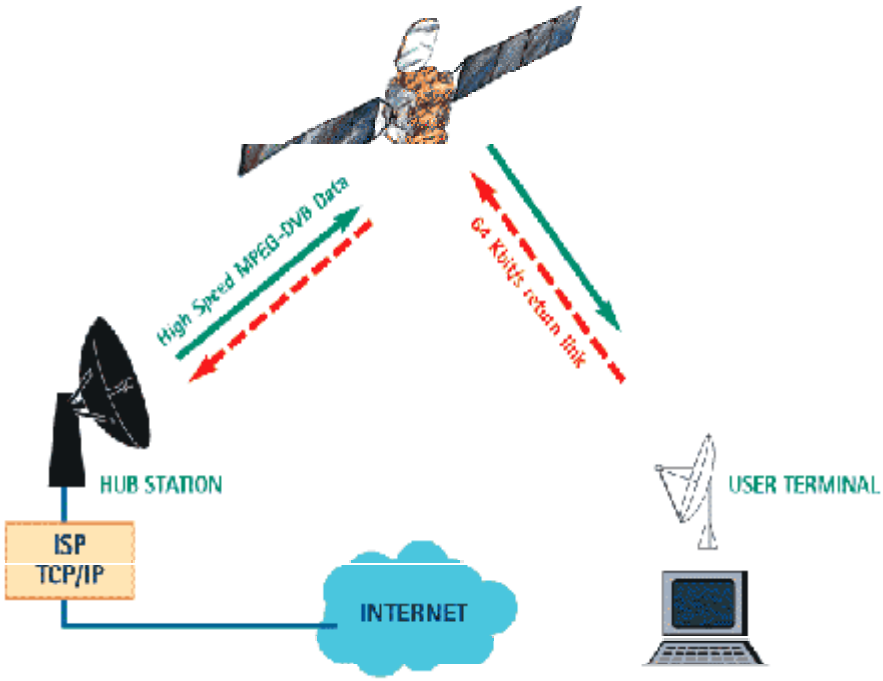
INTRODUCTION

In a wide-ranging 'ICT for development' debate, the connectivity issue often appears to be the killer: Any project, telecentre, ISP, school or farmers co-operative has to make do with whatever infrastructure there is – or so it is believed. If a cable link - a telephone connection for instance - is available, then the project can go ahead. If not, then little can be done.

Everyone has heard of satellites, but almost everyone thinks they are a technically complex and expensive solution. The bad news is that satellites indeed are somewhat complicated; the good news is that prices for end user hardware are coming down very rapidly, and more user friendly ways of billing are reducing prices even further.

The best news of all is that satellites can bring high-speed duplex Internet links to any place on earth. Thus, while current satellite coverage of Africa certainly offers room for improvement (and will get a whole lot better by 2003), it can already deliver solutions.



A Few Examples

Africa is highly dependent on satellites. Until recently, only North Africa plus Djibouti and South Africa had cable links to the rest of the world. Everything else, including international telephony and fax, was handled via satellite (notably by Intelsat and Panamsat).

As more sea cables are laid (Africa One, SAT-3, SAFE), dependency on satellites will decrease, notably in coastal regions. Even so, small satellite links will remain the solution of choice for local operators to connect to these submarine African cables - just as small satcom links are used to connect dozens of African ISPs and other users to cable networks in the West. And satellites will continue to beat all terrestrial infrastructure, anywhere on earth, when it comes to broadcasting radio, television or Internet files.

Here are a few examples of satellite use in Africa:

- Scores of ISPs across Africa having a satellite dish that gives their subscribers direct access to the Internet backbone in the West. A count in December 1998 in Dar es Salaam showed that twelve out of fourteen ISP's active in Tanzania's capital had their own satellite link to a ground station in either Europe or the USA.

- Various telecentres also use satellite to connect to the Internet. Till recently there was a Kampala based company called Starcom that operated mobile telecentres, built within the interior of big freight containers. A lorry would deliver the 'telecontainer' to a place where Starcom supposed they would find enough customers to make it profitable. If the customers didn't show up in sufficient numbers, the container would be moved elsewhere. A two-way satellite link connected these containers to the rest of the world, no matter where they were located. Most telecentres have a leased line to a nearby ISP. A breakthrough of satellite for telecentres will have to wait till the advent of cheap DAMA VSAT systems like Web-Sat and Direcway.

- African banks use satellites to quickly access data from foreign banks and to check the validity of credit cards. The Central Banks of nine West African countries have 26 of their offices interconnected by a proprietary satellite network, with a hub in Dakar, Senegal.

- All sorts of intranets can be upgraded by a satellite downlink, which feeds information and news to the memory of the intranet server. Companies like WorldSpace (which owns its own satellites), Hughes Direcway and Interpacket (which both lease capacity from others) are showering Africa with huge amounts of web based and other information. They are aiming mainly at ISPs, but schools, universities and companies can also subscribe.

- In war situations, NGOs, journalists and - it must be said - warlords, use light, mobile satellite phones to send or receive e-mail or even to surf the web. These solutions are rather slow and quite expensive.

INTERNET VSATs IN AFRICA; THEN AND NOW

A VSAT is a very small aperture terminal for satellite communication. The ‘aperture’ refers to the width of the dish antenna. VSAT dishes can be as small as 0.60 metres, up to 3.6 metres, or somewhere in between. The dish is connected to a box full of electronics, which in turn is connected to a PC. Instead of a box, some VSATs consist of two PC cards - one to receive, the other to transmit - plus a dish linked to a PC.

Remember the phones that were supposed to be mobile a decade or so ago? What happened to them has also happened to VSATs, but maybe even more dramatically. The size came down fast and the price came down even faster. In 1995, when the Internet first hit Africa, an ISP in Kampala decided that VSAT was the best way to connect their server/router to the Internet backbone. Using the Russian Express-2 satellite, Infomail Ltd in the Ugandan capital bought a VSAT for well over $US 100.000 and paid about $US 5000 per month for a 64 kilobit per second connection. The signal - carrying e-mails, mouse clicks, web-pages, updates for mirror sites and so on – went via the 3.7 metre dish on the Infomail premises to and from the Russian Express-2 satellite, which linked to a far bigger dish on the American East Coast, a so called hub station, which had fast cable links to the Internet. Infomail was probably the first African ISP to use a dedicated satellite link.

How things have changed! Today, at least 100 of roughly 600 African ISPs have their own VSAT, and, in addition, dozens of telecentres and cyber café's have one as well. The price of the hardware has gone down to a few thousand dollars, although the VSAT industry is notorious for lacking standardisation and there are scores of different VSATs and different price tags.

The nature of the average connection has also changed. While it is still quite common to have a VSAT with a fixed throughput, there is a strong trend towards DAMA – ‘demand assigned multiple access.’ DAMA means that a certain, relatively large slice of satellite bandwidth is being carved up dynamically between a number of VSATs. Advantage number one is that a DAMA network will allot, say, 4 kilobit/s to a VSAT sending e-mail, and, say, 2 megabit/s when the same VSAT is being used to download a piece of video.

Advantage number two is that you pay as you go. At the end of the month, users are invoiced for the number of bytes downloaded and uploaded (the subscription fee often includes a certain amount of bytes sent and received). This is a much better deal than a fixed high bandwidth connection day and night. If you were to use all of these kilobits all of the time, fixed throughput is cheaper than DAMA. But of course, during the night, most bandwidth is wasted and, during the rush hour, it may be insufficient. Some big ISP's like Network Computer Systems in Ghana lease a certain amount of fixed throughput, topped by DAMA capacity.

For DAMA you need at least a couple of dozen VSATs, and someone to organize it all - for instance, a large oil company linking its African offices to each other and to the Internet in one big DAMA network. Or all the major posts of a UN Peace Keeping Mission, or a Ministry of Education, linking a number of schools in a country. This seems to be of little use if you are only thinking of linking a single school or telecentre to the Internet. To buy (or lease) just one VSAT and enjoy the advantages of DAMA looks difficult, but there are two ways to do it.

One is to try and organize a DAMA network by lining up a bunch of users. A farm co-operative, for example, that needs an Internet link takes the easy and costly way to just find a VSAT vendor (to be found in the capitals of most African countries) who will provide an expensive dedicated link of fixed throughput. Or they can approach their government and see whether a DAMA network can be organised together with other cooperatives. Foreign assistance, groups like the Leland Initiative of USAID, the Acacia programme of IDRC, or the International Telecommunication Union, may also do the trick. If they cannot help, they can show you the way to other organisations that can.

The other way is to find out what DAMA networks are already operational and seek to join in. Sometimes, satellite operators set up DAMA networks themselves. Intelsat - with 20 satellites around the globe - may set up an Internet DAMA network for Africa. New Skies, which split away from Intelsat in 1999 and took over 5 Intelsat satellites, adheres to the conventional idea that their customers and not they themselves must set up VSAT networks. In any case, satellite fleet owners should be able and willing to show you the way to any customers who have such a network. In addition to the ones mentioned, SES Global (28 satellites), Panamsat (21 satellites) and Eutelsat (18 satellites) also have parts of their fleets over Africa.

Bear in mind that while most DAMA networks can accommodate IP traffic, they are not necessarily optimised for the Internet. Protocols such as Frame Relay and X-25 can wrap up your IP signals, but in doing so, some bandwidth is lost. In addition, you also want a DAMA network with a hub station that has a fast, high redundancy cable link to the Internet backbone.

This may sound technical, but the bottom line questions are, of course: what speed do I get (including: how much time is needed to set up a link) and how much do I pay per megabyte?

In Europe and the US, a few DAMA Internet networks are already open to any individual end user. The front-runner, Web-Sat, has a hub station in Dublin, Ireland, which links it's thousand plus users in Europe and Northern Africa to the Internet via the Eutelsat W3 satellite. The hardware (dish, receive card, transmit card) costs $US 2000 and may drop to $US 1000. The uplink speed (to the satellite) is 64 kilobit/s, the downlink can be anything between 16 kilobit/s and 2 megabit/s, depending on what you need. The monthly fee (in Europe, 2001) of $US 200 includes the first 220 megabytes. For each additional megabyte, Web-Sat will charge around $US 0.25.

StarBand (available in the US only at the time of writing) and Tachyon are similar systems, and more will come. It is very likely that such systems will become available within various footprints in Africa pretty soon. At the time of writing, Web-Sat was negotiating a deal to deliver it's service via the Ku-band footprint of Panamsat 1R, which covers everything between Cameroon, Chad and Senegal. Tachyon was also planning to provide world coverage.

What it all boils down to is that VSAT has become a much better and much cheaper tool to access the Internet, especially for small organisations or small ISPs.

A final note about using DAMA or fixed bandwidth. Such a network may serve as the infrastructure for an intranet, plus a link to the Internet backbone via one of the VSATs in the net. These networks are very common nowadays. Hotel chains, supermarkets (like Walmart), and car dealers (like Ford) often have them.

When considering a proprietary VSAT network - for a number of schools, or railway stations, or the outlets of a bank - one option is a mesh network, which means that all the VSATs can talk to each other directly, without the aid of a hub satellite station. Mesh is needed if you also want an internal telephone network, free of additional charges. Communication via a hub goes to and from the satellite twice, which means double time delay. Single hop time delay, also known as latency, is already annoying, as most people have experienced when making international calls via satellite. With double hop, a normal dialogue is hardly an option, and double hop is what you get with a hub network.

So if you want a VSAT network (just in case), do realize that you cannot only use it for Internet and intranet, but also for a voice network. If that is what you want, go for mesh. Real professionals can only arrange all of this, so you are bound to deal with a VSAT dealer.

WEB SAT

For years, a small satellite link (VSAT) has been the connectivity solution of choice for many African ISPs and telecentres. With a new service from Web Sat, this could soon change.

There is good news for Internet connectivity in the North Western half of the African continent. The Irish Web Sat system will be introduced via the Panamsat 1R satellite before the end of this year. A test is currently under way. Web Sat, a branch of Dublin based Armstrong Electronics, has already revolutionized internet access in parts of Europe, Australia and Canada where ISDN and ADSL aren't available.

Web Sat offers duplex internet links via a satellite dish the size of a TV dish plus two extra cards in a normal PC: One is a standard DVB (direct video broadcasting) receive card while the other, developed by Armstrong, turns the PC into a transmitter. A simple cable links the PC to the dish. The Web Sat hub station - linked to Internet backbones - is located in Dublin. The price tag for the hardware is about 2000 USD. The current monthly subscription fee in Europe is about 80 USD. The uplink speed is 64 kilobit per second; the download speed is up to two megabit per second. The user is online as long as the PC is switched on. These costs and performance compare very favourably with current VSAT systems used in Africa.

Director Doug Armstrong explains that "a big British Nigerian Indian company" will act as the Web Sat agent in Africa, while each country within the Panamsat 1R footprint will have it's own local distributor to sell and install the equipment and do the billing. According to Armstrong, "various aid agencies are very interested because they have huge interconnection problems. Web Sat will give them e-mail, access to databases, to medical records et cetera. Hopefully, with assistance from The World Bank, some terminals can be put into schools to teach Internet skills and for virtual classrooms."

Armstrong is keen to cooperate with donor organisations to make Web Sat available in places in Africa where Internet access is badly needed, but he is afraid that this will take a lot of effort by Web Sat: "We are principally a technical company. The bureaucracy of The World Bank is so tough. We would need some of our staff to work specially on obtaining the money, or on organizing cooperation with the World Bank. If we were one hundred percent efficient in obtaining funding, that is an area we should have targeted. They have their own extensive VSAT network in Africa, but it is very expensive. Web Sat costs about one tenth of that."

LEO AND GEO

DAMA versus fixed throughput is one very important distinction. LEO versus GEO is another. The bulk of satellite communications goes - and will go for decades to come - via satellites that follow the GEO's stationary orbit: In the equatorial plane, eastbound and at an altitude of exactly 35,786.1 kilometres above the earth. In that orbit, and in that orbit only, the position of the satellite is fixed in relation to the earth. There are a couple of hundred GEOs at work, typically with a throughput of a few dozens of gigabits per second. About a hundred of them can 'see' Africa or large parts of it, but more than half are actually looking the other way. They have their antennae trained at Europe, not Africa. A dish on a satellite creates a footprint on the ground, often thousands of kilometres across, with the best signal strength in the centre. These footprints can have all sorts of shapes, a round shape being just one option.

To make a shortcut to a practical question: If you want to set up a VSAT at location X, you want to know which satellites cover that place with their footprints, and how good their signals are. VSAT vendors and satellite operators have footprint maps (which all satellite operators feature on their websites). Remember: Signal strength is usually called EIRP (for: effective isotropic radiated power). EIRP is measured in DbW (decibel watt). A DbW value of over 48 can be considered as good. This is a bit technical, but it's important. Using a footprint of less than, say, 40 DbW will cost you a lot of money in terms of a much bigger dish antenna to get acceptable results, and more outages during heavy rain. Of course, the financial equation is a bit more complex. A weak satellite may be expensive in terms of your VSAT, but on the other hand the price per megabyte to be paid to the satellite operator might also be low.

GEOs have a few disadvantages, all stemming from their distance to the earth. The alternative is a Low earth Orbiting Satellite, or 'LEO.' These can be as close as 700 kilometres to the earth, though somewhere around 1500 kilometres is more common. They orbit the earth in one or two hours and dozens are needed to make sure that each place always has at least one LEO overhead.

We won't dig too deeply into this LEO matter, as it is rather uncertain which Internet LEO systems will be realized in the foreseeable future. New ICO (10 satellites at 10.390 km altitude) is likely to be the first. It launched its first satellite in June 2001. Sky Bridge (60 satellites at 1469 km) and Teledesic (288 satellites at about 1400 km) are also worth keeping tabs on.

The ones that do come, however, will cover the whole planet, including oceans, with equal signal strength, which is good for an underserved region like Africa. LEO users can make do with even smaller, cheaper VSATs (usually called 'transceivers' in a LEO context). The proximity of the satellites to the earth makes the Transfer Control Protocol (TCP) of the Internet run more smoothly via LEOs, while GEO traffic suffers from the time delay caused by their distance, the so called 'latency'.

You can't point a dish antenna to a LEO (it can be done but it is far too difficult and expensive for end users). So you need an omni-directional antenna - easy to use. The flip side is that you waste a lot of transmitting power. A more advanced solution is the phased array antenna, which kind of follows the LEO without moving. The development of cheap phased array antennae, currently under way, is key to the future success of LEO systems.

GEOs as well as LEOs operate in certain frequency bands. This, too, may be a bit technical, but it is important to remember the following:

- The higher the frequency the more susceptible the signal will be to rain;
- The higher the frequency, the smaller the satellite dish that is needed, i.e. cheaper;

- C-band is available all over Africa but the DbW values are not impressive. In other words: you can set up a C-band VSAT just anywhere, but you'll need a dish of up to 4 metres;

- Ku-band has to be strong to penetrate rain (though a real thunderstorm may still cause an outage), and strong Ku-band signals are not found in all of Africa. Satellite companies like to focus their Ku-band capacity on relatively affluent regions, because that is where they can make most money. Fortunately, most of these high-powered Ku-band spotbeams spill over into adjacent poorer regions. For instance, New Skies has a satellite with a really strong Ku-band spot on Saudi Arabia which includes the Hejaz (Mecca and Medina), and which unintentionally also caters for large parts of Eastern and North Eastern Sudan. Similarly, various Ku-band spotbeams on Panamsat and Intelsat satellites, aimed at South Africa can also be accessed in Southern Mozambique, Namibia, and Botswana.

- Ka-band is a phenomenon of the near future, though some satellites covering Europe and the US already have some Ka-band capacity.

NEXT GENERATION INTERNET VIA SATELLITE

Culminating in 1997 and 1998, the satellite community has been riding a huge wave of optimism. Builders, operators and outsiders alike had so much confidence in satellite technology and in the Internet, that scores of new, dedicated Internet-via-satellite systems were launched. On paper, that is. Rockets were to be deployed later on, after the design of the fleet, after the organisation surrounding it had been sorted out, and after the financing was in place.

At the climax of this paper development, well over fifty Internet-via-satellite systems costing a couple of billions of dollars each, had been enthusiastically presented, many offering world coverage. For a continent with a very poor infrastructure like Africa, the future of connectivity looked very bright indeed.

Alas, confidence slipped away - slowly at first, in the beginning of 1999, and faster in the course of 2000. This was mainly due to the spectacular failure of three LEO satellite systems - Iridium, Globalstar and Orbcomm - and the loss of total investments of over ten billion dollars. None of these systems (all three are still working) offer high speed Internet (just a few kilobits/s) and certainly not at affordable prices (several dollars a minute).

To cut a long story short: Very few high-speed-low-cost-Internet-via-satellite systems have survived, in the sense that their backers may succeed in bringing together the money needed to provide global coverage. SpaceWay (GEO) and New ICO (LEO) are busy building satellites and these should be available in Africa by 2003 or the year after. New ICO will offer mobile access to the Internet. A pocket sized ICO phone linked to a laptop will provide 144 kilobit/s access both ways. Tariffs are still not known, but they will need to be modest to attract customers. Teledesic (LEO) may materialize if New ICO becomes a success (because the two are intertwined at the top organisational level). Another contender is Sky Bridge (LEO, with additional GEO services).

What these special Internet-via-satellite systems, with the exception of New ICO, have in common is:

- end user hardware costing less then $US 1000;
- uplink speeds of several megabits/s;
- download speeds of hundreds of megabits/s;
- affordable end user fees. It is too early to predict how billing will be done, but it may all be on a pay-as-you-go basis;
- use of Ka-band, except Sky Bridge which will use Ku-band;
- IP based protocols (for the GEO systems modifications are needed to reduce the effect of latency);
- SpaceWay and Teledesic will offer direct links between end users.

SpaceWay will have three satellites covering the Americas by 2003, and will cover the rest of the globe using six additional satellites ‘later on'. At the time of writing, New ICO was still a bit in limbo. In June 2001, one satellite was successfully launched for testing purposes, while the rest of the fleet - largely completed - had to wait till a few hurdles had been taken.

Sky Bridge and Teledesic will each take a few more years to materialize, if they succeed at all. But they are very promising for Africa. No spot beams favouring wealthier areas as GEOs do, but equal signal strength over Cairo, Johannesburg and any village in Mali or Kenya.

We aren't done yet. There is one more, very important development, and it has quite a bearing on Internet-via-satellite in Africa.

While the plans for dedicated fleets were floundering one after the other, the VSAT industry seized the opportunity. Maybe the same trick (fast, easy, cheap) could be done using satellites that were already operational, satellites that were earning themselves back by transmitting one way TV signals, signals of traditional VSAT networks, and international telephony.

And yes, it could be done, as has been shown by companies like Armstrong Electronics in Dublin (the designers and operators of Web-Sat), by the Israeli-American VSAT builder Gilat, Hughes Network Systems, and others. They have made the equipment now being used by tens of thousands of end users in the West, and it's becoming smaller and cheaper all the time.

Undoubtedly, some of these systems will become available in some African Ku-band footprints within a year or so, maybe even sooner. This development triggered an interesting response from traditional satellite operators like Intelsat, Eutelsat, SES Astra, Panamsat, Orion and New Skies, who all launch one, two or three new GEOs each year. They all decided, albeit in varying degrees, to make some of their new GEOs more suitable to these applications. Eutelsat in particular is busy discovering Africa and will feature African beams on a few satellites very soon.

Finally, there is the Regional African Satellite Communications Organization, RASCOM, based in Abidjan, founded in 1993 with 44 member states. The idea to have a small fleet of RASCOM GEOs catering for Africa has been delayed time and again - partly because the money couldn't be found, partly because of political stumbling blocks. Maybe it was a blessing in disguise. The first RASCOM satellite, due to be launched in 2004, will have 16 very powerful Ku-band spotbeams covering all of Africa and will be especially tailored to serve some 50,000 small Internet VSATs in telecentres, businesses, schools, universities, post offices, airports, government offices and so on. The VSATs are part of the RASCOM order, which has been given to French satellite builder Alcatel.

In 2002, RASCOM hopes to start with a number of pilot projects, using leased satellite capacity.

A POLAR LEO?

It is not entirely true that LEOs are only useful when there are sufficient to cover the whole globe. Just one LEO in a polar orbit at, say, a thousand kilometres altitude, will cover the whole earth - not instantly, but over a time span of a few hours. While it takes the LEO one or two hours to orbit once, the planet is turning on its axis. The two movements combined result in coverage of every place in the world, though not continuously. As seen from a village in Ghana or Tanzania, this LEO will be overhead four times per day for about fifteen minutes.

In that time window, e-mails written ‘offline’ can be sent and incoming messages collected. The ground equipment will cost about $US 2000. Link it to a PC and you'll have free e-mail anywhere. This is not really an off-the-shelf product, but radio amateurs all over the world are familiar with these little LEOs and how to use them. These so called little LEOs have been available for two decades, in service with organisations like Volunteers in Technical Assistance (VITA) and HealthNet.

DOWNLOAD ONLY

GEOs can be used to broadcast Internet content, just as they are for broadcasting TV and radio signals. It is all to do with 'bits.' In the case of Internet, it is Internet Protocol (IP) without the Transfer Control Protocol (TCP), because there is no return channel to acknowledge receipt of packages.

As an example, the content from dozens of popular websites, including the National Geographic, the Wall Street Journal and Africa Online are broadcast several times a day via the WorldSpace Firstar satellite. The recipients are mainly ISPs, who store the material on their servers. So, when a subscriber to Africa Online in Nairobi wants to check the CNN site to know the latest developments on a news item, he is connected to the server on the Africa Online premises, and not to CNN in the US.

There are plenty of other examples, many of them much more suitable for end users than downloading CNN.com, for which a lot of storage space is needed. In Africa, WorldSpace is at the forefront of this application of data casting, as it is called, but there are others like Interpacket and Direcway.

Usually files can be pre-selected to be stored on a PC. Thus, everything the satellite emits will reach your small dish antenna, but only files about e.g. hydrology, goat husbandry and cricket will be stored locally. Apart from a dish, a Digital Video Broadcasting (DVB) card and some software are needed. The whole set will cost about $US 700. Not having to send any signals to the satellite makes it a lot cheaper than a VSAT.

With some handicaps, but very cheap, data casting can also be used to surf the World Wide Web. WorldSpace regularly broadcasts a generic start page of the web. This can be accessed anywhere in Africa - by linking the portable WorldSpace digital radio receiver (from $US 65) to a PC or laptop. This must be fitted with a Digital Video Broadcast (DVB) card (about $US 70).

Dozens of icons and file names can be clicked, in most cases the user gets an indication of how long to wait until that particular file is broadcasted again via the satellite (at a speed of 128 kilobit/s). Popular files are being transmitted more frequently. The monthly fee for the WorldSpace Direct Media service is $US 10.

WORLDSPACE CORPORATION

Headquartered in Washington DC, the WorldSpace business was founded in 1990 to provide direct satellite delivery of digital audio and multimedia services to the emerging markets of the world, including Africa, the Middle East, Asia, Latin America, and the Caribbean.

The WorldSpace satellite network will consist of three GEO stationary satellites. The first two satellites, AfriStar and AsiaStar, were successfully launched in October 1998 and March 2000 respectively. The third satellite, AmeriStar, will follow in 2002.

Each satellite has three beams with each beam capable of delivering more than 40 crystal-clear audio services and a variety of web content and data directly to transportable receivers.

Once completed, this unique global service will transmit quality information, education and entertainment programming to a service area that includes 5 billion people.

WorldSpace Foundation is a U.S. based non-profit organization that was created in 1997 to provide educational and informational programming to people in developing regions of the world who are disadvantaged by illiteracy, poverty or geographic isolation.

The foundation partners with a wide array of organizations to produce its educational programs for broadcast on WorldSpace satellites. These organizations include, non-governmental organizations (NGO's), UN agencies, government ministries, international development groups, universities and community radio stations.

Content on WorldSpace Foundation channels may include basic education and information on a variety of development-related topics, such as health, agriculture, environment, women's issues and civic education.

DOWNLOAD VIA SATELLITE, RETURN VIA TELEPHONE

Satellite download speeds - hundreds of kilobits per second, or even more - can be used for interactive Internet without a satellite return channel. You connect to the Internet via a telephone or ISDN line, which is being used for anything you send, like e-mail, mouse clicks and so on. Whatever you order on a website, by clicking an icon or a hyperlink, will reach you via satellite.

One advantage is that on the download side you are always online, so incoming e-mail will arrive without delay. The satellite will send it to its entire footprint, thousands of kilometres across, but only your computer will store your e-mail, courtesy of a tag. In the West, people can choose between several service providers offering download only (which started in 1995 in the US with DirecPC, which was recently renamed Direcway).

Some of these services are already available in Africa, like M-web broadband, which uses the Southern African Ku-band spotbeam of the Panamsat-7 satellite, which reaches as far north as Angola and southern Tanzania.

A similar service, called Menasat, is being offered in North Africa on an Egyptian Nilesat satellite by the Cairo based Global Data Broadcasting Corporation. Currently the fee is $US 980 per year for a 400 kilobit/s download rate; the first 18 gigabyte of downloaded material per year is included in the subscription fee. Plans are underway to lease additional capacity on a satellite covering Sub Saharan Africa as well.

LICENCES

To transmit any kind of wireless signals you need some kind of government approval. That rule goes everywhere in the world, otherwise the radio waves would become useless because of all the interference. As for VSATs, each vendor of equipment can tell you how to get a licence or they will get it for you. In some African countries like Ghana and Uganda this is quite easy - in some others it is more difficult.

It would be too cumbersome to go into the details country by country, if only because the rules are changing all the time. International finance institutions like the IMF and the World Bank are pressing for further easing of unnecessary restrictions on wireless.

At the time of writing, an African Telecommunication Regulators' Network had been founded - based in Morocco. One of its aims is to create a portal, which leads to information about wireless licensing, including satellite, in all African countries (www.gvf.org/portal.htm).

NEXT STEPS

There you are - wanting to set up a fast Internet connection in a place with no infrastructure. Most African countries have VSAT vendors in the capital, offering turnkey systems with a fixed throughput. That’s easy for them and for the satellite operator, but what you want is DAMA.

Of course, if you are a bank with 50 outlets in the country, you can get a proprietary DAMA system in which the available bandwidth is shared between all offices. The network can have it's own hub, or rent capacity on an existing hub that can be thousands of kilometres away.

If you just want to connect an isolated place, two maybe, stick to DAMA. In some countries, VSAT vendors arrange DAMA networks themselves by lining up a number of clients. Of course, these are hub and not mesh networks. The hub, whoever owns and operates it, has to have a fast Internet connection. It's little use having a fast satellite link, which slows down on the surface of the earth.

The right vendor is critical. The advantage of local VSAT vendors is that they know how to get the necessary license, but limited choice may force you to go elsewhere. A neighbouring country is one option. A VSAT vendor in New York, who has never been to Africa, probably isn't able to provide all that is needed.

You may have deduced from this text that the most attractive solution is probably one of the special Internet-via-satellite-plans, like Web-Sat, Tachyon, Starband or any of the ones to come.

LINKS

Current systems for DAMA duplex Internet available in the West, some of which will become available in parts of Africa soon:

- Tachyon (www.tachyon.net)
- Web-Sat (www.web-sat.com)
- StarBand (www.starband.com)
- Direcway (www.hns.com/direcway/intro.htm)

Future systems, all planning to include Africa:

- SkyBridge (www.skybridgesatellite.com)
- SpaceWay (www.spaceway.com)
- Teledesic (www.teledesic.com)

VSAT builders:

- www.gilat.com
- www.hns.com
- www.hns.com/pdfs/hns-in-africa/pdf
- www.sciatl.com

For an overview of all little LEOs and how to approach their operators:

- www.amsat.org/amsat/sats/n7npr/satcom.html
- www.sstl.co.uk (Surrey Satellite Technology in the UK, where they are being built and some are being monitored)
- www.vita.org
- www.healthnet.org

Download only:

- www.worldspace.com
- www.interpacket.net
- www.infosat.co.za

Fast download via satellite, uplink via telephone:

- www.infosat.co.za
- www.menasat.net

Satellite operators with footprints over Africa:

- www.intelsat.int
- www.panamsat.com
- www.newskies.com
- www.eutelsat.com
- www.europestar.com
- www.inmarsat.com

Organisations that can help:

- www.iicd.org
- www.usaid.gov/leland
- www.idrc.ca/acacia/
- www.itu.int/ITU-D/

IICD PROFILE

The International Institute for Communication and Development (IICD) assists developing countries to realise locally-owned sustainable development by harnessing the potential of information and communication technologies (ICTs). The driving force behind IICD activities is that local 'change agents' themselves identify and develop proposals for realistic ICT applications - local ownership forms the essential basis for sustainable socio-economic development.

Acting as a catalyst, IICD's three-pronged strategy is mainly delivered through a series of integrated Country Programmes.

First, IICD facilitates ICT Roundtable Processes in selected developing countries, where local stakeholders identify and formulate ICT-supported policies and projects based on local needs.

Second, working with training partners in each country, Capacity Development activities are organised to develop the skills and other capacities identified by the local partners.

Third, IICD draws on its global network to provide information and advice to its local partners, also fostering local information exchange networks on the use of ICTs for development. The best practices and lessons learned are documented and disseminated internationally through a Knowledge Sharing programme.

In support of these activities, IICD invests in the development of concrete partnerships with public, private and non profit organisations, thus mobilising knowledge and resources needed by IICD and its local partners.

Country Programmes are currently being implemented in Bolivia, Burkina Faso, Ghana, Jamaica, Mali, Tanzania, Uganda and Zambia.