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E-INCLUSION: SATELLITES ARE THE ANSWER

SES delivers innovative connectivity to improve and save lives

The global digital divide is a reality. Billions of people in the developing world do not have access to broadband Internet, excluding them from the economic and social advantages of the connected world.

Internet access has the power to rapidly transform quality of life. In an emergency, connectivity can make the difference between life and death. Connecting a hospital gives it the power to call on the wealth of the world's medical knowledge. Connecting schools brings quality

learning material to children regardless of where they live. Connecting key events like elections enhances citizen participation in public life. And connectivity for the agriculture and financial services sectors puts the tools of opportunity in the hands of those that need it most.

Broadband Internet can have dramatic positive effects, but access is the key to releasing its potential. As Internet access and speed accelerates in some regions of the world, the digital divide gets larger, making the gap even more important to bridge. Satellites are the answer. High above the earth, satellites can provide connectivity anywhere and respond swiftly to evolving situations. SES has built on the strength of satellites to provide borderless connectivity and created a completely global network that reaches 99% of the

world's population. A space network is not enough though, which is why SES has deployed a wide range of platforms and applications on the ground that give the power of connectivity to those who need it most.

The first project was [emergency.lu](#), a revolutionary service to rapidly put connectivity in the hands of first responders, wherever they may be. [SATMED](#) quickly followed, providing long-term medical support in remote regions. Both of these are well-established projects that SES is using to widen its scope. Today, SES is innovating in the field of e-learning, e-elections, e-agriculture, and e-microfinance. These latest e-inclusion applications demonstrate the potential that connectivity has to change lives, and offer a window into the future.

SES[▲]
beyond frontiers

THE BEGINNING OF SES E-INCLUSION: EMERGENCY.LU

When the Luxembourg emergency response team returned from its mission in Haiti in 2010, its members could barely contain themselves in the face of the appalling human tragedy unleashed by the 7.0 magnitude earthquake that had devastated the Haitian capital Port-au-Prince and other parts of the country.

The earthquake affected a total of three million people and an estimated 150,000 people lost their lives. The first responders described scenes of chaos on the streets, doctors in the badly damaged hospitals quickly running out of essential medical supplies, and worst of all, not being able to do anything, at least not fast enough, to save more lives. Numerous other international teams on the ground brought back similar reports.

The collapse of the terrestrial communications infrastructure only added to the confusion, with most aid workers unable to communicate properly and rescue teams blocked at the airport with nowhere to go. The population of Haiti, with no telephone or Internet, was cut off from the rest of the world.



emergency.lu antenna

IDEA

Alarmed by the terrifying reports, the Luxembourg Ministry for Foreign and European affairs decided that things had to change, fast. It partnered with three Luxembourg-based companies and the idea of emergency.lu was born. They would create a communications platform capable of rapidly deploying a reliable satellite-based communications system into a disaster zone anywhere in the world.

The [Luxembourg Government](#) provided funding and the other partners the needed expertise. [Luxembourg Air Ambulance S.A.](#), based at Luxembourg Airport, own a fleet of five fixed-wing aircrafts that would provide rapid worldwide deployment with very short notice. [SES](#) would deploy a specialised, transportable satellite communications antenna and provide pre-booked satellite capacity. Finally, [HITEC Luxembourg S.A.](#) would deliver the equipment to close the loop of connectivity between the satellite connectivity and end-users.

INNOVATION

A lightweight satellite communications solution was needed because the traditional antenna and equipment that the project required could not be transported by jet and set up on the ground in a short timeframe and unstable environment. Therefore, SES and its partners created a complete satellite communications kit that included a lightweight antenna, small enough to fit in one of Air Ambulance's jets, easy to assemble, and extremely robust for use in extreme conditions.

To connect with satellites in Geostationary Earth Orbit (GEO) 36,000 km above the Earth in such difficult conditions, a specialised antenna was needed that came in the form of a balloon. Instead of a 2.4m solid antenna, this antenna breaks a traditional antenna into pieces and integrates them into a balloon. Breaking the antenna into separate parts reduces its size for transport, and the balloon makes it fast to deploy. On-site, the antenna is made whole again by inflating the balloon, which then sits on the ground set to the specific angle needed to pick up connectivity from a satellite.

While it may be delicate in appearance, the balloon is in fact extremely resilient: it can withstand all weather conditions, and even maintain connectivity if damaged.

Once it is deflated, the 2.4m antenna fits in a box and becomes part of the emergency.lu rapid deployment kit created by SES and HITEC. The complete kit contains six other boxes that, together with the antenna box, weigh 32kg. This Rapid Deployment Kit is designed for fast deployment in the immediate aftermath of a disaster. With a team on standby 24/7, an Air Ambulance jet equipped with one such kit on board is ready to take off within two hours from an alert. 12 to 20 hours later, the communications platform is deployed in the disaster zone. In the following days and weeks a Regular Deployment Kit containing a normal transportable antenna can be shipped by cargo to the disaster zone in order to provide long-term support.

Yet, emergency.lu is so much more than the hardware that re-establishes vital connectivity, it also includes a powerful set of applications. First responders

and aid workers only need to connect their laptops, tablets and smartphones to the emergency.lu network to access a number of vital tools. These allow them to do such things as communicate easily with headquarters via voice over IP (VoIP) and instant messaging, track aid workers' or convoy movements, get situation reports and plan aid distribution routes, and finally download local maps to get orientation and assess the surrounding situation. Together, these applications provide key capabilities that were missing in 2010 in Haiti.

IN ACTION

Since 2012 emergency.lu has been used around the globe. Generally deployed at the request of the [UN World Food Programme \(WFP\)](#), as the global lead in the [UN Emergency Telecommunication Cluster \(ETC\)](#), it can also be made available to other ECT members, or humanitarian organisations. This is done through Luxembourg, which has registered it as a contribution to the European Union's

[European Emergency Response Capacity](#). Since 2012, several systems have been stationed in South Sudan, Mali, and Venezuela among others. This included a deployment in the aftermath of the Haiyan typhoon that hit the Philippines in 2013, and during relief efforts in response to the 7.8 magnitude earthquake in Nepal in 2015. Five systems were also sent to West Africa in connection with the fight against the Ebola epidemic. In these instances emergency.lu was paired with SATMED (following page) and the [B-LiFE laboratory](#). The B-LiFE project delivers a rapid deployment laboratory to crisis zones, enabling quick diagnostic tests and swift responses to health crises.

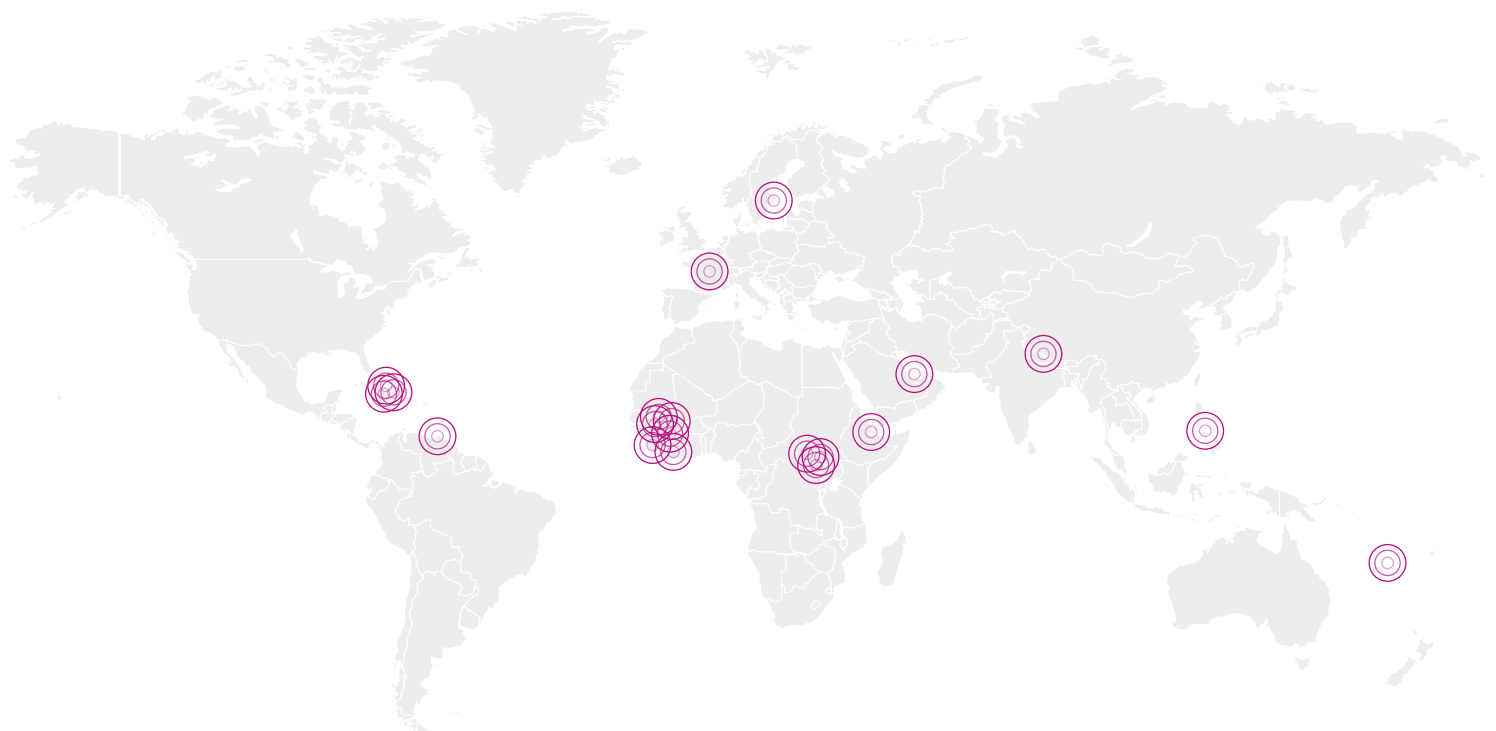
Most recently, one Rapid and one Regular Deployment Kits were installed in Haiti following aftermath of hurricane Matthew that hit the country in October 2016. For all of these missions, emergency.lu manages the entire service chain, including air transport, satellite infrastructure, terminals and application services, as well as training and refurbishment of the equipment after a mission.

THE FUTURE

Emergency.lu is now well established, but SES's philosophy is to permanently adapt solutions to needs on the ground and to foster innovation addressing those needs. The solution currently relies on local emergency generators, but in 2017 a "power box" will be integrated into the Rapid Deployment Kit. This will enable the platform to be connected to any kind of energy source, including solar and wind, which will increase the system's autonomy and make it even more reliable.

This will be of utmost importance in the coming years as the impact of climate change will likely worsen, and poverty and political instability will continue to generate migration and refugee movements. These trends may cause a paradigm shift for emergency.lu, from providing communication services to a relatively small group of humanitarian field workers in a disaster zone, to longer-lasting missions that provide means of communication to the affected local population. In turn this will require further capacity and innovative solutions.

Global emergency.lu deployments 2014-2016





A Friendship hospital boat in Bangladesh

LONG-TERM E-INCLUSION: SATMED

In the Bangladesh delta, local people make their homes on small remote islands in order to farm fertile land. The only way to reach these isolated communities is by ship; which is why a local NGO, Friendship, operates three floating hospitals. As they cruise along the rivers these ship board hospitals enable approximately 80 medical specialists to provide permanent healthcare for up to 200,000 patients per year.

In the spring of 2016, the Friendship staffs' challenging working conditions changed dramatically when a [SES team](#) installed maritime VSATs on their ships to provide connectivity, and enable them to use SES's cloud-based e-health platform, SATMED.

IDEA

Medical professionals in remote and resource-poor regions in many situations do not have access to e-health applications because of costs, lack of user-friendliness, poor interoperability between IT solutions and, last but not least, limited or non-existing internet access. Following the success of emergency.lu, SES approached this challenge, knowing that satellite services could overcome the issue of connectivity.

What was needed was a cost-efficient, robust and easy-to-use solution for rural or remote areas where computer

skills and financial resources are limited. With the valuable cooperation of [e-Medical Communication \(eMC\)](#), and funding from the [Luxembourg Government](#), SES was able to begin solving these issues with SATMED. A new kind of e-health platform, SATMED was developed with the support of innovative technologies established by leading universities and IT companies, and in close cooperation with five NGOs ([Friendship](#), [ArcheMed](#), [Fondation Follereau Luxembourg](#), [German Doctors](#) and [CURE](#)) to ensure that real needs on the ground were met.

INNOVATION

SATMED is a ground breaking internet based e-health application. It offers all the tools doctors in remote areas need to provide a wide range of e-health capabilities such as access and storage of patient e-records, medical imaging, e-learning, virtual consultation, remote monitoring and e-health management, combined with videoconferencing applications. In areas where internet access via the terrestrial infrastructure is not available, SES provides satellite-enhanced internet access using the same satellite capacity network as emergency.lu.

IN ACTION

Pilot projects enabled the e-health platform to be tested and adapted to specific requirements. User-friendliness was a top priority. That is why SATMED integrates a wide range of tools within a single platform. These tools are available as web applications that can be readily used on a desktop or mobile device, so they do not require any sophisticated and costly local IT infrastructure. All applications can be accessed via a single portal with the same user log-in, making SATMED particularly easy to use. The secure cloud service ensures the exchange, storage and back-up of highly-sensitive data according to strict governance rules, doing away with the need for local hosting and storage contracts.

What makes this solution so exciting is that it is so easy: all that is needed is a computer or a mobile device - and, of course, internet access. And when there is no access, SES is always there with the capability to provide connectivity everywhere.

The SATMED innovation is changing and improving healthcare across the world. Primarily created for NGOs, governmental institutions, hospitals, universities and health-management institutions, today SATMED is funded by the Luxembourg Government.

Thanks to SATMED, Bangladesh doctors and nurses can today share medical records among their ships as well as synchronise information at the headquarters in Dhaka. They are also able to connect to other doctors and gain access to medical knowledge from around the world that was previously inaccessible, provide medical counselling to marginalised communities, and train their personnel with e-learning. Connectivity is achieved with maritime VSATs installed on the deck of each floating hospital, and the tools are integrated into SATMED.

The Bangladesh project is a clear illustration of the way that satellite technology can benefit humanitarian

initiatives, but not exclusively. SATMED was first rolled-out in Sierra Leone as part of a pilot phase in 2014, when SES collaborated with the [Belgian First Aid and Support Team \(B-Fast\)](#) and the NGO German Doctors. Installed in the Serabu Hospital in the Bo District, Sierra Leone, SATMED brought internet access to this geographically isolated location. This was of particular importance during the Ebola outbreak, enabling the community to stay in contact with the medical staff, gather up-to-date information about the spread of the disease and to adopt preventive measures accordingly. Since then, SATMED, with the support of the NGO Fondation Follereau Luxembourg (FFL), has been deployed in Benin in a remote maternity hospital, in the district hospital in Allada, and in the CURE children's hospital in Niamey, Niger. In 2016 SATMED was also launched in the Philippines, in the isolated German Doctors' hospital in Buda on the island of Mindanao.

THE FUTURE

In September 2016 SATMED won the "Changing Lives Award" at the VSAT Global Event held in London. Building on the success of the first projects, SES is now exploring new SATMED applications in both humanitarian and commercial domains.



The SATMED application

THE FUTURE OF SES E-INCLUSION

E-LEARNING

One of the most fascinating e-inclusion stories is e-learning in the Zaatari refugee camp in Jordan. This vast camp in the desert is occupied by 80,000 people who have been forced to flee from their homeland by the war in Syria. Among them are more than 20,000 school age children. Beyond education, attending school provides a sense of routine and normality to these children who have endured violence and displacement.

SES, together with the German company [SOLARKIOSK](#), pioneered a special type of school among the nine regular schools in the Zaatari camp. The project, called “Connected Solar School” was developed to use SES connectivity for e-learning applications in combination with [SOLARKIOSK’s E-HUBB](#). E-HUBB is a structure designed by the Berlin-based architecture firm Graft and provides solar energy to power connectivity, lights, computers and printers within the school. By partnering with SOLARKIOSK, SES was able to build in the capability to provide Internet connectivity through [SES’s Astra Connect](#) broadband platform, to power quality e-learning materials sponsored by [UNICEF](#).

Being able to access online teaching material is a vital part of modern education. SES is now developing its cooperation with SOLARKIOSK to build upon the foundation created by the Zaatari camp project and establish new projects in Africa, where SES participates in other e-learning projects. Expansion will continue, bringing aid to teachers and children in schools across countries and empowering children.

E-ELECTIONS

Elections can pose a particular challenge in countries with limited communications access. Gathering votes and communicating to polling stations in large areas of the country is challenging without a reliable terrestrial telecommunications network. This is why Burkina Faso’s official electoral body, the [Commission Electorale Nationale Indépendante \(CENI\)](#) brought in SES and its partners to support Burkina Faso’s 2012 municipal elections. After the success of the 2012 project, CENI initiated the same approach again for the Burkina-Faso presidential elections in 2015.

In that instance, 368 polling stations across the country were equipped with VSAT terminals and served as a hub for the secure digital transmission of the vote tallies from over 18,000 electoral offices to the central CENI collection centre in the capital Ouagadougou. The provisional results were displayed in almost real-time on the Internet and by the public TV channel (RTB), allowing the public to accompany the evolution of the election results. The final result was then published the day after the presidential election, a first in Africa and a benchmark for future elections.





2015 Presidential election
in Burkina Faso



School children in Zaatar

E-AGRICULTURE

Beyond finance, digital technologies also have the potential to transform agriculture in the years ahead. Agricultural and rural development can be enhanced through improved information and communication; yet this requires connectivity to ensure that farmers in remote areas can benefit from useful applications and information related to their agricultural business. SES has been able to address this demand by establishing broadband internet connectivity via its Astra Connect platform wherever needed.

In the Netherlands over 200,000 households in mainly rural areas do not have access to high-speed internet, which limits agricultural entrepreneurs who depend on fast internet for the success of their businesses. Today 55,000 members of LTO Commerce, the sales division of the Dutch Federation of Agriculture and Horticulture, now benefit from Broadband provided through the Astra Connect platform. Connectivity in all businesses is vital, but particularly difficult in rural agricultural environments, making satellite the ideal solution.

E-MICROFINANCE

In developing countries, the market for microfinance is growing fast. However, remote sites often lack vital telecommunication services. The local mobile network is not suitable for business-critical transactions as it is usually congested and the quality of service is poor.

In the framework of the [SatFinAfrica](#) pilot project, which was run in collaboration with [ESA](#), supported by [Newtec](#), and led by pan-African ISP [SatADSL](#), Money transfer offices and Automatic Teller Machines (ATMs) in very remote areas were connected through SES bandwidth. The Astra Connect service was adapted by SatADSL to grant a reliable and secured communication system to money transfer companies or ATMs. After the successful completion of SatFinAfrica, the project team launched [SatCorpAfrica](#) project at the end of 2014. SatCorpAfrica aims at providing dedicated satellite services to Oil & Gas operators, the Mining and Banking industries, and more generally to Larger and Medium-Sized African companies with multiple sites located in remote areas of West Africa.

VITAL CONNECTIVITY

With a global network that reaches across borders, and services that are flexible and scalable, SES brings connectivity into reality overcoming the digital divide. As governments look for innovative solutions to achieve development goals, SES's powerful collection of reliable e-inclusion services will be there. From emergency.lu to e-microfinance, each project demonstrates how satellite technology improves and saves lives. Public Private Partnerships will be the key to harness the power of satellites in the Government and Institutional sector, and by fostering sustainable business models moving forward inclusive connectivity can be ensured. Supporting development across the globe, satellites are reducing the digital divide.

SATELLITES IMPROVE AND SAVE LIVES

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