BROADBAND CONNECTIVITY AND THE ROLE OF SATELLITE SOLUTIONS TO ADDRESS THE DIGITAL DIVIDE

Background

The European Satellite Operators Association understands that the Working Party on Communication Infrastructures and Services Policy (CISP), under the Committee for Information, Computer and Communication Policy (ICCP) of the Organisation for Economic Cooperation and Development (OECD) is presently working on 'Convergence and Next Generation Networks', which includes issues such as connectivity, access, digital divide and demand aggregation.

It has been brought to our attention that satellite communications technology is not considered in this context and as a potential solution to the digital divide, even though other wireless technologies such as Wi-Fi and WIMAX are discussed. With this document ESOA wishes to provide the OECD with information that we hope will be useful to understand the pivotal role that satellites already play and will continue to play as a contributory solution to the digital divide.

With this submission, ESOA hopes to contribute to a better understanding of the value of satellite broadband communications to address digital divide and related challenges.

Section 1

Introduction - Broadband Connectivity via Satellite

Communication satellites fly high above the earth's surface such that one satellite can in fact see and serve up to one third of the earth's surface at any given time. Satellites are part of an invisible infrastructure in the sky that successfully deliver services to millions of users who may not even know [or care] where those services come from. Given the robustness of satellites and their uninterrupted service, people may be unaware of the "rocket science" that underlies their service.

Bi-directional satellite connectivity services are therefore available quite literally anywhere, including in the vast areas not covered by modern wired (e.g. ADSL, fibre) or wireless (e.g. WiFi, WiMAX) terrestrial infrastructures.

Satellites are thus well suited to address the problem of digital divide. Furthermore, immediate provision of broadband access is enabled due to:

(i) The speed of deployment (within a few days of the order for Fixed Satellite Services (FSS) solutions or immediately for Mobile Satellite Service (MSS) solutions for "interim" connectivity/ communication solutions), and

(ii) The low equipment cost:
   a. around €1000 for 2-way broadband systems for FSS, intended for businesses and communitities, which comprise a below-a-meter antenna and an indoor unit of the size of DVD player, allowing bit-rates in the order of 2048 kbps in downlink and 1024 kbps in uplink.

b. As low as 200 euros for a 2-way broadband systems intended for consumers, allowing bit-rates in the order of 512-2048 kbps in downlink and 128-384 kbps in uplink
c. $1500 for a lightweight MSS data terminals enabling up to 500Kbit/sec and under 500$ for a mobile voice terminal.

Satellites therefore represent not only a 'natural' solution but also an easy and immediate one for overcoming geographical barriers to service provision.

As well as basic connectivity, data & voice services, satellites enable a range of other value-added solutions such as professional applications and services such as mobile broadband connectivity for aid and emergency situations, tele-education and tele-medecine, particularly relevant in rural, mountainous or developing regions such as Africa and SE Asia. All over the world, satellite broadband connectivity enables direct communications where other solutions are not feasible or provides the backbone technology for communications over terrestrial wireless technologies.

Section 2
Connectivity in Europe – Service, Cost and Challenges

Even in Europe where connectivity is taken for granted in most towns and cities, regional authorities have opted for satellite solutions to connect their rural and mountainous regions. Note for example the regions of Piedmont and Tuscany in Italy who awarded Local Administration Contracts for satellite services to act as a backhaul to connect their sites, Piedmont having 200 sites and Tuscany with 90, with the local access distribution often being provided using WiFi. In these cases, typical applications of the satellite network include "always on" broadband Internet access, access to central applications (in safe mode through VPN), VoIP, distance learning and remote monitoring and control. Another example is that of the region of Nordhessen in Germany, which, in May 2007, decided to offer Internet access via satellite to citizens and enterprises because no other solution was readily deployable.

On the one hand, the fact that the basic satellite infrastructure (teleport and satellite itself) is already in place means that a low CAPEX is required to procure the *service access* infrastructure. This is even *very low* when compared to the typical costs associated with laying fibre or radio relays. On the other hand, the OPEX required to purchase bandwidth, which is independent of the distance and the geographical location, can be higher than that of terrestrial technologies giving the same performance: a monthly subscription per site is usually in the order of 150-400 euros per month unless a very significant pan-regional demand aggregation can be found to drive down costs with the typical economies of scale of shared media.

In the domain of mobile communication, Mobile Satellite Systems are in some parts of the world, even more economical than tariffs applied by terrestrial systems for roaming users.

An interesting example how the OPEX is shared amongst communities, is presented by the West Midlands project in the UK. The West Midlands is a region in the UK with very limited ADSL coverage. The evident experience of deploying hybrid Satellite-WiFi networks in this and other projects across various regions in the UK and Ireland translates directly into working business models. For example a community of 10 users which is to be located within a radius of 2 kilometres can access the internet using satellite backhaul at a cost in the same region as standard ADSL. Users anywhere within the community can receive a service of 2Mbps by 512Kbps.

A key driver for deployment of FSS systems is finding of groups of users. The clustering of such communities has a significant positive effect on the CAPEX for such an FSS network. Clustering sites means deployment and maintenance cost is reduced and availability enhanced as local service teams can support an area quickly and effectively.

The imbalance between CAPEX and OPEX should therefore not be used as an excuse to disregard satellite technologies as a viable option, and sometimes even to leave entire regions unconnected, knowing that those areas might wait for years before terrestrial technologies reach them. While other solutions may not be ready or able to be rolled out today, the problem of digital divide is here today and so are satellite solutions. It only takes an aggregation of demand (generating economies of scale) to allow solutions competitive to other non-space-based solutions. Given the scale of the digital divide problem, such an aggregation of demand should not be impossible. Note further that an economic satellite solution does not depend on the aggregated demand necessarily being located in one geographic area; the demand can be dispersed over a wider area such as numerous countries of the European Union or the African continent.

Ensuring that the advantages of satellite such as speed, availability everywhere and independence from phone lines are understood, is crucial. This includes the education of users about pros and cons of the technology used and the overcoming of 'satellite myths'. Using e-commerce makes creating communities and connecting users significantly easier in locations within the coverage area. This reduces the cost of sale, which is often a hidden cost in many models. Public support is essential to speed up this process and allow the private sector to push into previously unconnected regions.

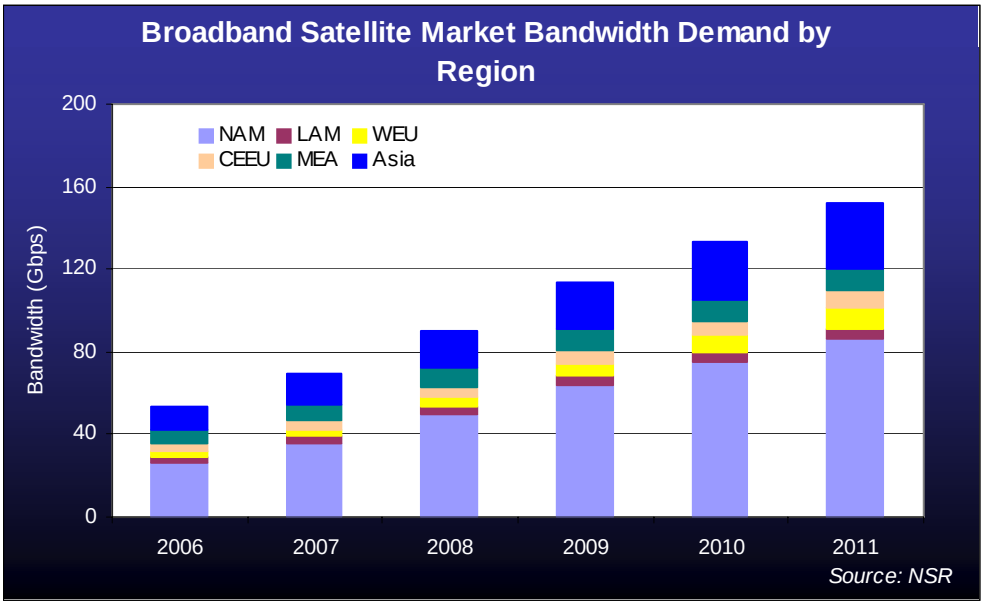
It is well documented that the early adoption of satellite technologies can create the conditions for a take-off of demand and supply of broadband services within the whole territory by reaching a critical mass of broadband users. Not only does this situation 'pull' the offer of new content and applications, but it also creates the basic pre-requisite for making investments needed for terrestrial services infrastructure economically viable. As the satellite resources are shared among many sites and re-assigned within the coverage area, satellite connectivity can be "shifted" *at no additional cost* from areas which are progressively being connected by broadband terrestrial infrastructure, e.g. fibre, to areas not yet connected, or to areas which, for economic reasons, will remain unconnected for many more years (those affected by structural digital divide). Finally satellite networks can indeed be perfectly integrated with other technologies to supply a seamless user service.

Good examples on this point are again the previously mentioned cases of Piedmont and Tuscany, where some terminals have been relocated from sites, which have now been reached by broadband terrestrial connectivity to other areas not yet served. Thus satellites have contributed to the development of the territory, with the relocation causing no modification to either the connectivity service or its costs.

More in general, satellites play a key role in the events of emergency and natural disasters.

As to the immediate future, attention has in the last year once again fallen on single-site satellite broadband services in Europe, following the emergence of single-site satellite broadband services in North America. These services are intended to serve unmet demand for broadband services, especially in Europe (see table below).

Price of terminals as low as 200 euros, and monthly subscription for the final users in the order of 30-100 euros per month for bit-rates in the order of 512-2048 kbps in downlink and 128-384 kbps in uplink, are available today.



Note also that satellite technology is also evolving to allow users data rates of 20Mbps forward and more than 2Mbps in the return using antennas as small as 66cm in diameter. These higher power satellites will also lead to more cost effective user equipment. Furthermore these satellites can allocate power between beams enabling specific local demand to be met.

More in general, interesting future perspectives exist for development of integrated solutions combining broadband satellite communications with satellite positioning and earth observation.

Section 3
Broadband for Developing Countries

The lack of a reliable communications infrastructure presents a real obstacle to the economic development of many of the world's poorest regions such as Africa. Given the vast expanse of land that the African continent spans with low population density in large parts of the continent, satellites are an obvious solution and one that many countries and international institutions are calling on to help address the African challenge. The New Partnership for Africa's Development (NEPAD), a joint initiative of African governments to stimulate socio-economic progress across the continent, is working with a number of ESOA members to reach its goal of improved telecommunications and broadband connectivity while simultaneously reducing costs.

(i) Connectivity as a service in itself: For much of Africa, the existing terrestrial networks are clustered around urban centres, leaving thousands of people and businesses in rural or remote areas with no access to voice, let alone data or broadband, connectivity. Satellite communications provides ubiquitous coverage over extremely large areas – several continents within one satellite footprint – with consistent and robust quality of service across the entire coverage area, enabling immediate access to broadband connectivity, IP data and 3G communications that are taken for granted in developed countries.

(ii) Education: One of the areas in which NEPAD has sought to use satellite broadband connectivity is in the delivery of educational resources to schools and colleges. Satellites can deliver e-learning resources directly to the schools, the teachers and the pupils that need them and even link schools with each other, to central information databases or with schools overseas. NEPAD has identified the access to satellite broadband communications technology as an important step in improving and increasing the educational programmes across Africa, and satellite operators are at the centre of a number of projects that aim to achieve this. The benefits

of e-learning can extend beyond schools too; for example, through human resources and training to improve the skills development of African employees.

One example is a project that was successfully implemented in South Africa. Two schools initially took part in successful trials, which used a compact and easy-to-use satellite terminal to connect four PCs and a wireless network. As well as accessing information on the Internet – information that the schools had previously not had any access to – the satellite connection supported new links between the African schools and UK-based schools. By connecting to a central server in Cape Town, it is also helped teachers share teaching resources and follow a national curriculum. The project was subsequently extended to 12 schools, before being taken nationwide.

(iii) Welfare & citizens: Satellite communications enable the networks with which African countries can enhance their democratic processes and civil governance, plan and build new infrastructures, establish health and disease management programmes, revitalise social and cultural life, and reduce the disparity between the rich and poor that is created by the digital divide. An example of how satellite connectivity reaches out to the citizens: mobile satellite technology is helping inhabitants of a remote African village collect their pension and social security without fear of fraud. The mobile units, which replace the need for people to walk many miles into an urban centre, are equipped with satellite communications for high-speed data connectivity. Fingerprints of the claimants are analysed and checked with a central IT database, ensuring that payments reach the people who need them most.

(iv) Support for commercial enterprise: Satellite broadband access is a proven competitive leveller for businesses in Africa - voice and data connectivity delivered by satellites enables African ownership and leadership in business, improves the opportunities for employment, and brings the power of networking across the continent and beyond. Today satellite operators are working with new African businesses in sectors as diverse as finance, oil and gas, manufacturing, professional services and IT. At a local level, they offer assistance to new service providers, helping build businesses that will deploy satellite communications in their own communities; for instance, using local knowledge to offer IT and communications facilities for other businesses in the area, establishing internet cafés in village centres, or renting out mobile satellite terminals so that businesses can share the cost.

An example here is the case of Deliflor, a leading Dutch grower of chrysanthemums, which was looking to expand its operation in Africa. It identified a suitable business partner in Ethiopia, located just a few hours outside of Addis Ababa. The local partner met all of the requirements of the Dutch company; except for connectivity. Deliflor's operations rely heavily on the data shared across its IT network. It used satellite connectivity to help its Ethiopian partner to establish a cost-effective communications solution, giving it a reliable data connection to its new partner in Holland. Thus satellite was instrumental in enabling a business which generated immediate local employment for 200 people at an approximate cost per terminal of €350 plus airtime used.

(v) Health and other challenges: In addition to NEPAD, members of ESOA work with various agencies of the United Nations and the European Union, and a large number of Non-Governmental Organisations (NGOs), to provide satellite communications that assist with development in Africa. A few examples: The UN World Food Programme is an agency, which relies on satellite connectivity between its offices. The UN World Health Organisation noted recently to ESOA that even though they are able to track the path of malaria carrying mosquitoes, they are unable to alert the villages and regions that will be affected due to lack of connectivity. This particular challenge will be addressed by the European Space Agency in the context of pilot projects to be implemented in collaboration with ESOA members.

Finally, it is worth highlighting the ability of satellite communications to provide simple mobile or transportable solutions, easy to deploy and operate for the development of itinerant services in rural areas.

Section 4
Conclusion

With this submission, ESOA hopes to contribute to a better understanding of the value of satellite broadband communications to address the digital divide and related challenges. Satellites offer a solution today *and* they can be sustainable in the medium- to long-term with an adequate aggregation at both regional and continental level, of the today fragmented demand in rural and isolated areas of the world.

We encourage CISP, ICCP and OECD to recognise satellite technology as a valid and proven means to deliver cost-effective answers to important global and economic challenges and to encourage those responsible for the appropriation of public funds to acknowledge this[1].

ESOA wishes to ensure that adequate visibility and priority is given to satellites in policy-making. Member Companies will continue to support all efforts requiring satellite capacity and services. Nevertheless public support and awareness is crucial to their ability to do this.

[1] The OECD recognized the role of satellites for bridging the digital divide in a study conducted in 2005 “Space 2030 - Tackling Society’s Challenges” where it is said on page 100: “In developing countries, satellite communications can allow the rapid deployment of communications services when terrestrial alternatives are underdeveloped, thereby contributing to economic and social development, for example providing distance education and tele-health services”.