European SatCom Policy:
A tool of international cooperation between Europe and Africa

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Introduction

The purpose of this chapter is to explore how European Satellite Communications (SatCom) policy can accelerate African development. One of the current European policy priorities is the Digital Agenda, with the ambition to bring broadband to every European citizen by 2013. This policy initiative promotes European growth as smart, sustainable and inclusive. The targets of the Digital Agenda can be pursued by different technologies, including SatCom, the advantage of which is to assure a uniform quality of service over a huge area of coverage. Due to their

geographical proximity, an appropriate SatCom solution that assures broadband for Europe can also serve a large part of Africa.

The last European Space Council in 2010 mentions the partnership on space with Africa as a way to support sustainable development of African continent and also in support of the Millennium Development Goals (MDGs). The expansion of broadband is a critical factor in development, and in meeting the MDGs. Broadband can deliver health services and education, as well as supporting cultural diversity and the generation of economic activity and management of climate change, natural disasters and other global crises. Highlighting the need for governments to raise broadband to the top of the development agenda and speed up its rollout, the importance of providing affordable broadband in the least developed countries is recommended.

It should be stressed that SatCom is often the best tool in the provision of broadband services in rural and remote areas, and in the case of natural disasters when land-based infrastructure is not available. In addition, this policy approach is consistent with the international space law principle that the exploration and use of outer space shall be carried out for the benefit of all people.

This chapter has two sections, the first describing the setting of broadband issues for Europe and Africa in terms of policy and technology, and the second presenting the current and planned SatCom capacities serving Europe and Africa where partnership with Africa can be enhanced.

The Setting: the Digital Agenda for broadband provision in Europe

Broadband as network and connectivity provision has numerous positive externalities[5] to enhance the welfare of every member of global society. This is also the rationale behind the European policy initiative, the Digital Agenda[6] to deploy broadband throughout Europe. The motivations behind

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[5]   For a comprehensive overview of the main positive impacts coming from broadband provisions ITU-Broadband Commission for Digital Development, see Broadband: a platform for progress, ©ITU/UNESCO, June 2011. It is available at: http://www.broadbandcommission.org/report2/full-report.pdf

[6]   European Commission, Communication from the Commission to the European Parliament, the Council, The European Economic and Social Committee and the Committee of the Regions, A Digital Agenda for Europe, COM (2010) 245 final/2, Brussels 2010. Available at http://ec.europa.eu/information_society/digital-agenda/documents/digital-agenda-communication-en.pdf

the Digital Agenda came from various external factors, including socio-economic and technological issues.   Previously distinct communication networks and services are today converging onto one network thanks to the digitalization of content, the emergence of IP, and the adoption of high-speed broadband.   But convergence has other aspects as well, including network convergence,[7] service convergence,[8] industry/market convergence,[9] legislative, institutional and regulatory convergence and also co-operation,[10] device convergence,[11] and converged user experience.[12] The movement towards convergence has been based on the evolution of technologies and business models, and this process has led to entry of new players into the market, increasing competition among players operating in different markets, and the necessity for traditional operators to co-operate with companies that were previously in other fields.

As a result, convergence touches not only the communication sector, but involves a wider range of activities at different levels across all market dimensions,[13] including the manufacturers of terminal equipment, software developers, media content providers, ISPs, etc.

What broadband requires is:

☐ High speed communication systems for transferring of complex data-packages;

☐ Always-on systems where there is no limit in terms of time access and location;

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[7] It is driven by the shift towards IP-based broadband networks. It includes fixed-mobile convergence and 'three screen convergence' (mobile, TV and computer).

[8] It stems from network convergence and innovative handsets, which allows access to web-based applications and the provision of traditional and new value-added services from a multiplicity of devices.

[9] It brings together in the same field industries such as information technology, telecommunication, and media, formerly operating in separate markets.

[10] It is taking place between broadcasting and telecommunication regulation. Policy makers are considering converged regulation to address content or services independently from the networks over which they are provided (technology neutral regulation).

[11] Most devices include a microprocessor, a screen, storage, input device and some kind of network connection. Increasingly they provide multiple communication functions and applications.

[12] There is unique interface between end-users and telecommunications, new media, and computer technologies.

[13] To get a comprehensive view of broadband the concept of business ecosystem see ESPI Perspective n. 59, Veronica La Regina and Chris Wilkins, The Appropriateness of Public-Private Partnerships for SatCom in Delivering the Digital Agenda, April 2012, http://www.espi.or.at/images/stories/dokumente/Perspectives/ESPI_Perspectives_59.pdf

☐   Two-way capability to guarantee interaction.

The EC has described its goals for the Digital Agenda in the following terms: "The objective is to bring basic broadband to all Europeans by 2013 and seeks to ensure that, by 2020, (i) all Europeans have access to much higher internet speeds of above 30 Mbps (fast broadband) and (ii) 50% or more of European households subscribe to internet connections above 100 Mbps (ultra-fast broadband)." [14]

Achieving these targets requires two types of technological action: extending the network reach, and upgrading the network to higher capacity. Three groups of technologies are required including wired, terrestrial wireless technologies, and SatCom.

Technology Action	Variable		Fixed	Terrestrial Wireless	SatCom
Extending the network		Investment	High	Medium	Low
	System Requirement	Backhaul	High	High	Low
		Last - Km	High	Medium	Low
		Number of People served	High	Medium	Low
		Land Coverage	High	High	Low
Upgrading the network		Investment	High	Medium	High
	System Requirement	Backhaul	High	High	Low
		Last - Km	High	Medium	Low
		Number of People served	High	Medium	Low
		Land Coverage	High	High	Low

Table 1: Matrix of Technology Actions and technologies for broadband implementation

At present, satellite capacity already in orbit can easily provide the

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[14]   European policy initiative, Europe 2020, pursues and establishes the concept of smart, sustainable and inclusive growth. See, EC, Communication from the Commission to the European Parliament, the Council, The European Economic and Social Committee and the Committee of the Regions, Europe 2020 Flagship Initiative - Innovation Union, SEC (2010) 1161, Brussels, 6.10.2010, COM(2010) 546 final.

basic broadband where no alternative network exists[15] and where terrestrial networks are not economically affordable as shown in Table 1.

There is significant scientific literature[16] following the seminal work of Haavelmo[17] which shows that investment in infrastructure increases GDP. There have also been several studies demonstrating that investment in broadband also enhances growth of GDP, the rate of job growth, cost saving and efficiency, serving as a communication and transaction platform for the entire economy that can improve productivity across all sectors. Broadband networks are increasingly being recognized as fundamental for economic and social development, and advanced communication networks are a key component of innovation ecosystems.

Broadband networks also increase the impact and efficiency of public and private investments that depend on high-speed communications as a complementary investment to other infrastructure such as buildings, roads, transportation systems, health and electricity grids, allowing them to be "smart" and save energy, assist care for the aging, and improve safety.

As noted above, the main challenge of SatCom is upgrading capacity, which is fixed from the beginning of its development. The development of a SatCom system does not have an exit strategy.

Currently, fixed technology has generally been adopted, but as it does not exist in remote locations, the extension of the network is costly. The cost should be lower with terrestrial wireless, but it still requires ground infrastructure such as radio bridges.   This often includes a satellite backhaul connection through Very Small Aperture Terminals, usually coupled with wireless technologies such as Wi-Fi.   This combination allows access to telecommunication and data services even to more remote areas, albeit with limited and expensive bandwidth.

Backhauling by satellite is affordable with low effort, as the addressable footprint is usually bigger than a single country.

Government investment in broadband networks will likely include a mixture of extending access to unserved/underserved areas and upgrading infrastructure in areas that already have connectivity.

There are a number of technological choices to be considered, each of which has benefits and drawbacks.   When policy makers focus on connectivity the variables to consider include the number of impacted

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[15]   It is digital divide due to lack of infrastructure.

[16]   See inter alia W. T. Stanbury, Perspectives on the New Economics and Regulation of Telecommunications, IRPP, 1996 ; OECD, The role of communication infrastructure investment in economic recovery, 2009.

[17]   Haavelmo, Trygve, A Study in the Theory of Economic Evolution, Amsterdam: North-Holland, 1954.

users, the marginal improvements users will receive, the capacity of the network, longevity and upgradability of the system, and the strategic value of the projects.

Governments also consider the number of users who will benefit from any network investment, and in the case of the Digital Agenda, the social objective is to not exclude anyone. Delivering low-speed broadband to areas previously without connectivity will likely have a different impact than upgrading network capacity for existing users from 10 Mbitps to 100 Mbitps.

The long term impacts of network investment on productivity are linked to their practical life span. Networks with long predicted life spans will produce higher aggregate impacts on GDP and growth than those which may need to be upgraded or rebuilt after only a few years. SatCom offers a nearly limitless upgrade path, while other technologies may not be able to accommodate higher speeds without significant investment in new network infrastructure.

In addition to these technology-related issues, the geography and demographics of Africa are also important factors in examining the relationship between Europe and its neighbor to the south.

The Geographic Relationship between Europe and Africa

The geographic position of Europe is generally presented from a European-centric point of view,[18] as shown on the left side of Figure 1. The image to the right shows the same geography from a different perspective that is highly relevant to the SatCom conversation.

The European continent was originally sandwiched between several future continents, and was ripped from Africa when North America and Greenland pulled away. Then the block struck Asia, and all of Asia and Europe pivoted on Iran. As Europe was driven back into the Mediterranean, compression raised the mountains along Southern Europe and North Africa, while friction formed mountains in Scandinavia. The final stop built the Ural Mountains.[19] The plate tectonics are shown in Figure 2.

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[18]   Probably the first maps of Europe are dated around 1100 with the Crusade routes.
[19]   "The Geological and Tectonic Framework of Europe," by J.A. Plant, A. Whittaker, A. Demetriades, B. De Vivo, and J. Lexa, in Geochemical Atlas of Europe. Part 1 - Background Information, Methodology, and Maps, Salminen R. (Chief-editor), 2005.
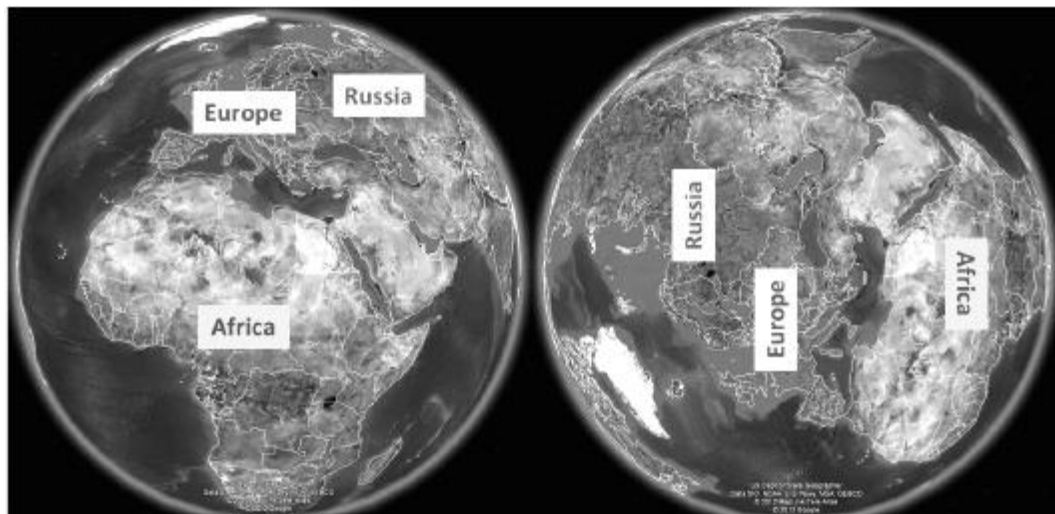
Figure 1 : Geographical position of Europe, Russia and Africa on the Globe
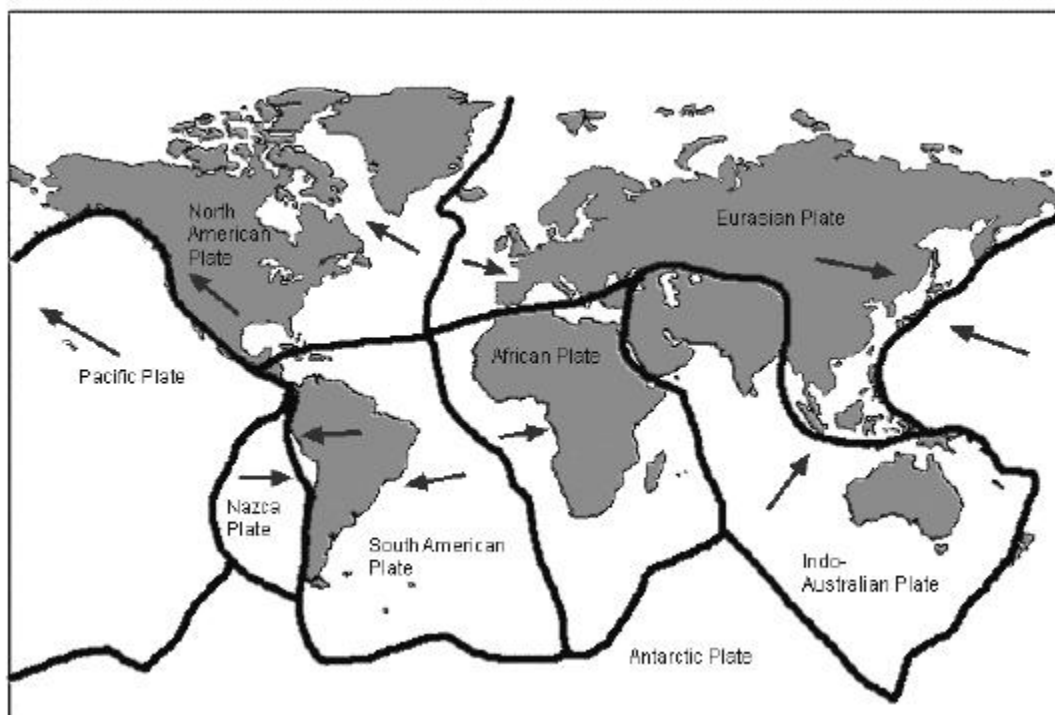Source : ©Google Earth – Elaboration by the author

Figure 2 : Global map of tectonic plates
Source : http://www.geography-
site.co.uk/pages/physical/earth/images/plates.gif

The Eurasian plate is 85% land mass, with a highly undefined plate boundary on its southern border connecting to the African, Indian and Australian plates. The continents are converging, and for many millions of years the northern edge of the African tectonic plate has descended under

Europe's. The main geologic features of the present-day Mediterranean result from two major processes, the tectonic displacement caused by the sub-conduction of the African plate underneath the Eurasian plate, and the progressive closure of the Mediterranean Sea involving a series of submarine-insular sills.

This combination of factors results in earthquakes, volcanic eruptions, droughts, tsunamis and similar phenomena that often have as consequences critical conditions with huge impact on critical infrastructures such as power plants and distribution networks, transportation networks, and communications systems.   Further, the complex relationships among various critical infrastructure elements result in infrastructure interdependencies.[20]

Disasters often directly impact telecommunication infrastructures, while a disaster in itself increases the need for communications, so high data traffic occurs and increased throughput and bandwidth are needed. Further, high traffic volumes can adversely impact on communications among response teams, which increases the reaction time for rescue and relief operations.

Satellite communications providers support recovery efforts following such disaster events by prioritizing the allocation of satellite transponders to the ministries of Defense, National Police Agencies and other government and public sector institutions that conduct disaster relief activities. People access the Internet through satellite connections as mobile and fixed common carriers use satellite communications for replacement of their damaged networks.

Public utilities such as railroad companies and electric power companies also become dependent on satellites. Railway operators employ satellite connections to minimize the impact of land-based disasters by transmitting early warnings and other information from disasters detectors to moving trains.

Demographic Overview

Demographically, Africa is the second most populated area of the world, accounting for some 15% of the world's population, but only 2.5% of world GDP. Europe's population is 11% of the world's, and 7% for the

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[20]   Saifur Rahman, Impact of Natural Disasters on Critical Infrastructures, 2005, http://www.emisa.vt.edu/2DOC/EAPC_Panel-2_06.pdf

EU-27.[21]

Africa's population growth rate is double the world's, but its population density is lower, at 39 per km^2, while the world average is 51 people per km^2. This geographic dispersion requires significant resources and complex systems to assure welfare, safety and security across vast territories.[22]

Africa has high socio-economic inequality, with a few rich persons and many poor.   With a Gini coefficient of 51%, Africa has the worst income distribution in the World.[23]   This causes Africa to have great exposure to external economic shocks, and thus African inflation ran at a damaging rate of 8% per year between 2000 and 2010.[24]

Africa is crucial to Europe's energy supply, as it exports 120M tons of crude oil annually, while the EU exports back to Africa 23M tons of refined oil products.

With these factors in mind, let us now examine the policies that link Europe and Africa.

Policy Initiatives Affecting the Relationship Between EU and Africa

The policy relationship between Europe and Africa encompasses a number of initiatives, including bilateral agreements and partnerships between EU and the African Union, and between European member states and various African states.

Here is a list of some of the pertinent agreements.

Year	Policy Initiative	Remarks
2000, 3-4 April	Cairo Declaration and Cairo Action Plan	Initial Africa – EU Summit
2001, 11 October	1st Africa-Europe Ministerial Meeting	Joint declaration on terrorism
2002, 28 November	Africa-Europe Ministerial Meeting	Initial policy development from human rights to trade and markets
2003, 10 November	EU-Africa Dialogue - Ministerial Troïkas	Enhancement of the dialogue; establishment of the governance models

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[21]   Eurostast, EU-Africa Summit - Revival of EU27 trade in goods with Africa in the first nine months of 2010, News release, STAT/10/178, 26 November 2010.
[22]   Niall Ferguson, Civilization: The West and the Rest, The Penguin Press HC, 2011.
[23]   UNECA, African economies at the start of the 21$_{st}$ Century   , 2008.
[24]   OECD, Statistic Reports, 2011.

	Meeting	
2004, 1 April	2nd EU-Africa Ministerial meeting	Peace and security are the key-topics
2004, 4 December	Africa – Europe Dialogue 3rd Meeting of the Troïkas	Ministers recognized the widening digital gap between Africa and the rest of the world as a serious setback in the efforts to bring about sustainable development, poverty eradication and integration of the continent in the global information society.
2005, 13 April	4th EU-Africa Ministerial meeting	Initial plan on capacity building on peace and security
2005, 2 December	5th EU-Africa Ministerial meeting	Enhancing and monitoring the dialogue
2005, 19 December	The EU and Africa: Towards a strategic partnership	Initial proposal for EU and Africa partnership
2006, 8 May	6th EU – Africa Ministerial Troika Meeting	The Partnership is intended to both have a wide scope and promote interconnectivity in regional infrastructure networks (roads, rails, ports, energy, water and ICT).
2006, 10 October	7th EU - Africa Ministerial Troika Meeting	The European Commission informed the meeting about the launch in July 2006 of the EU – Africa Infrastructure Partnership, which constitutes the EU's response to the NEPAD short-term Infrastructure Action Plan. Ministers welcomed the Partnership, which will support programs in the sectors of transport, energy, water and sanitation and ICTs that facilitate interconnectivity at continental and regional level.
2007, 15 May	8th EU – Africa Ministerial Troika Meeting	The launch in September 2007 of the EU Africa Infrastructure Partnership and Steering Committee to support AU/NEPAD infrastructure Short Term Action Plan (i-STAP) and Medium to Long Term Strategic Framework (MLTSF) programs in the sectors of transport, energy, water and sanitation and Information and Communication Technologies to facilitate interconnectivity and access to services

		at continental, regional and national levels in Africa.
2007	Commission/Council Secretariat Joint Paper, Beyond Lisbon Making the EU-Africa Strategic Partnership work	In the area of Information and Communications Technology (ICT) the partnership aims at bridging the digital divide that limits access to modern telephony and internet services. It should address the harmonization of policy and regulatory frameworks, the investment in broadband infrastructure and support non-commercial e-services.
2007, 7 -8 December	Lisbon Declaration - EU Africa Summit	Initial step of Africa Forum and further EU – Africa Partnership
2008, 16 September	10th Africa – EU Ministerial Troika Meeting	Enhancement of the governance model
2008, 10 November	Council Conclusions on trilateral dialogue and cooperation between the European Union, China and Africa	The Council urges Africa and China to cooperate with the EU in establishing trilateral dialogue and cooperation.
2008, 20 - 21 November	11th Africa - EU Ministerial Troika meeting	Establishment of "Africa-EU Partnership on Science, Information Society and Space"
2009, 28 April	12th Africa - EU Ministerial Troika meeting	Development of the people-centred dimension of the Partnership
2009, 14 October	13th Africa - EU Ministerial Troika meeting	Implementation of the Joint Africa-EU Strategy
2010, 26 April	14th Africa – EU Ministerial Meeting	Implementation of the Joint Strategy
2010, 19 November	15th Africa – EU Ministerial Meeting	Preparations for the 3rd EU Africa Summit
2010, 29 – 30 November	Tripoli Declaration 3rd Africa EU Summit	Enhancement and strength of the cooperation
2010, 30 November	New Joint Africa – EU Strategy (JAES)	Promotion for an inclusive and sustainable growth with the involvement of private actors and entrepreneurship

Table 2: The main key-policy documents of Africa – EU International Relations

The Lisbon Declaration in 2007 led to further partnerships and the Millennium Development Goals, a robust peace and security architecture in Africa, the strengthening of investment, growth and prosperity through

regional integration and closer economic ties, the promotion of good governance and human rights, and the creation of opportunities for shaping global governance in an open and multilateral framework. Here is a clear reminder of strategic partnership as enabler of the Joint Strategy and the Action Plan.

The first joint Africa–EU strategy[25] identified four objectives: the Africa-EU political partnership; the promotion of peace, security, democratic governance and human rights, fundamental freedoms, gender equality, sustainable economic development and Millennium Development Goals (MDGs); the sustenance of a multilateral system for addressing global challenges; and support for people-centered partnership including non-state actors. The same policy initiative establishes a strategy framework of four areas: peace and security; governance and human rights; trade and regional integration; and key development issues. This last cluster foresees policy as a tool for accelerating progress towards the MDGs. For the purposes of this chapter, the relevant points are n. 59 as an element of "Human and social development;"[26] n. 66 under "Environmental Sustainability and Climate Change"[27] and n. 84 under "Development of Knowledge-based Societies."[28]

This partnership required a further action plan, named "First Action Plan 2008 – 2010 for the implementation of the Africa – EU Strategic Partnership." This document proposed a list of priority actions, and among them there are two specific actions of relevance here, number 8, "Africa –

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[25] It is linked with the previous African Union Constitutive Act and Strategic Framework 2004-2007 and the EU Africa Strategy of 2005.

[26] From the 1st Joint Africa-EU strategy: (…) Furthermore, building upon the 2007 Addis Ababa Declaration on Science Technology and Scientific Research for Development, Africa and the EU shall strengthen their cooperation in these areas. In this context, attention will also be paid to space-based technology, applications and sciences.(…)

[27] From the 1st Joint Africa-EU strategy: (…) Africa and the EU should strengthen existing cooperation mechanisms and programs relating to the use of space technologies and space-based systems.(…)

[28] From the 1st Joint Africa-EU strategy: (…) Africa and the EU will strengthen their cooperation in building knowledge-based societies and economies. Both sides recognize that the development of S&T and innovation is one of the essential engines of socio-economic growth and sustainable development in Africa; that competitiveness in the global economy is increasingly dependent on knowledge and innovative ways of applying modern technology, especially Information and Communication Technology (ICT); and that meeting the MDGs requires a special global effort to build scientific and technological capacities in Africa. Thus partnerships and investments advancing access to ICT infrastructure, access to quality education, and the development of science and technology and innovation systems in Africa are crucial for attaining all other development goals. (…)

EU Partnership on Science, Information Science and Space" established the objective, the expected outcome, the related activities, the involved actors and sources of finance. Telecommunication is an element of all the priority actions of this section, as they are a crucial element to bridging the digital divide and scientific divide, and to enhancing cooperation in the use of suitable and affordable space applications to support African development.

This plan brought deployment of EASSy,[29] a 10.000Km submarine fiber optic multi-point cable system along the East coast of Africa, which became operational in 2010. The project was funded by Infrastructure Trust Fund of 3.6 million Euros.

Ancillary actions, more focused on applications, have been the EU project of AfricaConnect for 12m Euros, supporting the deployment of regional research and education networks in Africa, and their interconnection with the European GEANT network. The objective is to provide the African scientific community with better access to research and education resources, and higher capacity access the internet. The AXIS project mobilized by Luxembourg supports the deployment of local internet exchange points through the Infrastructure Trust fund, with initial contribution of US$4m.[30]

The 3rd Africa–EU Summit took place in Tripoli on November 29-30, 2010 resulting in the Tripoli Declaration. The partnership was confirmed and a new Joint Africa–EU Strategy (JAES) 2011-2013 was adopted, which includes the involvement of private actors and entrepreneurship. These two peculiar attributes of growth come from "Europe 2020," a 10-year strategy proposed by the EC in March 2010 for reviving the economy

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[29]   The Eastern African Submarine Cable System (EASSy), an undersea fiber optic cable system connecting countries of Eastern Africa to the rest of world was switched in 2011. Fiber is coming into Africa by the bucket load.

[30]   From Luxembourg's Department of International Cooperation : En 2010, la Coopération luxembourgeoise a ainsi répondu favorablement à une demande du Fonds fiduciaire l'UE-Afrique pour les infrastructures auquel elle a contribué deux millions d'euros au démarrage en 2007 et a décidé d'appuyer deux projets financés par ce fonds : le projet « Satellite-enhanced Telemedicine and eHealth for Sub-Saharan Africa » et le projet « African Internet Exchange System (AXIS) ». Pour ces deux projets, Lux-Development joue pour le compte de l'Etat luxembourgeois le rôle de « lead financier ». L'agence est responsable pour la mobilisation et la gestion de l'assistance techniqueLe projet de télémédecine est portée par une « Telemedicine Task force » au sein de laquelle figurent la Commission de l'Union africaine, le NEPAD (Nouveau partenariat pour le développement de l'Afrique), la Banque africaine de développement, les organisations africaines régionales, l'OMS (Organisation mondiale de la santé), la Commission européenne et l'ESA (Agence spatiale européenne). Cette dernière est le principal porteur du projet qui consiste dans une première phase (4 ans) en une série d'études avec un budget de 4,17 millions d'euros.

of the EU that aims at "smart, sustainable, inclusive growth" with greater coordination of national and European policy.[31]

The Tripoli Declaration emphasized issues related to technology transfer to promote a knowledge-based society, which requires a solid and consistent telecommunication network and related infrastructure to support the integration of Africa into the global economy. The EU committed itself to collect 0.7% of its Gross National Income by 2015 for aid spending in Africa with a substantial fund of 50 billion Euros of Oversea Development Aid (ODA) to support the overall Africa–EU Partnership.

This declaration is linked with the Action Plan 2011 - 2013, issued and adopted by the 3rd Summit EU–Africa. The Action Plan identifies 8 thematic partnerships,[32] of which telecommunications are an element of partnership number 3, Regional Integration, Trade and Infrastructure, and number 8, Science, Information Society and Space.

The Action Plan also has a section describing cross-cutting issues in terms of political architecture, financial structure, and policy tools. Advocacy for backbone infrastructure will be done as a policy of regional economic integration, trade and infrastructure.   The partnership for Science, Information Society and Space includes telecommunication as a cross-cutting element supporting the deployment of the other development objectives of the Action Plan.

The role of network and connectivity is described mainly as support

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[31] Europe 2020 identifies five headline targets: 1. Employment: 75% of 20-64 year-olds to be employed; 2. R&D and Innovation: 3% of the EU's GDP to be invested in public and private R&D for innovation; 3. Climate Change & Energy: reducing greenhouse gas emissions 20% (or even 30%, if a satisfactory international agreement can be achieved to follow Kyoto) lower than in 1990, providing 20% of energy from renewable sources, saving of emissions through at least 20% increase in energy efficiency; 4. Education: Reducing school drop-out rates below 10% at least 40% of 30 - 34 year-olds completing third level education (or equivalent); 5. Poverty & Social Exclusion: at least 20 million fewer people in, or at risk of, poverty and social exclusion. These targets will be implemented through national targets in each European country, reflecting different situations and circumstances. They are highlighted through 12 Flagship Initiatives which contain three segments of Growth: smart, sustainable and inclusive.

[32] The eight thematic partnerships are :
1.   Peace and Security;
2.   Democratic Governance and Human Rights;
3.   Regional Integration, Trade and infrastructure;
4.   Millennium Development Goals;
5.   Energy;
6.   Climate Change and Environment;
7.   Migration, Mobility and Employment;
8.   Science, Information Society and Space.

for the development of an inclusive information society in Africa, in line with the guidelines of the Europe 2020 Digital Agenda and the Africa Union ICT development framework.   Implementation is expected to be done by multiple stakeholder groups such as the Africa Union Commission, the EC, national entities dealing with ICT policy, research communities, NGOs, private companies, and international organizations to enhance cooperation at all levels to address poverty reduction, economic growth, social development, and regional integration.

The Role of SatCom in the Africa – EU Partnership

The core issue inhibiting the African continent from achieving intensive and wide broadband access is the lack of infrastructure, including

Figure 3: Intra-Africa Optical Fibre Network
Source: Mon, 07/12/2010 - 17:03 — ©UbuntuNet

telecommunication networks and electricity systems.

      The coastlines benefit from the backbone and cable infrastructure developed to connect Africa with the other regions, but huge areas lack any telecommunication infrastructure, as shown in Figure 3.   This prevents Africa from achieving its proper role at the global level, and its interaction with other regions is actually declining.   African internet traffic is about 0.7% of overall world traffic.

      If broadband brings several positive externalities, its absence implies numerous negative externalities.   Global traffic in terms of billions of minutes is shown below in Table 3.

Interregional Flow	Traffic (B.ns of minutes)	Interregional Flow	Traffic (B.ns of minutes)
US Canada – Europe	12,2	Europe – US Canada	8,8
Europe – US Canada	8,8	US Canada – Europe	12,2
US Canada – Asia	21,7	Europe – Asia	12,7
Asia – US Canada	6,8	Asia – Europe	5,4
US Canada – South America	30.3	Europe – South America	3,5
South America – US Canada	5.5	South America – Europe	1,3
US Canada – Africa	2,7	Europe – Africa	6,4
Africa – US Canada	0,5	Africa – Europe	0,9
IN- Flow Total	21, 6	IN- Flow Total	19,8
OUT – Flow Total	66, 9	OUT – Flow Total	31,4
Asia – Europe	5,4	South America – US Canada	5,5
Europe – Asia	12,7	US Canada – South America	30,3
Asia – South America	0,3	South America – Europe	1,3
South America – Asia	-	Europe – South America	3,5
Asia – Africa	2,3	South America – Africa	-
Africa – Asia	0,5	Africa – South America	-
Asia – US Canada	6,8	South America – Asia	-
US Canada – Asia	21,7	Asia – South America	0,3
IN- Flow Total	34,9	IN- Flow Total	34,1

OUT – Flow Total	14,8	OUT – Flow Total	6,8	
Africa – Europe	0,9			
Europe – Africa	6,4			
Africa – South America	-			
South America – Africa	-			
Africa – Asia	0,5			
Asia – Africa	2,3			
Africa – US Canada	0,5			
US Canada – Africa	2,7			
IN- Flow Total	11,4			
OUT – Flow Total	1,9			

Table 3: Interregional Traffic Flow, 2012
Source: © Telegeography, with elaboration by the author

An assessment of the internet traffic within and between each region, and shows that Africa is quite isolated from the rest of the world. To bring African infrastructure towards world standards, it needs upgrading and extension of national networks; development of communication capabilities and rural communications; rapid expansion of communications skills and manpower development institutions; appropriate use of new communication technologies for national and interregional communications; continuing expansion of the terrestrial communication network project (Pan-African Telecommunications Network, PANAFTEL); and establishment of telecommunication, broadcasting and related equipment manufacturing facilities.

Despite the lack of capability, demand for telecommunications in the developing economies of Africa does exist. There is also the abundant supply capacity of the developed countries willing to serve this market. However, the mutually beneficial arrangements acceptable to both sides have still to be created.

Each African country has its own specific problems, but some common constraints are evident. Most African countries have established basic national telecommunications networks that are small and concentrated in the urban areas. International and some of the intra-African traffic is provided by satellite Earth stations. Rural areas in Africa remain especially poorly served, and with some exceptions, are given low priority by national telecommunication administrations. The low initial

revenue potential from rural services is in part responsible. In operation, these services are sometimes inefficient, slow, and very expensive.

Alternatively, international services operating within the same network are faster and often of better quality. In spite of the progress made in the development of the Pan-African Telecommunications Networks (PANAFTEL), it is still limited in scope. Utilization of the network by its potential users for radio broadcast, television services, aeronautical and meteorological services and press and news agencies, etc. is very low, in part due to operations difficulties, poor maintenance, in some cases high tariffs, absence of operational agreements, shortage of trained manpower and spare parts, and poor management, as well as the need for upgrading some of the earlier installations, utilization of new technologies and inter-connection to other sub-regional section of the PANAFTEL Network.

Satellite broadband access can be a fast and feasible solution to complement terrestrial broadband services and ensure coverage to the most remote areas.   The technology has improved enormously in terms of reduced transmission delay and throughputs of capacity per time unit.

Early in 2013 the West Africa Cable System (WACS), an ultra-high capacity, fibre optic, submarine cable system that will link countries in Southern Africa, Western Africa and Europe, will be switched on.

With one stroke a huge of amount of a new capacity will come to Africa. The system will play a key role in reducing digital divides across the region and connecting Africa with the rest of the world, but this is by no means the only new network.   Figure 5 shows current and planned telecommunication networks by terrestrial technologies which are along the coastline. This again has the weakness of not serving peoples living in the internal areas and in locations remote from the main cities.   The main owners of these infrastructures are multinational companies[33] of developed nations, and their goal is to seek business profit.

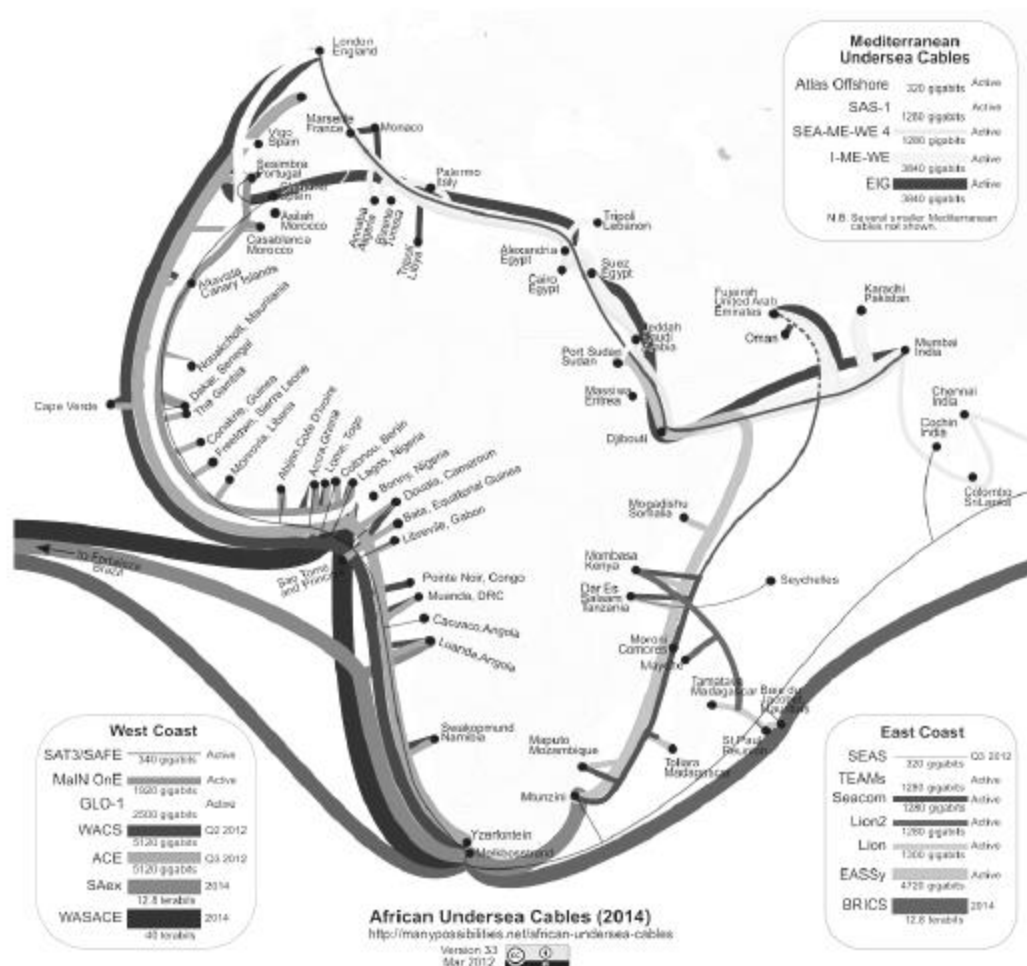[33]   See http://manypossibilities.net/african-undersea-cables/

Figure 4: Planned Telecommunication Networks for Africa
Source: http://farm6.staticflickr.com/5120/7087121729_9de109f3b9_b.jpg

The implementation of a terrestrial telecommunication network covering the entire African land is huge expense and also requires long lead time. Thus, an obvious alternative is to consider SatCom, already present in the area guaranteeing connectivity through C-Ban and Ku-Band, and also with the potential of Ka-Band.

Figures 5 and 6 show the current availability of KU and C band SatCom over Africa. In addition, several commercial ventures are operational for Ka-Band over Africa,[34] and there is also an innovative SatCom system, O3B,[35] with the specific mission of providing broadband to Africa.

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[34]   ESPI Report 32 – Veronica La Regina, SatCom Policy in Europe, May 2011;
       http://www.espi.or.at/images/stories/dokumente/studies/ESPI_Report_32_web.pdf
[35]   See http://www.o3bnetworks.com/

Beam strength (dBW)

Source: Satellite operators. Cartography: Paul Hamilton.

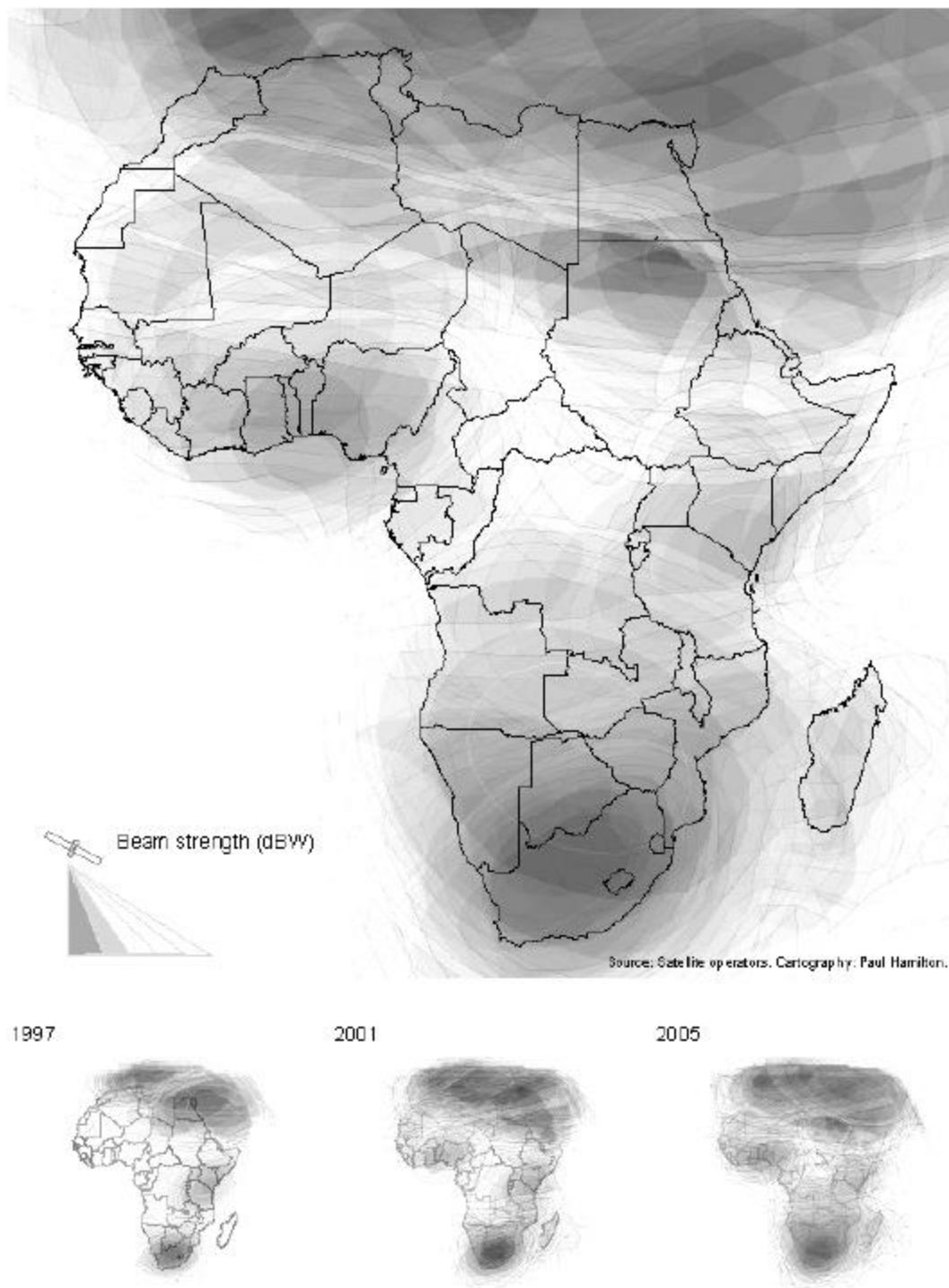1997   2001   2005

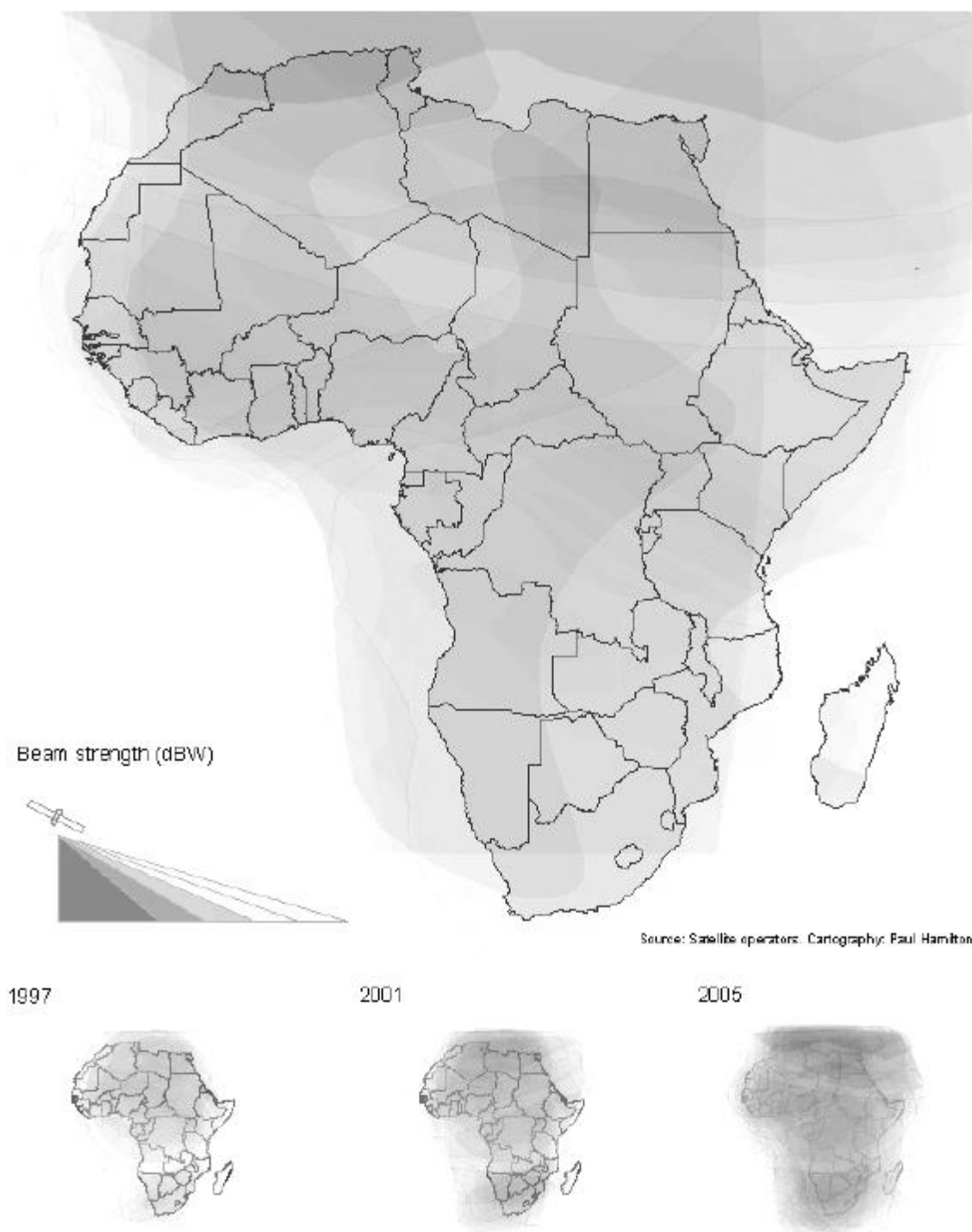Figure 5: Ku Band Coverage Over Africa
Source: Paul Hamilton

Figure 6: C Band Coverage Over Africa
Source: Paul Hamilton

The critical point of SatCom provision in Africa is the lack of a fair and equitable distribution of the benefits. SatCom is used as an element of the overall business ecosystem of telecommunication as a provider of backhaul and back-up services, and thus the satellite operators including

Intelsat, Eutelsat, SES, Arabsat, Rascom, etc. are dealing with local telecom operators and not directly with end users. This business model provides higher profit margin[36] to satellite operators, but the overall economic ecosystem does not benefit from the entire value-added that could be created.

Conclusions and Policy Recommendations

In conclusion, SatCom's particular strength in cost-effectively providing communication over large areas, and its easy deployment for end user solutions, makes the sector of special interest in the present era of globalization feeding the phenomenon of convergence.

Two key social applications in which satellite communication contributes are telemedicine and tele-education. Offering quality medical care and education is a challenge in many developing countries, particularly in rural areas. Telemedicine helps connect local health care workers with support from information and personnel in other areas.

Through tele-education, students connect with teachers, curricula and course assignments from a distance. In addition, SatCom can play a crucial role in disaster management.

Europe has made significant achievements[37] in the sector in terms of technology, regulatory frameworks and market share. At the same time, new efforts are required to enhance these achievements and to address new challenges in a strategic way.

The main challenge as reflected in the UN Summit on the Millennium Development Goals, concluded in September 2010 with the adoption of a global action plan to achieve the eight anti-poverty goals by their 2015 target date, and the announcement of major new commitments for women's and children's health and other initiatives against poverty, hunger and disease. Europe has already started dialog on the eight goals that, in a broader sense, establish the concept of smart, sustainable and inclusive growth. Of particular relevance is goal number 8, "Develop a global partnership for development," and sub-target 8F which suggests establishing partnerships making available the benefits of new technologies, especially information and communications. Here, the role of the EU should be to provide broadband in a sustainable way for and with

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[36]   ESPI Report 32 – Veronica La Regina, SatCom Policy in Europe, May 2011; OECD, New Space Economy, Febraury 2012.
[37]   ESPI Report 32, idem supra.

Africa, which means sustaining partnerships with local actors and stakeholders using existing capacities, and transferring the necessary competences that are lacking locally.

To achieve this goal it is worth noting the contribution that SatCom can make to the EU Digital Agenda for the EU itself and, using the same effort in terms of infrastructure, for EU goals for its neighbours, Africa and the Middle East. This involves a set of considerations from the industrial and regulatory points of view. It is crucial to enhance the synergies between the traditional terrestrial-based telecommunication sector and SatCom through an integrated industrial policy, as proposed by the EC in 2010. Implementing the dialog in an integrated way also helps in reducing the time and costs required for adoption of policy initiatives.

The importance of the Digital Agenda presents the opportunity to start new dialogues among European stakeholders, as both public and private players. This process will bring benefits in several areas, such as a more equitable international and European communication regulatory framework, an industrial policy that enhances the competitiveness of the EU, a market more satisfying for consumers, a space policy more integrated to deliver economic, societal and strategic aims.

All these issues are supported by a set of synergetic policy recommendations, including:

- Enhance the existing framework of EU–African partnership, which should involve also SatCom as an available and prompt key enabling technology for broadband provision;
- Enhance the role of private actors in potential innovative public-private partnerships with innovative business models to get higher distributions of benefits coming from broadband commercialization;
- Strengthen the international dimension of SatCom to overcome lack of national and local telecommunication policies favorable to broadband;
- Establish a synergetic view of the role of SatCom as a cross-sectorial enabling element of policy initiatives in telecommunications, industrial policy and technology transfer, international relations for trade, peace and security, and socio-economic growth.

In conclusion, the objective for the EU should be an integrated vision for SatCom that would deliver the Digital Agenda as a key component with an appropriate space policy that supports the concept of European growth

and competitiveness to enhance the European role as global actor.   A coherent and appropriate SatCom system for broadband, delivering services as one of the Millennium Goals for the EU and for Africa is an opportunity to give substance to the fundamental principle of international space law that the exploration and use of outer space shall be carried out for the benefit and interest of all.

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