

HOW SUBMARINE CABLES HAVE REDEFINED THE DIGITAL DIVIDE CONCEPT AROUND THE WORLD - COLOMBIA, CASE OF STUDY

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Abstract: Colombia won last year at the Global Telecommunications Conference in Barcelona, for the Live Digital Plan, the award as the government with the most innovative telecommunication policies in the world. Live Digital, is the technology plan, which aims to give the country a technological leap by the massification of the Internet and the development of the national digital ecosystem, through the use of ICT. [1] Conclusions of the United Nations Conference on Sustainable Development that took place in Rio de Janeiro, in June 2012, confirm, that the work done in Colombia by Public and Private Organizations, are the key factor to responds to the challenge of the government, to achieve democratic prosperity through the appropriation and use of technology. Projects as the Submarine cable to San Andres Island in service since 2010 and National Fibber Backbone (Vive Digital Project) which spreading broadband to more than 750 municipalities, are examples and lessons to share with our neighbours as Ecuador, Brasil, Peru and Venezuela, looking for with them, to create the appropriate political space to achieve a fibber optic sub-aquatic system to interconnect Manaus (Brasil), Tabatinga (Brasil), Leticia (Colombia) and Iquitos (Peru), capable to reduce the digital divide envisioned by the FCC Telecommunications ACT in 1996 and formulated and clarified by ITU in the “Monitoring the Digital Divide... and Beyond” report in 2003. [2]

1 INTRODUCTION

The history of telecommunications in Colombia seems to forget the May 19, 1990. That day, was opened by the President Virgilio Barco (RIP), the first connection of fiber optic submarine cable to South America. This system promoted and designed by AT & T called TCS-1, the same technology that leads to Europe TAT-8 and to the Pacific TPC-3, marked the beginning of the inter oceanic digitizing on this continent.

The national data network from Bogota Colombia to the Submarine Cable Station in Barranquilla was carried through a platform known as

COLDAPAQ, owned by Telecom, operator of the state disappeared overnight because of the opening the sector, regulation and competition. The speed data connections for universities, banking and business sector fluctuated between 1200 and 9600 baud, besides being permanently affected by anomalous propagation conditions in the tropics.

As a result of continuous improvement needs of multinational companies established in the Colombian Atlantic coast, ACCUNET from AT&T arrived to Colombia in 1991. This technological leap, accelerated the demand for high quality services and forced the development of digital transmission

networks into the country, achieving in 1997 to close the first national fiber optic ring, with more than 4000 kilometers, including the interconnection through one submarine cable festoon to three of the major ports of the Colombian Caribbean.

With the limited needs of international growth, but with the obligation to renew the technology park, Colombia headed by incumbent Telecom at the time, signed both the MOU in 1996 for Panam cable and Maya 1 in 1998. These systems came into operation in 1997 and 2000, and were affected by excess capacity acquired and assigned, which discouraged conventional international telephone traffic.

The FLAG cable success in 1997 [3], shot in traders and investors worldwide, expectations and projections of growth that took almost a decade to be materialized, causing the collapse of the dot Com in 2000.

Entering the market at the beginning of the last decade, first-order actors as Internexa, Orbitel, Promitel and Telmex to cite the best known, and the disappearance of others like Telecom and its carrier partners, somehow created the conditions for the trinomial Government - Investors (Operators) - Information and Communications Technology ICT (GIT), consolidated in the last thirteen years, a powerful fiber optic infrastructure of over 30,000 kilometers long, running coverage to reach 1,000 municipalities, 8 submarine cables, including a national segment to San Andres Island in the form of Government supply contract, 6 million broadband subscribers, around 12.7 % of Colombia population, 1.2 million mobile Internet access or low speed connections, 48.5 million wireless subscribers, 4.1

million cable TV subscribers and buzz to reach the Amazon with fiber optic cables.

2. DIFFERENTIATING FACTORS THAT HAVE CHANGED THE TRADITIONAL FORMULATION OF SUBMARINE CABLE PROJECTS

By 1996, all of them: the global phenomena as the stimulus switched telephone traffic as a result of the development of technologies such as VoIP, the increased transmission capacity to migrate PDH to SDH technologies combined with DCME algorithms, the redefining of model of cost going from MIUS to Ring MIUS, the incorporating new sources in 1550 nm, the appearance of the optical amplifier (EDFA) and improved fibers, the increasing operators encouraged by deregulation, the accounting rate, the call back and the need to meet new demand dedicated international services, forced the American incumbent operators, to find fiber paths to USA through the Pacific Ocean, as a commercial mechanism of survival, because it was clear the huge difference between satellite connections and emerging submarine cable available by then only in Colombia and Brasil.

Across the world, there were already examples of successful projects as FLAG, demand and market research as revolutionary as those undertaken by Neil Tagare in KMI (Kessler Marketing Intelligence KMI) trying to replicate in these latitudes, although in general, were unknown projections and implications of an Internet that without consolidation, not aroused suspicion about its extraordinary growth and overcrowding.

Entel Chile, Telefonica del Peru, Emetel Ecuador, Intel and Cable & Wireless

Panama, Telecom Colombia, Ice Costa Rica and AT&T in the U.S., by the initiative of Entel Chile, made the long journey to transform a memorandum of understanding in a Cable Project who subsequently became known as Pan Cable. The interests of the parties were deformed in what was called "The Dark Night of Cartagena". Landing points Changed from Panama to California were replaced for Atlantic landings in Barranquilla Colombia, Punto Fijo Venezuela, Aruba, Saint Croix and Saint Thomas. The Technical Working Group, TWG, Procurement Group PG and Route Working Group RWG were taken over by Telefonica of Spain who incidentally incorporated CTC Chile World newfound openness and claim another landing point in Arica in a revolutionary and elegant settings. The withdrawal of ICE Costa Rica and regional political conflicts also influenced the redesign of the system.

The Panamerican Cable system, framed the most important technological leap in the region at the end of the twenty century.

Unlike TAT-8, TPC3, Florico-1 and TCS1, the Panam System of SDH nature, optical amplification and collapsed rings, integrated the submerged plant from Alcatel in the Atlantic Ocean and Tyco Submerged plant in the Pacific, with terminal equipments and PFE from KDD NEC, under OA&M assigned to Telefonica Peru.

Difficulties to lay cables in the Pacific Coast come from the beginning of the previous century, when telegraph cables arriving in Buenaventura were affected by sediment and the depth of the access channel. The Pan American cable included two mooring point in Colombia, in the bay area of Málaga, but like Global

Crossing, the landing points could not be consolidated.

The submarine cable projects executed before 1996 were sized according to related statistics and data telephony traffic, is unaware of the social impact of the Internet and mobile phones, so the advancement of a country or region were measured in terms of telephone density and per capita income and somehow inbound and outbound traffic. Were dedicated circuits mediating component technology penetration of multinationals and was directly related to economic indicators investment.

The FLAG effect, was felt in Latin America, to enter competition Maya Systems -1 and Arcos, Maya 1 while in the emerging WDM raided and their owners belonged to a consortium, Arcos Festoon type technology and private counseling, offered facilities to emerging operators outside the consortia but urged to grow. The capacity of these cables somehow entered into crisis, but marked the beginning of the first decade of the century.

Only the explosion of the Internet, has validated many years after the disputed concept of Notional Capacity, as the digital divide in Colombia has been deliberately reduced, thanks to the availability of capacity delivered by the cables that are landing on the Atlantic coast.

3. THE CONCEPT OF THE DIGITAL DIVIDE COMES TO COLOMBIA, AND LEFT TURNS

In Cintel Congress 2000 in Cartagena Colombia, Telecommunications expert ASETA, Jairo Gomez Malaver, raised the concept of digital divide, as measured

variables and their effects in the Andean Community.

The Digital Divide was then defined as the difference between individuals, communities, provinces, or countries with the best conditions for appropriate use of information technology and communication in their daily lives and those who do not have access to the same or if they have it, not know how to use. [4]. The equations were applied in different areas of the country, based on telephone and computer penetration of households, human development indices, basic needs and income per capita. Soon the modeling should be revalued therefore indicators of availability of computers, telephone lines and basic computer knowledge, were absorbed by the explosion of the Internet, cellular networks and the spread of technological appropriation. The methodology suggested by the ITU in its "Manual for Measuring ICT Access and Use by Households and Individuals" is being studied and applied by universities, government agencies and operators to validate the impact of programs like Digital LIVES. [5]. The results were so dissimilar that could not be obtained a clear picture of the phenomenon, however these results are helping to classify areas with limited access to ICT and thus mark regions where the coefficients of inequality should be corrected.

4. IMPACT OF GOVERNMENT TRINOMIAL - INVESTORS – ICT

Figure 1 (High Resolution in Appendix 1), is a general view of the Amazon basin, showing the coverage of influence of the project, also shows the impact of the efforts made by the GIT trinomial in Colombia during the past 25 years, where clearly is shown the penetration of access

networks in the west central area of the country, including the insular territory of San Andres.

Leticia, capital of the Amazon Department is around the 0,06% of the national population, but independently how big a region can be or where it is located, is a mandate by the National Constitution, providing equal opportunities to all its citizens.

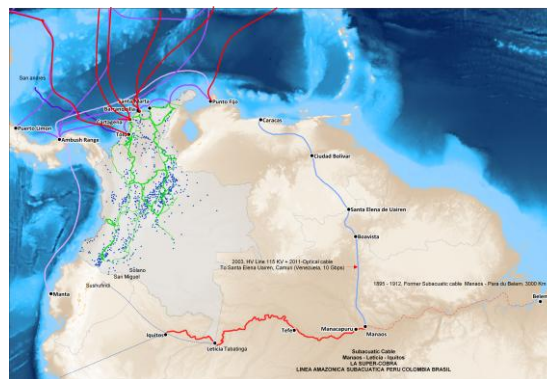


Figure 1

For the particular case of the Colombian Amazon, which is essentially equal to the Brazilian and Peruvian, to all obligations of these governments, we must add the personal debt that we all living beings on this planet have with the Amazon basin, which is the perpetual supply of oxygen, water and heat balance.

It is not a secret that the key ingredient to isolate properly the inner conductor from the steel armoured in the submarine telegraph cables was extracted from the jungles of the Amazon.

Thanks to the exploitation of this extraordinary resin, Manaus became to the late nineteenth century, in one of the most important cities in the world, but its glory was extinguished when the experiment of rubber cultivation was replicated in its Malaysian antipode.

The IIRSA (Initiative for the Integration of South American Regional

Infrastructure) and the joint efforts of the governments of Venezuela and Brazil [6], have helped to Manaus to fix both interconnection problems the electrical as telecommunication. The impossibility of establishing environmental protection strips at least 50 meters wide and two thousand kilometers long, is one of the most important reasons to avoid towers, so, the whole Amazon basin from Manaus to Tabatinga - Leticia and Iquitos are still pending for decision to build its ICT highway.

No possibility exists today to interconnect these populations by power lines.

Adverse factors as the rainy season that runs from December to June, may prevent to survey the river or lay some cable routing, however, the same grandeur of the river can be an open door to explore the possibility of a double-tended, which means higher availability according to P-cycles theory [7].

5. WHAT DOES THE HISTORY

It all started in 1895 when brothers Siemens dared lay a underwater telegraph cable, aboard the CS Faraday [7], from the mouth of the Amazon River in Pará du Belem to Manaus, world rubber cradle, with the risky mission of taking words from the jungle to the markets of the United States, Europe, Asia and in general, to any point on the earth equipped with a Morse. The euphoria lasted only a few years, since the dynamics of the world's mightiest river exceeded forecasts and the draft 2900 kilometers [n] was abandoned by the extreme difficulty in performing repairs and by the advent of wireless telegraphy which Marconi patented in 1900. The story is poor in details of this nature, but

the boom-bust cycle reached, is less than 10 years.

5.1 LA SUPERCOBRA

This sound and suggestive Latin name stands for **L**ínea **A**mazónica **S**ubacuática **P**erú **C**olombia **B**Rasil, is in effect, the proposed name for the steel and fiber super-snake, which must lie at the bottom of the Amazon for many years, with the mission of connecting at least half a million people located along the Amazon River between Manaus and Iquitos, over a length of about 2000 miles.

The distribution of the most important towns involved in the project is shown in Figure 2.

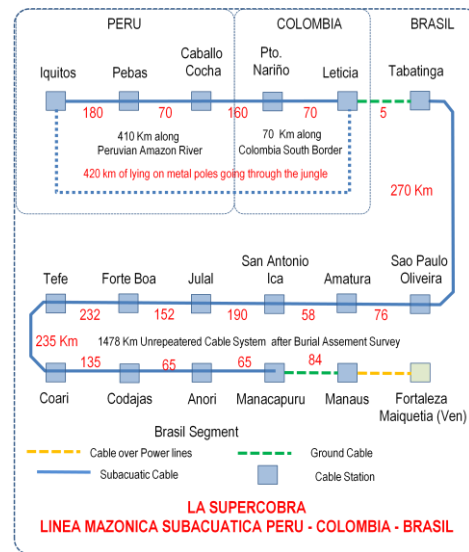


Figure 2

Internet traffic from cable stations located in Camuri (Venezuela) and Fortaleza (Brazil) and sent to Manus via Santa Elena (Ven) - Boa Vista (Bra), would be routed to Tabatinga and Leticia through a chain terminal stations located in strategic towns and where the main signal is regenerated and retransmitted without using remote power devices. The final span to Iquitos of 410 kilometers long, 70

of which belong to Colombia, is marked by the very common changes of course, especially in the vicinity of Iquitos. To counter this threat, as outlandish proposals have emerged as crossing the Amazon jungle using jointed and installed metal posts always above the overflow elevation of the river at its finest season. Unlike pylons, this support does not affect the corridor routing and should be high enough so that the catenary in its lowest point exceeds the tops of the tallest trees. For purposes of preliminary studies have been considered supports dodecagonal section, 50 meters high and 1.50 meters in diameter and spans between 400 and 500 meters with ADSS cables. As alternatives to the interconnection with an established Point Of Presence (POPs), we have considered the option of send the traffic from The Amazon to the city of Sushufindi in the province of Sucumbios (Ecuador), where it could connect to the town of San Miguel in Putumayo department of Colombia.

This option crosses several national parks, is 600 kilometers long and is similar in its considerations tended to the previous option from Iquitos to Leticia through the Peruvian jungle.

Populations of Tabatinga (Brazil) and Leticia (Colombia), will be connected via an 5 Kilometres land cable. Regional coverage for each terminal station, within a range of 40 miles, could be achieved via radio.

5.2 THE STARTING POINT

Thousands of documents related to the extraordinary world of the Amazon, are an invitation to mankind to discover it, love it and know it. The Elsevier Foundation research [8], are a clear

example of what in science and health, we could all benefit to interconnection via fiber optics to the Amazon.

The following chart taken from the Journal of Hydrology, Volume 374, Issues 1-2, 30 July 2009, profiles the Solimoes River before Manacapuru, the starting point of the proposed cable system.

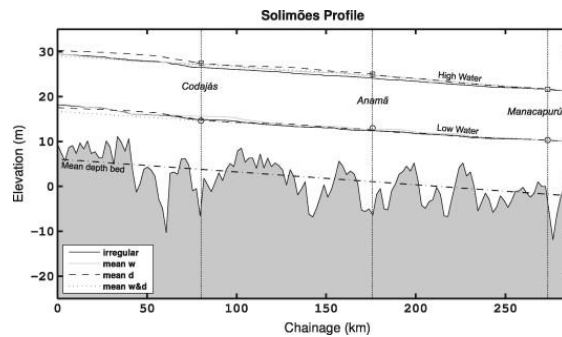


Figure 3

Solimoes is the name of the River between Tabatinga and Manaus, From this city and as soon as the water mixed with the Black River, is called Amazon.

One of the biggest challenges of the study is to find ways to preserve the cable to the effects of changes in level greater than 20 meters between the winter and summer seasons, while observing the effects of the sub-fund as a result of the movement of sediments all traveling at more than 5 m / sec.

“The impossible missions are the only ones which succeed”

Jacques Cousteau

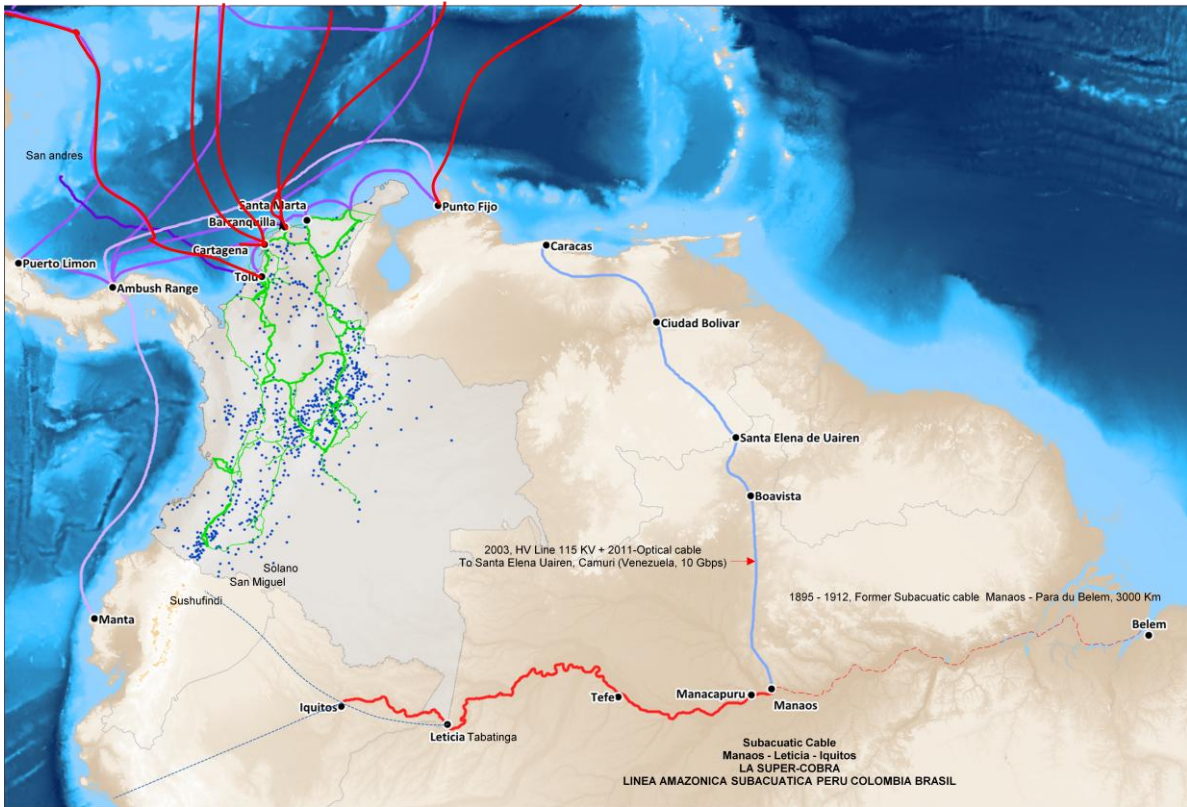
6 CONCLUSION

The telecommunications-related technologies have evolved so much, that it's hard to imagine how the world will be over the next 25 years. So, as antithesis, it's possible be anticipated, how far behind developed communities the people

of the Amazon River basin will be, if from now, stakeholders as the submarine cable industry, the governments of Colombia, Brazil, Peru, Ecuador, the Academy, the Hydrographic research centers, the pharmaceutical companies, the International Aid Agencies as IIRSA, the Banking and general web users, do not work together to built the required River - Jungle Cable System, that allows them, to finally jump from the ocean to the cloud!

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APPENDIX 1

Figure 1