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Fiber Optic Networks in Romania - ready for Next Generation Network or Future Networks?

About future of Fiber Optic Networks in Romania

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***Abstract* – This paper is bringing some questions and several possible paths for future fiber optic networks development in Romania, in a country with a lot of fiber optic cables and experts on fiber optics but on contrary with less new types of solutions for fiber optic networks or next generation networks.**

Keywords: fiber optic networks; future networks; next generation networks,

I. INTRODUCTION

Romania has one of fastest internet connection in the world, being the first one in Europe and on the 5th place in the world with the fastest internet connection with a pick of 67 Mbps, according to Akamai Report published for December 2014.

The status of fixed internet connections in Romania is observed by ANCOM as follows in Figure no. 1.

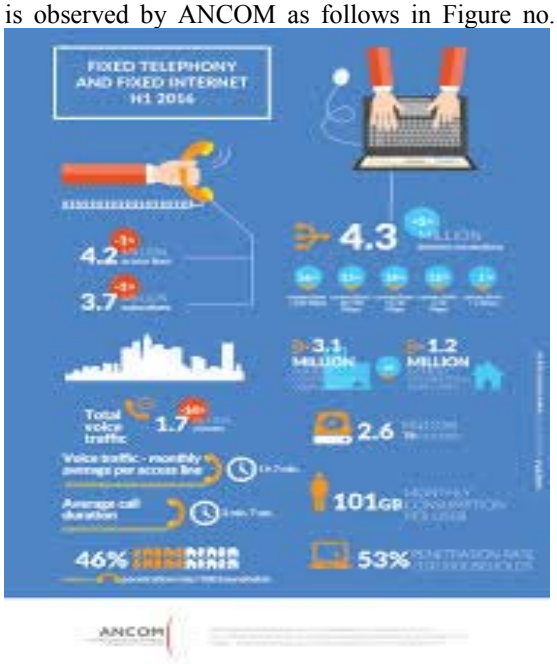

Fig. 1. Fixed telephony and fixed internet connections in 2016 in Romania

According to Romanian telecom regulator body ANCOM at the end of 2016 more than half of 4,4 million fixed broadband connections enable speeds above 100 Mbps. The average fixed broadband internet download speed in Romania went up by 78% last year, compared to 2015, to 95 Mbps while the average download speed for mobile connections also increased by 35% to 26 Mpbs.

This very good situation of internet speed in Romania is due to fiber optic networks developments. The actual leader with the biggest fiber optic network, RCS&RDS, decided since 2000 year to have its communications network based on fiber optic cables. Their fight with incumbent operator, Telekom Romania, for growing-up the FTTH networks in the last 5 years made us to question ourselves during this article: where is going the future of fiber optic networks in Romania beyond the physical numbers of FTTH connections or Past Households/Connected Households?

We will go in this paper through legal framework, new operators, technologies for fiber optic networks and challenges of actual fiber optic networks for future use and we will end with some conclusions.

II. LEGAL FRAMEWORK

A. Law no. 159/2016 regarding the Access to Infrastructure

The article no. 29 of this law is stipulating that starting with 25th of July 2017 all the Building Permits should be issued in Romania for any residential buildings or education, finance, hotels, office buildings only by including the access infrastructure based on technical norms. This article it was supposed to be the platform for fiber optic networks large deployments.

This law brings 2 new very important terms for fiber optic industry in Romania: **infrastructure operator** (which has to be seen different from a telecom operator) and **inner physical infrastructure** (which is for buildings and including more types of cables).

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Furthermore, this law brought at the surface the war between Telecom industry and Energy/Power distributors. While the telecom regulator ANCOM is involved in creating and developing the technical norms, the Energy regulation body ANRE it's out of this game. The battle for infrastructure is moved to poles owners and utilities level.

The process of elaborating of Technical Norms can reconcile the two parties, telecom and energy, as well as private operators / infrastructure owners and public infrastructure owners / local authorities.

B. Decision no. 1644/2014 of ANCOM President

The National Regulation Body in Communications of Romania (ANCOM) issued a Decision concerning the format and way of data transmission to ANCOM from all the telecom operators for the GIS coordinates of their networks deployments and also of their associated infrastructure. According to this Decision the big operators should begin to report to ANCOM their GIS coordinates of their fiber optic networks starting with 1st of January, 2016 (article no. 3).

C. Government Decision no. 414/2015 regarding the NGN Infrastructure deployment plan

This law is approving the NGN Infrastructure deployments plan in Romania in order to reach the EU targets of Digital Agenda 2020 which include RONET project (rural broadband for white areas from 783 villages) to be built with EU funds. This project brings the new official definition of Infrastructure Operator.

D. EU Directive no. 61/2014 has been adopted within Law no. 159/2016

The EU Directive no. 61/2014 regarding the measures to reduce the costs of deploying high-speed electronic communications networks was adopted in Romania within the Law no. 159/2016 as a completion of the Law no. 154/2012 regarding the access to infrastructure. This law should bring the big advantages of infrastructure sharing in Romania too, but there is a big need of technical norms in order to be implemented and accepted by local authorities and other utilities.

E. Governement Decision no. 245/2015 regarding the Digital Agenda 2020 implementation in Romania

This national plan has very few connections with fiber optic networks in Romania unfortunately but has some objectives related to connectivity speeds at national level which it seems to be reached already in urban areas but not in rural areas yet.

F. Other proposals for national strategies from the Ministry of Developments

There are 2 other proposals which should be considered for the next developments of fiber optic networks especially inside the buildings:

a) National Strategy for Living

b) The Strategy of buildings renovation

III. NEW OPERATORS

In the past, the fiber optic networks had been used by telecom operators only because it was built for communications purposes. As data are more and more used in all the fields the new type of operators who own fiber optic networks appeared in Romania too. Thus we have among the new type of operators:

- *Infrastructure Operator*, like NETCITY Telecom
- *Energy* companies: ENEL, Electrica, CEZ, EON, Transelectrica / Teletrans
- *Oil, gas and Railway* companies
- *Real-Estate* companies
- *City Halls*
- *Health or Automotive* companies

There are some good expectations from them in order to bring new technologies or new ways of using the fiber optic networks.

IV. TECHNOLOGIES FOR FIBER OPTIC NETWORKS

Since the leader of fiber optic networks from Romania, RCS&RDS, introduced GPON it's about 10 years. Telekom Romania followed them but after more than 2 years. The actual services of 1 Gbps for Customer who are going towards the Gigabit Society proposed worldwide are asking for more bandwidth in the very near future.

In the last 5 years there are more and more operators using GPON technology and the technology is becoming more and more mature on the Romanian market especially because there are 3 GPON suppliers in the market and not all of them are Chinese companies.

There are in Romania areas with saturated fiber optic networks, usually in some urban dense areas, with 96 fiber optic cables installed and also some areas with big demand and a lot of problems in fiber optic networks installation.

Especially in these last areas there is a need for better usage of existing fiber optic networks, not only for the owner operator but also for other operators.

The classic Point to Point technologies are still dominating the fiber optic networks market but WDM with both CWDM and DWDM options is advancing more and more in Romania. Media Converters using one pair of optical fibers are still used in Romania but less and less.

The initial projects of FTTB (Fiber-to-the-Building) for both RCS&RDS and Telekom Romania are moving in the last 2 years to FTTH (Fiber-to-the-Home). It is interesting to see in 2020 how many homes in Romania will have fiber optic.

V. CHALLENGES OF ACTUAL FIBER OPTIC NETWORKS FOR FUTURE USE

In order to see the future developments of fiber optic networks in Romania we propose to look at the actual challenges of existing fiber optic networks in correlation with the context of other country developments.

a) Maps digitzation

As Romania is in a big lack of digital maps but with a great effort to make at the local authorities level the digitized maps, we consider that all the big fiber optic networks owners have a great challenge to move their own maps, the majority of them in MapInfo or AutoCad into new digital maps correlated with the others maps, especially those from the city halls with whom they need further cooperation for planning and construction of their new network upgrades.

The small operators have the advantage of less volume of work but on the other side, the process of maps digitization needs not only the new software products in Romania for planning and design but the data migration. This process of data migration from analogue to digital maps, from poor network inventory to digital fiber optic network inventory will force the operators to clean their fiber optic networks. There were many acquisitions of small ISPs or cable companies in Romania who deployed a lot of fiber optic cables, aerial especially, which are not used anymore. Based on our experience in urban areas the percentage of non-active fiber optic cable networks varies from 25 to 60% from the existing fiber optic cables on the poles.

The GIS network inventory of a fiber optic network is an asset not enough used and recognized yet in Romania and therefore we are expecting in the near future to see here the benefits of this transition to digital maps which it should bring more value added revenues than costs as there are seen till now by the management and shareholders teams.

b) Last Mile

The battle for Last Mile has 3 players: fiber optic cable, copper cable (UTP/coaxial) and Wireless/Mobile. In the last years we have noticed a good progress of fiber optic cable which reached 61% as FTTP coverage from all households at the national level in June 2015. NGA (Next Generation Access) has as drivers the 5 big telecom operators but we are expecting to see new players in NGA market.

c) Flexibility requests

The telecom crisis makes the battle tougher for new customers and therefore the owners of fiber optic networks are willing to reduce as much as possible the connection time of a new customer. The new challenges of Smart City, Smart metering and IoT networks are bringing more requests to access in the fiber optic networks at intermediary points. There is a need to improve the connectivity in fiber optic networks and to implement new products in the networks, like small ODFs in manholes or Terminal Boxes for several houses/customers.

We hereby prefer the term of POA (Points of Access), which is similar to POP (Points of Presence), for defining the points in the fiber optic networks where can be connected any type of Customer by using various type of fiber optic connectivity.

d) Virtualisation of fiber optic networks

The so called SDN and NFV products which are been tested for a while at international level may be implemented in Romania too by the big telecom multinational players. Somehow we are noticing the paradox of having in Romania so many good IT and software experts but so small number of products for fiber optic networks like SDN or NFV.

e) Automated Fiber Optic Networks

In Romania it remains only one big telecom operator with his own O&M team (RCS&RDS) while all other telecom operators had outsourced the O&M activities to Huawei and Ericsson. It will be interesting to see in the next 2-3 years the differences in operational models.

One of the options to reduce OPEX for a big fiber optic network is automated fiber optic network. Presently there are only Orange and Transelectrica using such options like Remote Test Units and we expect to grow up the number and type of systems for automatization of fiber optic networks.

f) Quality of Fiber Optic Networks

The materials used in fiber optic networks showed in Romania some good case studies for what to use and not to use in fiber optic networks. The fiber optic network maintenance experience brought new information and database. We see in the last years in Romania the trend for personalized products for each operator where the drivers of industry has the biggest role complemented by the smaller operators which are bringing very innovative ideas, products and solutions for the fiber optic market.

Concerning the quality of works in network design or execution of fiber optic networks we are observing the decreasing of the works quality especially due to the price pressure from the operators' side. As we reached in Romania the minimum level of prices for works and we have a great number of fiber optic specialists working abroad, the owners of fiber optic networks must find ways to invest in training and people if they want to grow up the quality of their future fiber optic networks.

g) Shared Infrastructure

The biggest challenge and the biggest driver of next NGA rollout in Romania is the shared infrastructure according to ANCOM and BEREC opinion. The mentality of the owners of fiber optic networks is to own the fiber optic cable in Romania and the next coming years should bring the transit to more Dark Fiber services and Capacity services based on shared infrastructure. The competition between the telecom operators will be forgotten in favor of competition between the different type of operators (like telecom and energy for example) aiming the Customers database extension.

Fiber optic metropolitan projects are growing in Romania and Infrastructure operators should support the public / private partnership for the benefits of Customers. This trend is growing up due to the legislative framework which is imposing the underground fiber optic networks in urban areas instead of aerial fiber optic networks on existing poles. The transition for this new type of projects and new type of cooperation between the operators and the local

authorities is to be improved very fast in the coming years.

The implementation of EU Directive no. 61/2014 in Romania by Law no 159/2016 is waited with many hopes, despite of big resistence from power operators or poles owners for example, but it should be supported by many technical norms.

h) National Projects

The project called RO-NET funded by EU with 84 millions of Euro and under implementation by Telekom Romania it seems to have great difficulties and from the lessons learned from this project we hope to see next national projects more helpful and faster. Presently, the deployments of fiber optic networks are driven by private operators in the majority but there are some community projects as good examples for near future deployments.

VI. CONCLUSIONS

The keys for future of fiber optic networks in Romania are Quality, POA and NGN equipments. Quality of materials and works used in fiber optic networks construction is becoming more and more important. POA – Points of Access – make possible to connect the Customer not only at the network end but at any intermediary point of fiber optic network.

Next Generation Networks equipments will follow GPON technology and they will make better use of existing fiber optic networks with more bandwidth for Customers in many various activity fields.

Fiber Optic Networks will expand in other shared infrastructures as the costs for investments will decrease and new and more infrastructure operators will take the lead for fiber optic networks infrastructure deployments.

The human resources for fiber optic networks are more developed abroad with many Romanian experts in the big companies. These Romanian experts working abroad should bring more value to fiber optic industry in Romania within the next years to come as the local labor market is stressed by the shareholders for profit and prices reductions.

The innovation in using actual fiber optic networks it seems to be closed to zero but a closer relationship between private fiber optic industry and academic institutions and training centers is expected within the next years.

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