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Communication Infraestructure Innovation for Internet Viral Connectivity with Power Carrier Line and Automatic Position Radio System

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Abstract

In this research we study Communication Infrastructure Innovations for Internet Viral Connectivity with Power Carrier Line and Automatic Radio Position System. Thus, using several Internet Accounts distributing in the Systems and Software designed for such aims, Antennas connection and modest Computers, we are able to reach the Web without decline the Bandwidth, as it would be happening in a Standard Serial Connection. We are going to be using such great robustness in resources, such as PLC (Power Line Carrier) managed through The Power Energy Service (PES). The PES Connects The Towns and Cities in the National System in Power Distribution. The versatility and simplicity about the Communication via Radio Frequency and/or via Satellites Amateurs using the viral system APRS (Automatic, Position Radio System), Networks between Computers and the Satellite link is an Economical and Revolutionary Innovation in the Internet Access for Reducing the Digital Gap in the People [10].

Keywords: Communication Infrastructure Innovations; Power Carrier Line; Viral Connectivity; Internet Access; Digital Gap.

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1. Introduction

The communication system nowadays depends in on one emitter, one media, and one receptor at the chain end. So the actual data net is weak and expensive because the big storage server size, and the large distance between the subjects, demands great efforts and big costs; so our viral system allows to be in contact in an easy way, maintaining inter- operability aids for the data and the messages communications subjects [7].

Due to the great existing digital breach in our Country, the access difficulty to the Internet from many people the Dominican population partly that lives in distant places it is a great problem to solve.

Due those considerations, our engineering research team, is development strategies for reaching the goal of a rural internet viral connection taking in mind the following tasks:

- An internet platform design by PLC and APRS with for viral computer Networks.
- The implementation for an Electronic Communication System, in order to make the possibility for an easy access and cheaper connection way between many distant regions and towns, on a distribution and the Radio Frequency system by Wireless means.
- The model implementation in a community by a Viral Network using town Computers.

2. Structure and platform System parts

2.1. Paradigm for the Viral Computers Communication

The viral diffusion for the information across the computers net for people integration is burglaryable, and in addition it adds value because the Intelligence is placed in the ends, allowing low costs, become the media in an agile system.

The possibility for increasing the Net Connection Distance is possible with The APRS ability for free Radio Pack Data Transition and for reaching all the Country using the Electrical Energy Power System as a Solid Communication Media to get all People and where those are living, such in example: in distanced Towns [11].

This way we are able to reach and impact in:

- Digital inclusion of distant towns
- Social impact of the viral communication
- Telephony: Voice on IP, TV on IP d) Blogs and Videoblogs
- Cultural Diversity and Democratization of the Communication through Computer
- Social Apropriation of the Technology

The following pictures present the Infraestrure to be able our Communication Infraestructure Innovation for Internet Viral Connectivity with Power Carrier Line and Automatic Radio Position System.

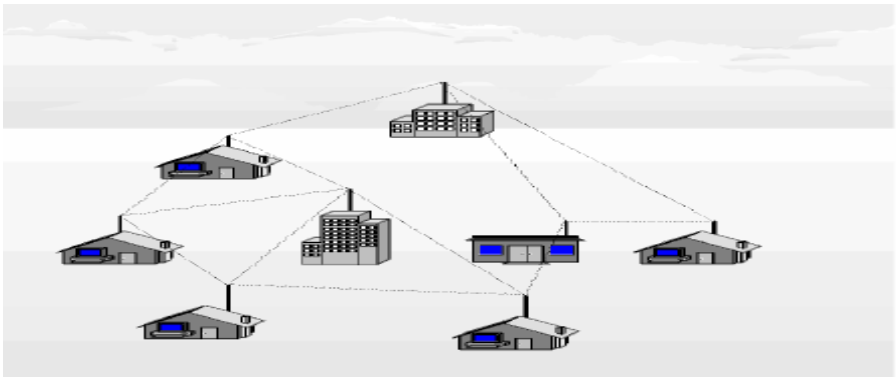

Figure 1: Associative ¨viral¨ Connectivity for a platform Paradigm Computers Communication (Courtesy Andrew Lippman) [11].

Figure 2: Bandwidth and Capacity: Viral versus Conventional Nodes (Courtesy Andrew Lippman) [11].

2.2. Another Viral Network considerations

• The Concept are created by Andrew Lippman (MIT).

• Free knowledge and viral networks like contagion strategy free Knowledge.

• Keys for an open society.

• It is a communications network without infrastructure of communications.

• It uses each computer connected to her like host and reproducer of the communication flow.

• The users create their own infrastructure.

• The communication takes place as a virus scatters itself.

• Revolution: complete decentralization, logic and physics.

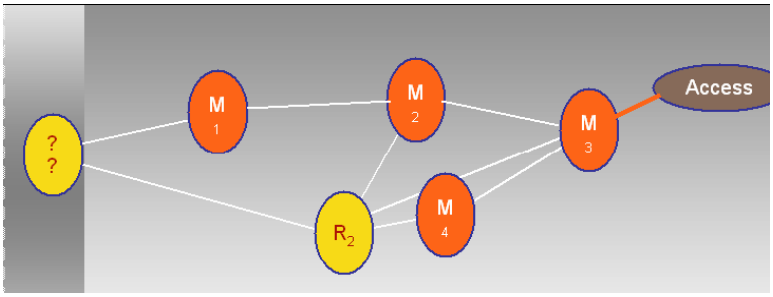

Figure 3: Typical viral Cell 2.3 [11].

2.3. Characteristics Viral Networks Innovation

The viral network are burglaryable, Incrementals and Cooperatives, and the viral systems are innovating by their modularity and the distribution of their capacity - intelligence is in the ends; in examples: Internet, fax, Ethernet networks [12].

Nowadays with the viral system, we became independent from the telephone infrastructure (last mile) to connect to us because the viral network is more open to the innovations, is more flexible when not being cradle in a central system; thus it is placing the intelligence, in each knot of the connection, and not in the servant of a supplier, that because it has the capacity to auto configurated itself based on the number of connected computers.

The following notes are considered:

• Each user is an antenna.

• He will demand new algorithms that guarantee the continuity of information flow if one of the nodes falls.

• The algorithm will have to be able to redirect the data flow towards other nodes.

• The computers connected to the network work like retransmitters.

• Whatever more computers are connected, smaller it will be the distance among them, and better it will be the communication.

• The viral network mesh has a topology.

• Whatever more users, it is better.

• With the broadband, each new connected computer tends to congest the traditional network.

• In the network mesh, whatever more machines are working in an area, more ways will be available for the propagation of the communication, avoiding overloading.

• The network mesh is a shared in common network that works better whatever more machines share its connectivity.

• Million children with 100 dollars laptops, becoming in an enormous mass for retransmitters necessary to make the viral communication viable.

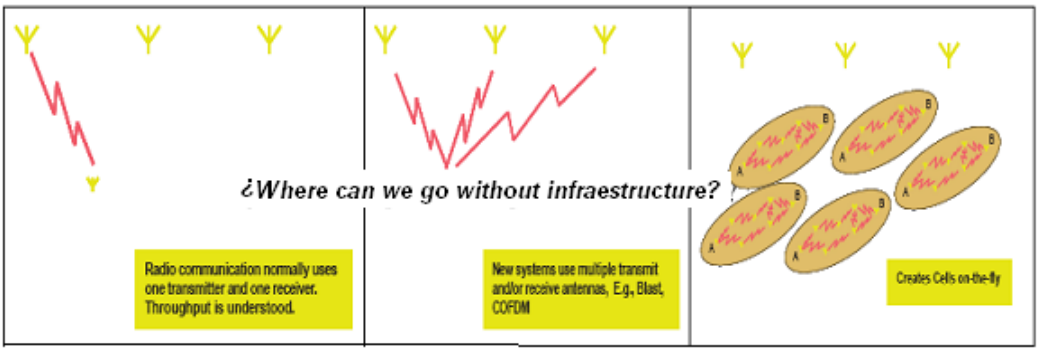

Figure 4: Cells Viral Association [11].
(Courtesy Andrew Lippman)

2.4. Applications uses with the new technology

• Communitarian municipal networks.

• roadcasting (http://roadcasting.org).

• mesh tries to use networks.

• transform cars into emitters.

• music receivers.

2.4.1. Examples of experiences

• Roofnet (Cambridge).

• Digital Tiradentes.

• Taipei (10,000 points of aceso: 90% of the city.

• Philadelfia (investment of of U$ 10 Ms to cover 217 km2s.

• Players.

• Ember (Bob Metcalfe, father of Ethernet), Firetide, Tropos and PacketHop, Motorola.

2.5. Today Viral Examples

•Spreadsheets: More users => more applications.

•Napster, Emulates: More users => more music available.

•Skype: More users => more interchanges.

• Mesh technologies: Skype.

• Application Peer-to-peer VoIP (voice on IP).

• First version: October of 2003.

• 7 mill. of users the first year, more than 50 at the moment.

• IM, Audio and video-conference, mail of voice (voice-mail), etc.

• Open API; viral operation.

• Skype-out, 2004; Skype-in, 2005, Skype-cast 2006.

• Bought by Ebay in September of 2005 by $2.5/4.1 Billion.

• Viral growth.

3. Technical Structure for this Project

3.1. Connectivity to the internet using APRS and PLC

The developments for the model, and the construction methodology, are presented below, and also with an images sequence with a conventional architecture search in the Web in figure 5, between others.

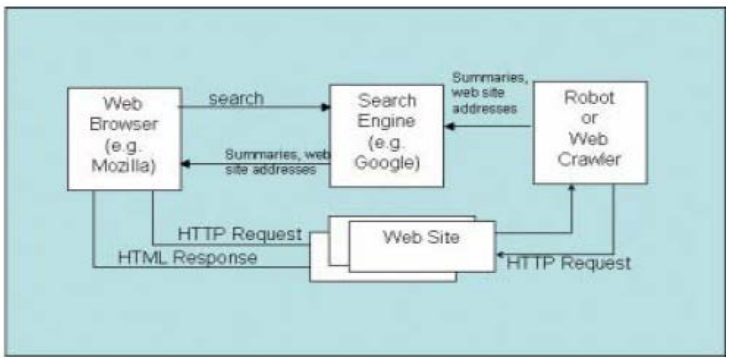

Figure 5: Conventional Architecture Search in the Web

3.2. Connectivity to the Internet by PLC and APRS

In Figure 6 we can see the functionality diagram for the Communication Infraestructure Innovation for the Internet Viral Connectivity with Power Carrier Line and Automatic Radio Position System. [8].

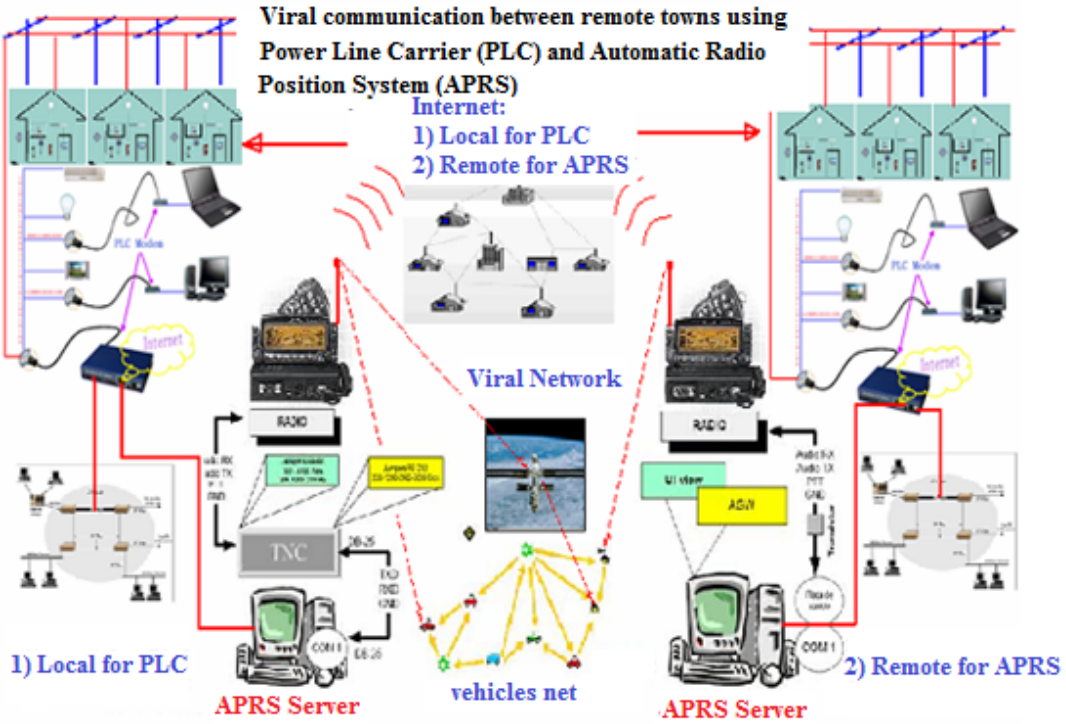

Figure 6: Typology of the Complete Propose Communication Structure [10].

4. The way how the System works

In our homes we are able to connect an internet port in any electrical plug of the address through Modems PLC, all type of devices like computers, printers, Telephony IP, Cameras Web and generally all the devices, and that conform the applications denominated Domestics [4].

As the structuring of a new network LAN, we must observed, that does not need the assembly of additional wirings but it already uses the existing mains of the address, this constitutes one of the main advantages of technology PLC, because the PLC system is typically Symmetric, l meaning that work in two-way traffic, are bidirectional.

When we are using the power electrical networks, our internet signal require additional devices denominated baypass that allow when coming out to pass the signal of RF of the entrance of average tension for the low voltage in the transforming at the distribution lines MT-BT.

4.1. Details of Connectivity in the Homes

In the accountant of each home several possibilities can be presented/displayed.

For the case in that the access to Internet and telephony IP is only required, the signal it follows until the final equipment (for example a computer), which is connected, through a Modem PLC or Equipment of Abonnated (CPE) connected to any current taking of the mains of the house or address. Modem PLC isolates the signal of electric power of 60Hz, extracts the communication signal it demodulates and it extracting the data that give (by means of an interface USB, wireless Ethernet or) to the terminal equipment. Another case that can appear is to place in the transformer a Gateway of the Home that allows to structure a network LAN to the interior of the home. To this network they are possible to be connected [14].

4.2. Details about the PLC Technology

Technology PLC uses the already existing networks of electrical distribution of loss and Average Tension for the information and data transmission. The electrical energy arrives at the users in the form of AC voltage from LF (50 or 60Hz) and in parallel way the PLC uses carriers of high frequency (the usable band in the last covers from 1MHz to 45MHz and 200MHz equipment) to transport the data [16].

4.3. PLC Schematic Diagram

In the figure 7 we can see the interfacing model PLC Arquitecture.

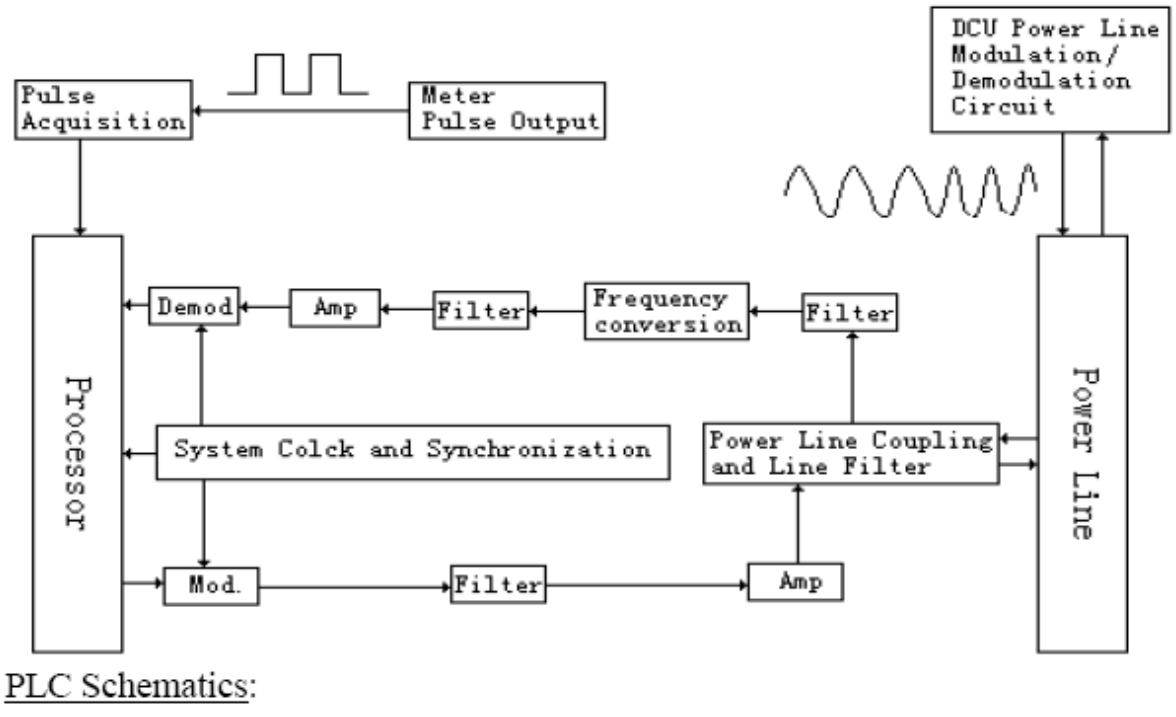

Figure 7: Schematics Power Line Carrier [13]. (Courtesy of Archnetco)

4.4. Modem for interfacing the PLC

In the figure 8 it is showing several interfacing model for interconnecting internet using PLC.

Model	Computer Interface	Type	AC voltage	Network Interface	Size(mm)
ATL60140U	USB1.1	USB	110/220V	HomePlug Powerline	128×100×26
ATL60140E	IEEE802.3	Ethernet	110/220V	HomePlug Powerline	128×100×26
ATL60142E	IEEE802.3	Ethernet	110/220V	HomePlug Powerline	100×64×29
ATL60142U	IEEE802.3	USB	110/220V	HomePlug Powerline	100×64×29
ATL60149	IEEE802.3	Ethernet	110/220V	HomePlug Powerline	150×180×30
ATL60142M					
ATL60000					23×35×17
ATL60001					
GTL60101	110/220V				
GTL60102	+12V				

Figure 8: Modem Interfaces [14].
(Courtesy of Archnetco)

5. Basic Equipment - Radio for PRS (System of Automatic Positioning by Radio)

Figure 9: Transceiver Radio

These equipment makes possible the communication between the remote towns, serving like connectors of the internet network; this is made using a VHF Radio Transceiver Amateur operating in 144.390 Mhz. (Dominican Rep.). In each one of the ends of the communication system [15].

5.1. Transceiving Radio

The radius would have to be “to transceiver” that as system APRS uses to a system of detection against collision to know how when to send the data. Its rank of cover will depend on the power of the transmitter and the land.

5.2. Connectivity by Radio Frequency to the Internet

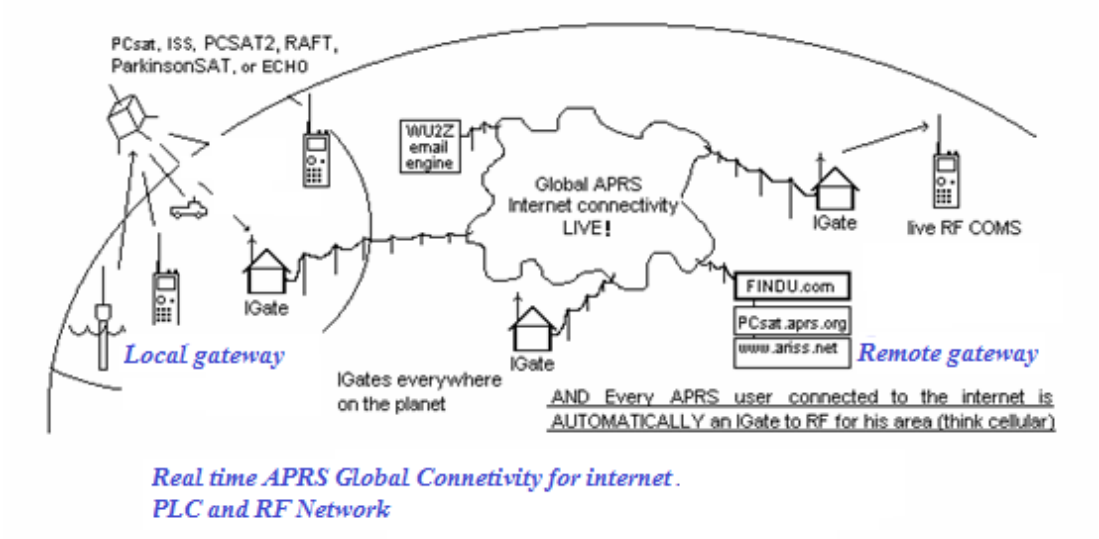

Figure 10: Connectivity Cloud [15].
(courtesy of1frk/aprs)

5.3. IP Layers for APRS

We are presenting the internet layers for the viral model implementation:

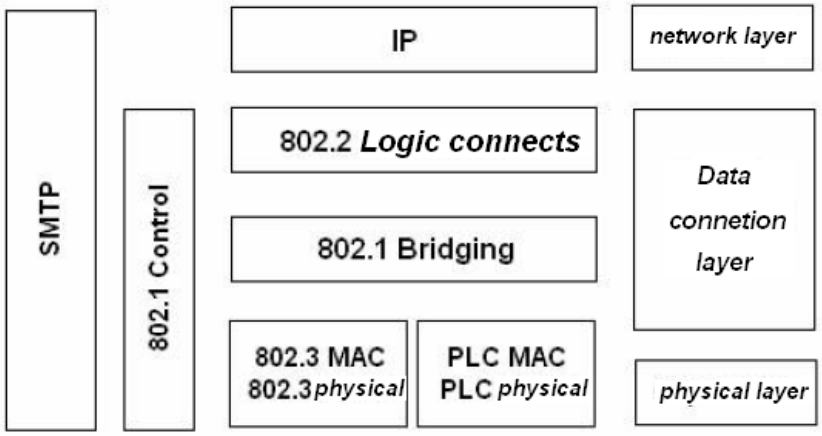

Figure 11: Messages and Maps internet position layer [14].
(Courtesy of Archnetco)

6. Conclusions

The implementation way for our proposed platform, allows to uses the Internet in an economic way, connecting remote places, and reducing the digital gap. Thus using some pair subscriber accounts in addition to the viral net, this allows the following possibilities, and give us the answer for some questions:

• The viral possibilities allow economic access to the Internet through great distances.

• In the education: the students are those that they innovate, the infrastructure makes more rigid to the system.

• Communications: Intelligence is now in the terminals. They will be marginalized the suppliers.

• Social appropriation of the technology. In the area of the health: the patients as group knows more than the Doctor. The psychologist average read only a magazine per month.

• The Internet is not more than a tool than knowing as it works can remove to major benefit and this is what I have learned investigating and we hope our paper can be used for future references.

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