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A Review paper on Viral Mobile Communications System

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ABSTRACT

In this paper a research has been done to overview the viral mobile communication technology. In the modern era the GSM technology is obsolete and a new concept of viral mobile communication in the form of 3G as well as 4G CDMA in spite of GSM for the point-to-point information transportation when the network is stabilised through the research and analysis in the field of viral mobile communication. Due to this research and analysis a new perception with new conception for a new model of the viral mobile technology will be formed.
Keywords: Cross Entropy, Hard handover, Soft Handover, Viral Mobile Communication.

I. INTRODUCTION

Along with the development of 3G and 4G mobile communication system, neither TD-SCDMA (Time Division Synchronous code division multiple access) nor WCDMA (Wide Band Code Division Multiple access) and CDMA2000 (is also known as multi-carrier code division multiple access) can satisfy the mobile service provider and mobile subscriber (MS) with their performance [1,2], which will make new standard and technology develop constantly, supporting the system performance more mature and perfect [3]. The theory of viral mobile communication (VMC) will apply itself to solve the problem of point-to-point information transportation of MS in network [4,5,6], trying to make the MS get rid of the participation and support of the upper equipments, more making vast MS achieving point-to-point information transportation and switch[7,8]. This study introduces the viral communication theory into mobile communication system of 3G and 4G and analyses the corresponding performance. This new technique explores the enabling principles wireless communicators and will demonstrate their fundamental ability to scale and automatically configure themselves through a diverse set of applications including live voice, secure transmission, low power/ high-availability signaling, and sensors with a sense of place.

This paper is divided into eight parts. Starting with introduction (Section-I), next section covers the conception of viral mobile communication (Section-II). Moving ahead, viral architecture requirement is discussed (Section-III). After that design principles of viral architecture are discussed (Section-IV), the model of viral mobile communication are discussed (Section-V), the process of MSA soft handover communication are discussed (Section-VI), link capacity equation of the viral mobile communication network are discussed (Section - VII). Finally, conclusions summarize the last section (Section-VIII).

II. METHODS AND MATERIAL

A. The Conception of Viral Mobile Communication

The definition of viral mobile communication (VMC) is to apply the theory of viral communication to 3G and 4G mobile communication system without direct support of upper equipment, devoting itself to realize point-to-point information transportation and switch of MS. Its characteristics are shown below:

a. Mutual independency
b. Scalability
c. Share resources
d. Rapid reproduction

New technologies allow us to make wired and wireless devices that are ad hoc, incrementally installed and populous almost without limit. They need no backbone or infrastructure in order to work as an alternative, they use neighbours to bootstrap both bit delivery and geo location. This re-distributes privileges of communications from a vertically integrated provider to the end-user or end-device and segregates bit delivery from services. Communications can become something you do rather than something you acquire. This is very important issue in economic and social cases that include telephony, media distribution, safety and rising markets.

The key idea is communications devices that work with no central backbone and scale almost without bound. They are based on reinterpreting the basic principles of wireless in the glow of efficiently viable digital radios that can expand spectrum capacity even as they use it. This obvious challenge is resolved by real-time RF processing that collaboratively distributes signals and reduces the power required at each node. As with the PC, this fundamental shift in architecture, moves communications intelligence from the core of a network to the ends, and builds upon a viral architecture that enables infinite growth and very much reduced costs of improvement.

Our study boundary entails conception of infrastructure free, scalable networks that preserve operating power, interoperate with existing systems, adapt to new radio techniques as they appear, and minimize the cost of functional evolution. This is practicable in the near term. We will demonstrate it through sample applications in domains as diverse as sensor nets and personal telephony. Viral communication architecture is one where elements are independent, scalable and where each new element adds capacity to the system, so that it can be adopted incrementally from a small base and gains accelerating value with scale.

B. Viral Architecture Requirements

We use the term viral architecture to mean a system that is adopted "virally". Viral adoption refers to a system architecture that can be adopted incrementally, and gains momentum as it scales. The growth behaviour of such a system can be called viral growth. Although many systems are fairly scalable, many are not viral, because they require a critical mass of adoption before any benefit is achieved [9].

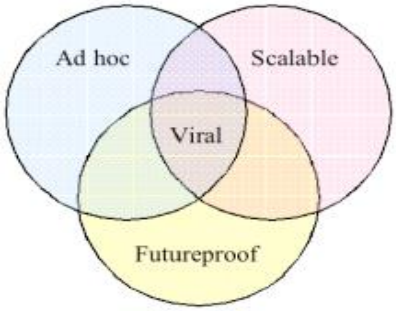

Figure 1: Basic architecture of viral system

Ad hoc network is a decentralized type of wireless network. The network is said to be ad hoc because it does not really pre-existing infrastructure. Scalability of a network is defined as the capability of a process, to handle growing amounts of work in a graceful manner or its ability to be distended to accommodate that growth.

For example, it can refer to the capability of a system to increase total throughput under an increased load when resources (typically hardware) are added. Each new element of a viral architecture must not reduce the capabilities of those that were there before to gain momentum, each new element must create more value from connecting into the system than from operating alone (Fig.1). That is, each adoption is a "win-win" decision the existing elements gain a little more benefit from the new element, and each new element has a stronger value proposition for joining the system. Momentum results from this process, because a reluctant adopter will eventually be attracted to adopt when the scale reaches his cost/benefit trade-off even when the architecture still has small reach.

C. Design Principles of Viral Architecture

There are two primary design principles that lead to a viral architecture scalability and independence [10]. The first states that viral systems have to be able to grow almost without bound, and the second requires that its elements operate autonomously, without connection to a central authority. In fundamental nature, one should be able to freely add elements and they should work without connection to a backbone. This works for

automobiles as long as there are sufficient infrastructures, and we will show that it can work for communications and that the roadways are fundamentally infinite.

- **Scalability**

From the point of view of a single handed radio receiver, capacity in bits per second is limited primarily by bandwidth of signals coming into its antenna. Signals whose frequencies overlap cannot be easily distinguished, hence the notion of interference. When the bulk of information services were broadcast services and radios where expensive, this view of spectrum made intelligence.

However, from the perspective of electromagnetic propagation in space, information capacity is unlimited. The limit is defined by the processes of detection, not the space itself. The technology of the receivers and the computational architecture of the radio system, not the physics of the space, are the limits to communications capacity. There are a number of methods in common use that prove this point. Space division multiplexing, for example, as used in microwave and satellite links, re-uses the spectrum by restricting either the direction of emission or requiring directivity in the receiving antenna. License is granted to a place, not a merely a band. The fundamental nature of scalable wireless networks is cooperation, a generalization of the phased array. Sheppard's packet repeater network design works because each node forwards packets of information on behalf of each other node. Since the power needed to reach an adjacent node is reduced by a factor equal or greater to the square of the distance, the total amount of energy used to carry a bit from source to destination is reduced. And since the energy radiates over a narrower region, the total amount of information that can be simultaneously travelling in the network increases as the nodes in the network get denser. In effect, each node is a "tower" for all of the nodes that are nearby the "cells" are defined by who wishes to communicate with whom rather than the topography or zoning requirements of the place.

Secondary concerns are that a viral system be future proof and adaptable. In automobiles, the presence of either new cars or new routes does not obsolesce existing ones. A communications device should work indefinitely no matter what other communicators enter the environment and no matter how the underlying communications technology evolves.

- **Independence**

The second criterion for a viral system is independence of operation. While this is almost understood by impression of the manner by which they scale, it is a requirement for decentralized growth. It is dictated by the applications we require independence in order to extend communications to cases for which an account or registration process simply does not apply. But more important, "de-centrality" includes a range of autonomous, distributed devices as diverse as remote controls for home entertainment equipment, portable and wearable health monitoring equipment, things placed in the physical world such as security cameras, burglar alarms, environmental sensors, thermostats, and consumer equipment such as digital cameras, personal recorders, and so onward. It is unreasonable to expect that a radio-operated TV remote control would require an account with the local cellular operator or that one would need permission to download the photo from a digital camera. Independence results from the use of a collaborative scheme for spectrum use. The principle is that each participant in a communication has the full capability of the network. Routing, relaying, and signal regeneration are alive in each device.

The notion is not radical and is implicit in ad-hoc networks. There, the general definition is that each node is a router. We likewise include routing in the devices, but we extend that notion to the radio layer itself and use the RF signal itself as a routing control parameter. Rather than complicate the design, this allows viral elements to literally sneak a signal around corners or through gaps in the local spectral flux.

D. The Model of Viral Mobile Communication

There are two kinds of call process of MS in CDMA mobile communication system: one is hard handover that MS only communicate with one base station(BS),which means the connection of MS and BS is broken off firstly and connected successively. The call process is shown in figure 2(MSC is the mobile switch

center) ; the other is soft handover that the MS communicate with two or more BSs, which means the connection of MS and BSs is connected firstly and broken off successively. The call process is shown in figure 3; the corresponding zone of two segments of arc is soft handover zone.

Reason of handover failure will be minimize if we consider viral mobile communication network the process of information transportation among the MSs is shown in fig 4, In the general communication processes shown in fig 2 and fig 3, MSs carry through corresponding call under certain condition viral mobile communication is needed; the algorithm of the information transportation process is given below [11].

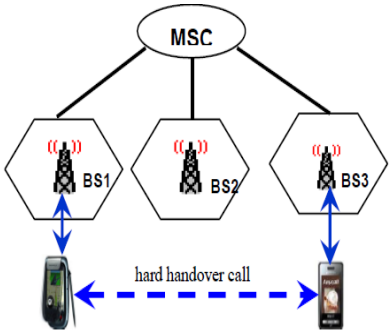

Figure 2: Hard handover call process

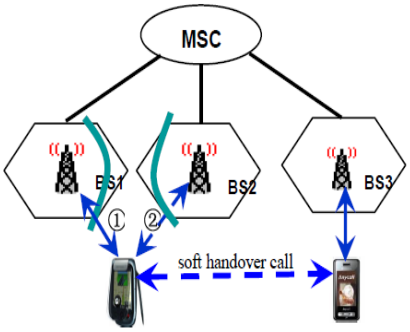

Figure 3: Soft handover call process

1. Assume that Base Station (BS) is microcell.

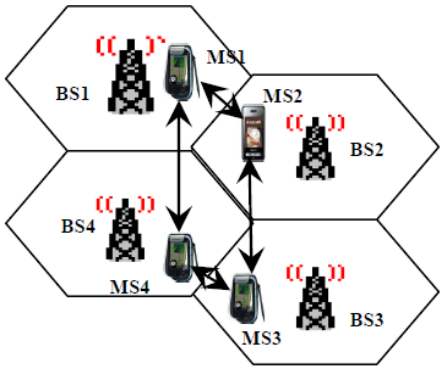

Figure 4: Viral Communication Process

2. Define BS_i and MS_i, where i＝1, 2, 3, 4;
3. The information transportation between MS1 and MS3 can be completed by MS2 indirectly or can be completed by MS4 indirectly.
4. MS1 may choose not to transport the information to corresponding BS1.
5. MS3 may choose not to transport the information to corresponding BS3.
6. Return to general communication process after the VMC finishes.

E. The Process of Ms_a Soft Handover Communication

- Soft handover is that the MS_B and MS_C connect to their corresponding BS_1 and BS_2 separately.
- Construct corresponding forward and backward link.
- Soft handover is the MS_A connects to BS_1 and BS_2 together.
- The soft handover communication link of MS_A and MS_B shows in this figure based on above assumption.

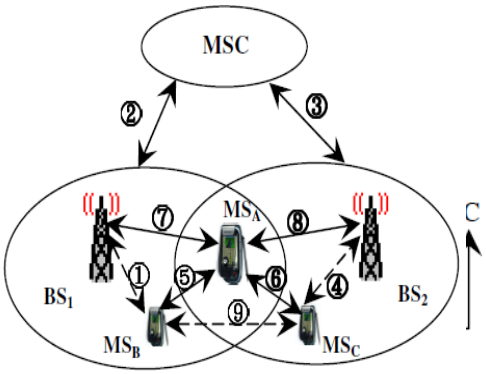

Figure 5: Soft handover call process (MS_A)

F. Link Capacity Equation of the Viral Mobile Communication Network

The viral mobile communications system is controlled under ideal power; the reverse link equation in every cell can be written as:

$$\frac{E_b}{N_o} = \frac{\sum_{i=1}^{N} \frac{W}{R_{bi}}}{\sum_{j=0}^{Ns-1} X_j + \frac{I}{S} + \frac{\eta}{S}}$$

Where

E_b is the energy per bit,
N_o is the noise spectral density,
W is the CDMA bandwidth,
R_{bi} is the service bit rate,
N is the number of services,

N_s is the users/cell,
I is the total interference,
S is the desired signal power,
η is the background noise,
x_j is the voice activity factor,

In addition assume that the signal-to-noise threshold received by BS is q, $q = \frac{S}{\eta}$.

In the viral communication network for each cell, defining the parameter of viral mobile communication network, then the link capacity equation can be resulted from formula.

$$\left(\frac{E_b}{N_o}\right)vmc = \frac{\sum_{i=1}^{N} \frac{W}{R_{bi}}}{(N_s^{vmc} - 1)X_j + \frac{I}{S} + \frac{\eta}{S}}$$

$$N_s^{vmc} = P_{sho} N_s P_{vmc}$$

- In above formula, P_{sho} is the soft handover probability of MS in microcell.
- P_{vmc} is the probability of viral mobile communication for MS in microcell during soft handover.

III. CONCLUSION

Finally, I am concluding through deep thinking as this is an under developing technology and hence there is a vast field of expansion in the field of wireless communication. Due to this technology the fundamental ability to scale and auto configuration in life voice, secure transmission, low power / high- availability signaling etc. will be possible.

The communication is a very giant field and yet a great exploration is to be done and this viral mobile communicate technology will enable the principle of wireless communication which the world has to see in future and these new principles will apply to the broad band 3G and 4G mobile communication for the betterment and comfort of humanity by point-to-point information system.

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