Review on Intelligent Network for LTE Cellular System

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ABSTRACT

This article an overview of most developing and growth oriented world is depend on generation of technology change, here is ones technology play an important role is cellular system for speed and LTE the leading technologies for next-generation mobile broadband. The development of telecommunications technology and the need for more advanced services has created projects on standardization of international Intelligent Networks (IN). The standards of Intelligent Networks define IN in an abstract point of view, so it leaves the service providers the decisions on their own implementations.

Keyword : - *LTE, MIMO, INTELLIGENT NETWORK, Network theory, Methodology.*

1. INTRODUCTION

Network theory appeared in social science along with rising awareness about the role of knowledge in sustainability of systems. We introduce in this article the concept of intelligence networks, in order to explain and advance a new framework for addressing decision making processes for the national security. Our primary objectives are the following:

1) To establish the role of the intelligence approach in contemporary security environment. Therefore, in the first part of this paper we will synthesize researches in intelligence theory and substantiate the leverage of this approach in regards with the policy for national security;

2) To introduce decision makers with elements and methodologies of the intelligence processes. The second part of the paper will describe old and new cycles of intelligence, and also outline the advantage of developing intelligence processes on networked structures;

3) And finally, to take forward intelligence theory and introduce a new method to improve intelligence processes.

Researchers generally acknowledged that units in contemporary global system behave as information processing structures. The present interconnected environment emerged along with innovation in technology and communication mechanisms, and then rapidly extended to social sciences field, in order to describe social behavior and anticipate the building of social networks. From this step on, concepts like network, complexity and dynamics, acquired political significance and were introduced in decision making processes dealing with social, economic and political phenomena.

The two competing bodies involved in churning out 4G wireless technologies [ADA07b] are the 3GPP in Europe and the 3GPP2 in North America. The 3GPP is marketed under the brand name of Long Time Evolution or LTE and is working on the 4G technology which is to succeed the 3G technology of UMTS. The 3GPP2 project is marketed under the brand name Ultra Mobile Broadband or UMB and their effort is to make transition to 4G from the existing CDMA2000 family of standards in North America.

The next generation of computer technology followed from the development of time sharing operating systems in 1960's. Time sharing made it possible to have multiple I/O-terminals connected to the computer, which was the origin of local terminal networks with data communication protocols. At the same time the use of computers was started in the process industry, where computers removed process measurement and control tasks from humans in the 1960's. This meant that the I/O operations of the computers had to be developed further and they could already communicate with other instrumentation devices. Later on, the process industry became heavily computer controlled, and the computer control of manufacturing was extended largely later in the 1970's. It was also then when the extensive use of telecommunications networks became possible. This was supported by digital PCM-transmission technology (PDH-systems) deployed in the 1960´s and 1970's and modems with signaling rates of about 300 bauds. In those days, the telecommunications networks were still largely non-digital and did not provide

bit error free data transfer. Bit errors appeared very often and for this reason transport protocols at end systems and heavy link and network protocols between the network nodes were developed to minimize this unreliability problem.

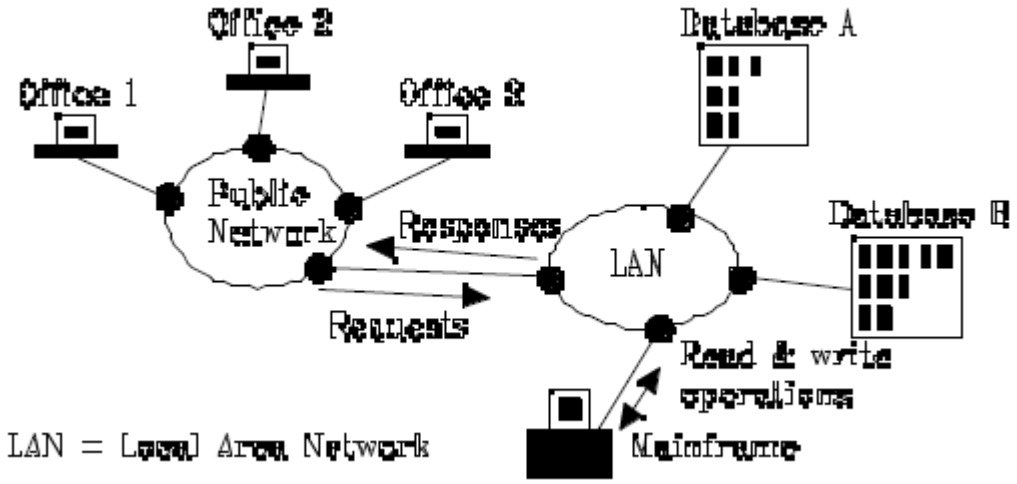

Figure -1. Transaction processing system.

2. UTMS

UMTS (*Universal Mobile Telecommunications System*) is intended to be an international standard for global telecommunication system. It is a third generation mobile telecommunications system which integrates several second generation mobile systems like cordless telephones (CT2 (*Cordless Telephone 2*) and DECT (*Digital European Cordless Telecommunications*)), mobile telecommunications systems (GSM and PCN) and radio message systems (ERMES (*European Radio Message System*)) **Hara93.** Evolution of mobile services and systems.

In the next five years the third generation mobile networks will be developed called the UMTS (Universal Mobile Telecommunications System). UMTS was researched in the RACE program of EC (*European Community*) and ETSI's group SGM5, which research will be continued in the ACTS program of EC. This new generation is based on application and service oriented technology that supports on-demand transmission capacity up to 2 Mbps in various radio environments.

The ultimate goal is to provide seamless end-to-end services to the user by using a combination of fixed and wireless/mobile access technologies, where a mobile phone could be used at home, office and elsewhere. UMTS is an open system which is based on TMN and IN concepts. The system supports ISDN services and could be at some degree compatible with B-ISDN with ATM switching and possible broadband mobile access. This system is a very advanced telecommunications system that supports global mobility and Intelligent Network services and is not expected to be introduced before the year 2000.

There has also been proposals for still higher speed mobile networks such as MBS (Mobile Broadband System), which could support bit rates up to 34 Mbps. However, the architectures of these proposed networks are still open, and they will depend heavily on how the control of mobility and intelligence will be distributed over the network.

3. MIMO

Multiple Input Multiple Output (MIMO) is one of the most popular Advanced Antenna Technologies which is supported both by LTE and UMB. The salient features of MIMO is that it offers higher throughput for a given bandwidth and higher link range for a given power value. A detailed discussion of the MIMO technology is beyond the scope of this survey and we provide a cursory glance at the key features of the technology. In MIMO the transceiver and receiver have multiple antennas giving MIMO multiple flavors based on the number of antennas present on each side. However, the key idea is that a transmitter sends multiple streams on multiple transmit

antennas 9 of 15 and each transmitted stream goes through different paths to reach each receiver antenna as shown in Figure 2.The different paths taken by the same stream to reach multiple receivers allow canceling errors using superior signal processing techniques. MIMO also achieves spatial multiplexing to distinguish among different symbols on the same frequency. MIMO thus helps in achieving higher spectral efficiency and Link reliability.

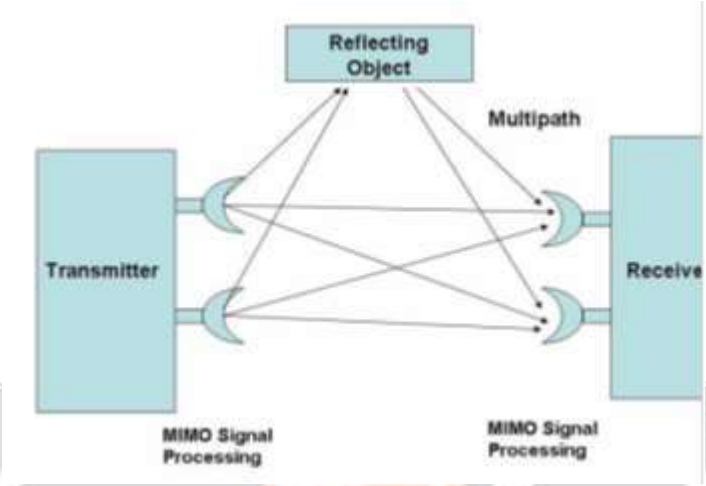

Fig.-2: MIMO

Multiple-Input Multiple-Output (MIMO) is a key technique in any modern cellular system that refers to the use of multiple antennas at both the transmitter and receiver sides. Base stations and terminals are therefore equipped with multiple antenna elements intended to be used in transmission and reception to make MIMO capabilities available at both the downlink and the uplink. Next-generation cellular systems will have to provide a large number of users with very high data transmission rates, and MIMO is a very useful tool towards increasing the spectral efficiency of the wireless transmission.

Enhanced MIMO is considered as one of the main aspects of LTE-Advanced that will allow the system to meet the IMT-Advanced rate requirements established by the ITU-R. The majority of the MIMO technologies already introduced in LTE are expected to continue playing a fundamental role in LTE-Advanced, namely beam forming, spatial multiplexing and spatial diversity. However, further improvements in peak, cell-average, and cell-edge throughput need to be obtained to substantially increase performance.

The aforementioned techniques require some level of channel state information (CSI) at the base station so that the system can adapt to the radio channel conditions and significant performance improvement can be obtained. TDD systems this information is easily gathered from the up-link, provided the channel fading is sufficiently slow, due to the fact that the same carrier frequency is used for transmission and reception. On the other hand, due to the asymmetry of FDD systems, feedback information over the reverse link is required. Full CSI could cause an additional overhead that might be excessive, so quantization or statistical CSI are preferable in practice.

4. METHODOLOGIES

Methodological requirements for the intelligence system came from two directions. From the internal perspective, intelligence processes taken place inside intelligence organizations demanded restructuring, since problems changed so radically and the traditional bureaucratic design was no longer efficient. Problems of communication between and inside agencies, between the consumer of intelligence and the analysts, between analysts and collectors of information, induced the idea that a more complex planning design was needed. Also, network
methodological aspects offer a second perspective over the structure and functions of threatening systems in the global environment. The flexibility of networks may allow the well-known problem of asymmetrical courses of action in conflict situations.
The representation of networks through graphs opened the way to make assumptions about relationships and structures based on several attributes, such as the degree of connectivity, the centrality of units in a network, critical units and paths (Harary, 1969). Network building models, as well as network destabilization processes are highly

debated issues, with consequences in various fields of decision making. Thus, the utility of networks creation methodology can be observed in regards to model management, workflow organization procedures, and data and rule management tasks (Basu and Blanning, 2007). On the other hand, destabilization of networks discussion finds its meaning in security issues arisen in last decades. Kathleen M. Carley et al. (2002) examined the capacity to destabilize large, distributed networks, consisting of actors connected through various sociodemographic dimensions. The article outlines the importance to locate nodes, links and their attributes – whether in an alliance, communication systems, financia flows – since based on these observations one could affect the stability of a network by removing critical nodes or linkages (Carley et al., 2002).

From the intelligence point of view, these two perspectives offer incentives for treating problems regarding national security based on network modeling and analysis. The selection of a type of graph to use in building networks is directly related to the purpose of the graph and the complexity of the problem. In this paper we use metagraphs, in order to build a model management process and an intelligence workflow system.

The intelligence decision model illustrated in Figure 2 consists in four elements: policy need, data and information, intelligence, and report analysis. Thus, policy needs is a pure input. Intelligence element depends on data and information. Data and information element along with intelligence element are both depending on policy needs. Report analysis depends on data and information, as well as on intelligence.

Finally, policy depends on the report analysis provided by the Intelligence community.

5. CONCLUSIONS

This article conclude LTE support in cellular system with using intelligent network. The LTE service is enhancing network system on the bases of band frequency that will enable achieving the target performance requirements established by IMT-Advanced. The development and integration of this elements will not end with 3GPP Release 10, but will provide the starting point for their implementation. In addition to the elements that we have examined in this paper, it is also expected that the use of femto-cells, self-organizing networks, and energy management systems will drive the evolution of current and future mobile wireless networks.

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BIOGRAPY

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