

Research on the Graph Theory and Topology Optimization Model with the Applications on Mobile Communication

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Abstract—In this paper, we conduct research on the graph theory and the topology optimization model with the applications on mobile communication. The mobile communication system based on smart antenna technology is the hotspot of research in the field of wireless communications. Smart antenna in order to study the smart antenna technology, through the analysis of the basic structure, working principle and the method of adaptive beamforming algorithm, it is concluded that the smart antenna technology has been identified as one of the key technology of mobile communication system, it will play an important role in future mobile communication systems. Switching technology is technology needed to mobile communication network to provide the mobile services, it can make the mobile terminal at any time, any place can get online connection and service as is the important mechanism to realize seamless roaming. Our research proposes the novel paradigm that is innovative.

Keywords- Graph Theory, Topology Optimization, Applications, Mobile Communication, Review.

Introduction

With the rapid increase of the information exchange demand and the rapid expansion in the personal mobile communications, modern frequency spectrum has become more and more valuable resource. Condition is bad, the signal transmission in the mobile communication channel before arrived at the receiving end will experience decay, decline and the delay spread, in addition, there is interference from other users,

they is an important factor to limit the system communication quality and capacity. To counter these effects, the article introduces smart antenna technology in mobile communication as the purpose is to make full use of the airspace resources improve system performance and capacity.

Mobile communication network is divided into core network, basic access network and the mobile terminals, etc. Along with the technical conditions mature, the fusion of the mobile communication network will become the trend of communication development. Network convergence is the purpose of using same core network, support different way of access, and can be on the same communications platform to carry out various operations. The integration of the network must solve the problem of the following several aspects of the fusion. (1) The integration of the business. Network integration is the integration of business power and purpose, the integration of business requirements and hidden from the user's network provide the unified platform automatic switching mechanism, make the user feel in no matter what circumstance can easily be efficient communications. (2) The fusion of the access network. Different access networks need to work together to support the user the seamless roaming in the heterogeneous wireless environment, the access network also needs to have certain information interaction between levels to support based on IP network. (3) The integration of core network. The future of mobile and fixed network can completely base on

IP is made of the same core network as the mobile communication core network integration will be based on the IP network layer [1-3].

Smart antenna arrays by regulating the signal of the weighted amplitude and phase, to change the direction of array shape, namely adaptive way or to preset basic control amplitude, point and the zero position of the beam, the beam is always pointing in the direction expectations, and zero point to the interference direction, realize the beam as the user, so as to improve the gain of antenna and dry to the noise ratio. At present the world economy is so low that the basic development of the whole telecom industry encountered unprecedented difficulties, plus 3G license auction and mobile communication market gradually saturated, the voice for the

development of the 3G has brought many unfavorable factors, affecting the practical process of 3G. In addition, the maturity of 3G itself, business and the market conditions, will also be decided its large-scale commercial basis. Controversy over time, along with people, 3G is gradually into the practical phase. Equipment specifications include base station, mobile station and grouping of the equipment and the interface specification including air interface, interfaces and primary group. The above equipment specification and interface specification has the corresponding test specification which mobile station effectiveness and general compatibility test that specification including basic function, protocol, and other parts.

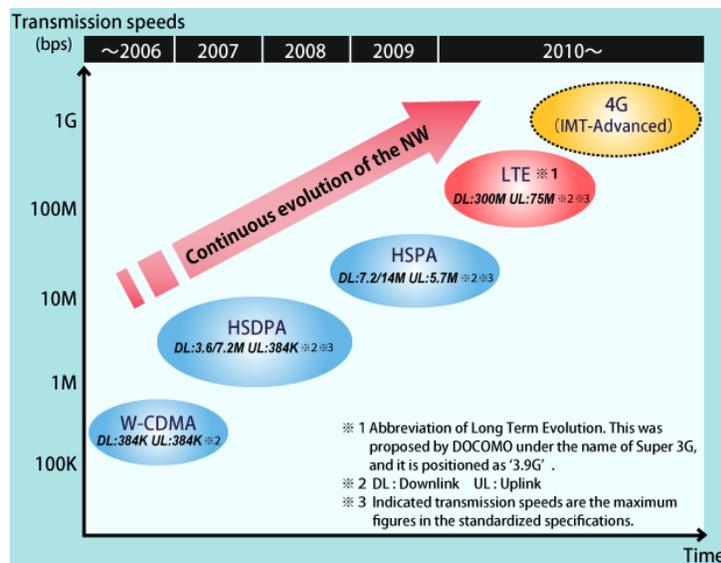


Figure 1. The Developmental Path of the Mobile Communication

In this paper, we conduct research on the graph theory and topology optimization model with the applications on mobile communication. A new generation of mobile communications will integrate different mode of wireless communication, from the wireless local area network (LAN), radio and the television, the cellular signal to the satellite communication, mobile users can freely roamed from one standard to another standard of the Internet. Can a new generation of mobile communications to

show people a relatively perfect prospect of mobile communication, it also laid a new generation of mobile communication huge market base. In the later sections, we will discuss in detail.

Our Proposed Methodology and Algorithm

The Mobile Communication Characteristics. Switch is the basic and primary capabilities of mobile communication network dynamic support

terminal roaming. Switch management is to ensure that the mobile terminal moves from a base station coverage to another base station coverage seamless and the condition when the connection. A new generation of mobile communication is basic characteristics of fusion, the fusion embodied in the aspects of network as terminal, applications and services sum up a new generation of mobile communication has the following main features [4-5].

- Personal communications, information systems, broadcasting and entertainment according to user's requirements into the seamless information database. Users according to individual be fond of can be easily and safely access to a wide range of services and application in system.
- The ubiquitous service requirements of ubiquitous mobile access. Mobile access to break the barrier of the different service providers and technology, through the mobile way to access information and services will become a standard.
- To meet user demand for services and capacity of the change and development, form the basis of the above system is a high degree of autonomy of the adaptive network, it has the structure of the organization and management ability. Autonomy is one of the elements of network running efficient and cost-effective use of radio spectrum. Therefore, self-management will become the primary standard.
- Intelligent mobile agent will exist in the entire network and the user terminal, and will simplify the task, and it is transparent for users. The intelligent mobile agent will play a role in all levels, from the management of user information bias to the network organization and reconstruction of the main unit.

The rapid development of Internet and the natural combination of mobile and it makes the

mobile Internet of the future development direction. As a new technology, the Internet of things can realize the combination of natural and mobile communication network extends to the different objects, and for the whole society to bring more convenience for the exchange of information.

At present, the entire network in the pan in the network, that because now the network has been communication from people of the world to communicate to general physical world. The past about communications network will involve anyone, any time and any place, namely this feature at any time and place. With the increase of content-content communication, any form of communication between such as words, pictures, the sound and video, and so on also can be obtain achieved. Now most of the communication is the communication between technologies across the technology of communication is not much, the future should be more technology, the application of network and communication.

The Concepts of the Topology. The topology of the network weights of network features. We can see that the evolution of the network is not only the evolution of the network topology, as well as the evolution of the power and edge power points in the network. In addition, the empirical study also shows that the network node and has a great relevance, in basic statistical sense. There is a nonlinear relationship between them is, of course, this feature can't simply from the node degrees to weigh [6].

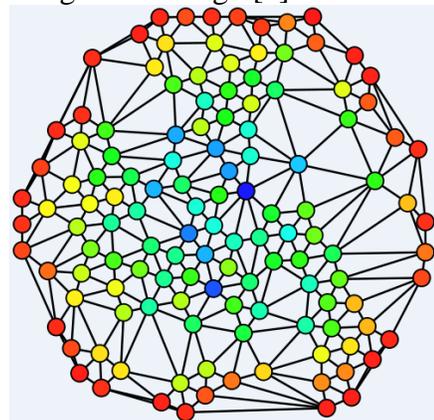


Figure 2. The Demonstration of the Topology

Looking for all routers and its connection to the management domain, the basic idea is similar to the breadth-first search algorithm of undirected graph, from any management domain can access the router, found in the routing table adjacent routers and subnet, and add the new router search queue, the connection of the relationship between them to join the router connection collection. Based on the above findings, this paper established a simple mechanism of substance flow. Then apply mechanism to the complex network, to analyze the network features, further using the corresponding feature for network empowerment and we formulate the following material flow mechanism in the network.

$$Q_{j \rightarrow i}(t) = k_i s_j(t) / \sum k_i \quad (1)$$

In the real network, a node may not assign its own material all the surrounding nodes, at the same time a neighbor node is also unlikely that take all material on this node. We formulate the rules of the purpose is to highlight in the network, the dynamic characteristics, and convenient we are analyzed. The mechanism of preference for material transfer and transmission is also reasonable. For two different networks, even if they have the same size as have the same number of edges, the normalized factors may also have very big difference; Molecular items reflect the nature of a node itself already, also reflected the characteristics of its neighbor nodes. For any two nodes, if they are the same, so they are in equilibrium with the physical quality of the relationship is determined by neighbor nodes.

The Graph Theory. Graph model is a kind of approximate description of diagnosis knowledge representation method of object with the purpose is to realize the object to the diagnosis information acquisition, basic information organization way and according to the regulations of the model to store information, such as a directed graph, the fault tree, etc. Modeling based on graph theory model, the model expression and reasoning method for main

graph model at present. Study of the graph theory model is more active, the graph theory model of existing sort is various, the multiple research branch, with development of further research on the graph theory model theory and practical application, the future will be more new used in graph theory to solve the problem of complex system fault diagnosis model. In the following figure 3, we demonstrate the corresponding patterns [7-8].

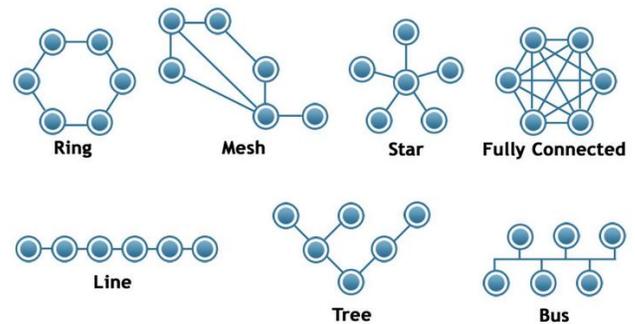


Figure 3. The Graph Patterns with Different Node Distribution

In causality diagram, nodes are often used to represent a symptom or malfunction, the connection relationship between symptoms and fault, with weight or probability to define and express connection strength. This method is relative to the rules, make knowledge expressing structured, easier to express complex knowledge. The following formula two defines the mentioned features.

$$G = (V, E) \quad (2)$$

A complex linear system can be concise and visually in the form of expression for the signal flow graph, which can calculate the transfer function of the primary normalized analytical expression, the expression is a precise description of the system characteristics and the analysis of the control system design has important significance.

The Communication Signal Transmission. In communication and transport system and signal system interface scheme, should choose advanced technology, application of basic

communication technology, should consider the safe and the reliable, unified standards, advanced technology, easy extension of general equipment, centralized management and maintenance, easy to manage, easy to maintain, easy to determine the fault of the network management system.

Minimize the degree of bending cable. First of all to make a judgment on the degree of bending cable, judge whether the bending of the cable will impact on signal attenuation, has no effect if the cable bending. If you have any impact on the signal attenuation, further analysis and research in the process of cable laying, affected by external uncontrollable factors will exist the phenomenon of cable bending radius is too small, in these areas will be easy to produce the signal attenuation. In the actual process of laying therefore, to comprehensively consider all sorts of uncontrollable factors influence on cable bending radius, try to avoid too small bending radius, keep bending radius in a fixed range, in order to reduce the effect of cable bending the signal attenuation [9].

The influence of signal offset with increasing distance interference and strengthened. Instrument and electrical cable, for example, the longer the parallel distance, the greater the interference of the instrument design code for cable from the electrical cable has a minimum range, and in vertical cross also wants when must cross. Instrument basic cable production to do total shield plus screen, when installing a laying on steel tray or the steel protecting tube, steel tray and protecting tube should be grounded, so that we can minimize interference, increasing the signal transmission distance. Using optical medium will reduce the interference of electromagnetic field in the path to the greatest extent, for strong interference is a very good solution.

Conclusion

In this paper, we conduct research on the graph theory and the topology optimization model with the applications on mobile communication.

Wireless sensor network as the choice of different network topology is made according to the application scenario. When all sensor nodes in the network is very close to the base station, the star network has its corresponding advantages, because the star network structure is simple, easy to implement because the transmission distance is nearly at the same time, the transmission power is not big, easy to get good result, but this scenario is contrary to sensor network application scenario; Mesh network is suitable for base station from the sensor node area, and the status of the node distribution density smaller. Under this theoretical guidance, we propose the novel developmental suggestions for the mobile communication that will be meaningful.

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