

RESEARCH OF MOBILE SPATIAL INFORMATION SERVICE BASED ON OPEN FRAMEWORK

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ABSTRACT:

Mobile Spatial Information Service can put spatial information technology, mobile contact, internet and etc. together, make plenty of information and strong service function of Geographic Information System used into mobile terminals, which brings convenient and economical technical ways to mobile users on exchanging information, receiving information, sharing information and releasing information based on location, and thus mobile users can get spatial information service with no limits by system flat, cable connection and etc. at any moment and any place. MSIS (Mobile Spatial Information Service) takes full advantage of convenience and agility of wireless mobile and also states most information and facts related with location and leads GIS applying to walk into a brand new era. Found on understanding related concepts on spatial information service and related technology, the paper points out a mobile spatial information service whole framework, and design its function.

1. INTRODUCTION

Location is the base of people's understanding and operating real world. Because of rapid economical life, people get eager for related information right now, like "where am I, where is the person I want now?", "what is standing by me?", "what is circling me?", "how I will get the right place?" and so on. Upon that, rapid development of spatial information technology, mobile contact, internet and mobile terminals possibly might make people's wish come true. Mobile Spatial Information Service which emerged as the times require becomes an organic integration made of technology above. It expands a lot of information in internet and strong service function of Geographic Information System into mobile terminals in order to light a convenient and economical technical way on information exchanging, receiving, sharing and releasing. Mobile users can get spatial information service at any time and spatial by mobile internet, of course, without any limits of system flat and cable connection. Therefore, during the period of post-PC, MSIS will be an exciting area filled with commerce opportunities. With support of GPS or mobile contact network position technology, what MSIS system offers is Location Based Service, which is also said mobile users' geographic location can be made sure and spatial information service on related with the geographic location or the very location is supplied at any time and any spatial. Because of huge value of commerce, the field is highly observed. During 5~10 years in future, Geographical Information can supply anybody or anything with 4A service anytime and anywhere. MSIS makes full use of wireless mobile's convenience and agility, which also states most information and facts related with location and leads GIS applying into a brand new era.

2. MOBILE SPATIAL INFORMATION SERVICE SYSTEM AND MAIN KEY TECHNOLOGY

2.1 Mobile spatial information service systems

Mobile spatial information service, under support of GPS or mobile contact network position technology, what MSIS system offers is Location Based Service, which is also said mobile users' geographic location can be made sure and spatial information service on related with the geographic location or the very location is supplied at any time and any spatial. MSIS system is a complicated technical system with spatial information technology, mobile contact technology and internet technology as basic supporting technology and with purpose of sending mobile information service to mobile or cable users anytime and anywhere. Its developing and system building are involved with navigation position, mobile contact, mobile calculating, internet and etc. many technologies. A whole mobile spatial information service system is made up of four parts: position system, mobile service center, contact network and mobile capacity terminal. The following picture is showing its system structure:

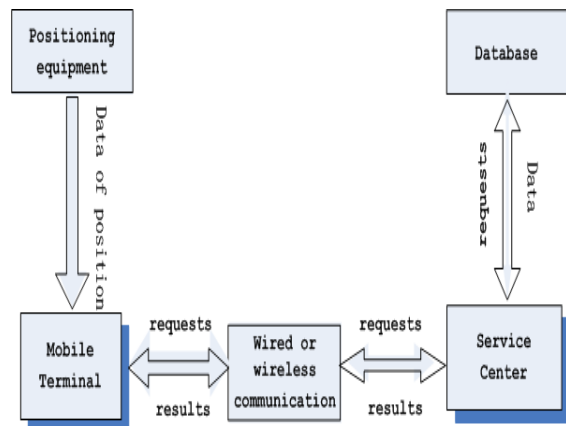


Fig 1. Work flow of MSIS

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Users request location-based services through mobile terminal, the request is accepted by mobile location-based services centers after pass various communications gateway, the center certify it and call the position system to obtain the user's location information(the other situation is that users have positioning equipment such as GPS, it can send location parameters to the Service Center through wireless network)according to the user's location, the service center response for the service, for example, send a road map. Specific services provided by content providers.

2.2 Mobile position technologies

Mobile position technology has a great future in the field of wireless mobile. Wireless position technology is used to measure by receiving wireless' some parameters. According to special arithmetic, the position of tested object is judged. Furthermore, in general, measuring parameters include transmitting time, scope, phase, and coming angle and so on. Arithmetic standing or falling is the key to the accuracy of spatial location service receives, which is one of key technologies in location service.

There are three types of technique schemes to achieve Mobile position technology: the technique scheme based on mobile network, the technique scheme based on mobile terminals and the technique scheme based on mix type. The technology's survey based on network happens at network, these position technology include COO(Cell Of Origin)、AFLT(Advanced Forward Link Trilateration)、AOA(Angel Of Arrival)、TOA(Time Of Arrival)、TDOA(Time Difference Of Arrival)、E-OTD(Enhanced-Observed Time Difference, and so on. The technology's survey based on mobile terminals happens at mobile terminals. This type of position technology contains GPS、A-GPS(Assistant Global Positioning System, and so on.

2.3 Transmitting technology of spatial information

A wireless network is important expanding and makeup for cable network way and has gradually become such an important part of computer network. It grew up based on cable network, which made computer in the net movable and quickly deal with connection problems which couldn't be difficultly solved by cable way. As a result, it is widely used in the field of dealing with mobile datum or incapably physically transmitting fabric lines as medium. Wireless network is the most effective bridge between mobile users and wired networks and a key carrier of mobile contact. Compared with wired network, wireless network must face the surrounding interrupting, channel blocking, all kinds of noise, reecho and etc. drawbacks, which is the reason why low wireless network's bandwidth, high mistakes, frequent breaking and etc. characters come out.

2.4 Building technology of mobile spatial information service

There are a great many kinds of ways to build mobile spatial information service. Technical ways of traditional distributed objects are mainly divided into Distributed Component Object Model by Microsoft Company, Common Object Request Broker Architecture by OMG and Enterprise Java Beans by SUN. Everyone has his own good ways. They all build a base for mobile spatial information service. Thought DCOM、CORBA and EJB have come true in all kinds of flats, they have a common flaw: incapably expanded into internet. They all

depend on strict management surroundings, asking service client terminals to closely connect with the service system offers. That is needed that server and client server find a detailed object model agreement with an exact and basic structure in the same style. Web Service technology is just good choice to solve the problem. Between each other of Web Service is loose, using an open data format and a data transmitting standard, making its requiring at surroundings up to the least and what's more, making contact easily through firewall. Compared with traditional object technology and component technology, Web Service makes better use through languages, flats and hardware.

3. SYSTEM DESIGN AND REALIZATION

3.1 The type of service

According to the ability of mobile terminals, mobile spatial information services system can be divided into two types. The first type, mobile terminal has an independent storage, computing, analysis. Mobile terminals will store a variety of thematic data in advance and do not need to request services through a wireless network; another type is that all data stored in the service centers, mobile terminal does not have an independent storage, computing, analysis, and only used to display the result. All users' request must submit to the service centers through wireless network, the service centers deal with the request and return the results to the mobile terminal. Although the first type of services responds faster, its mobile terminal needs a high storage capacity and the data can't update in time to meet the need of user for real-time dynamic services. Due to network bandwidth, the second type of service responds slowly, but with the development of wireless communication and GIS, the second type of service must be the development way of mobile spatial information service.

3.2 Architecture of System

According to the physical structure, the mobile spatial information service can be divided into the mobile terminal (client) and service center (server-side); they communicate using wireless communication networks and internet. Mobile terminals send service request and position parameters to service centers, service centers process the request and return the result to the mobile terminals.

Integrate spatial positioning, wireless communications and geo-spatial information application. Application needs mobile smart devices; we choose smart phones, Windows Mobile operating system, the spatial positioning adopt GPS positioning mode, which is embedded in the smart phone, wireless communications adopt GPRS/CDMA broadband wireless communications equipment, the service center constitute with Web server, map server, database server and so on. According to the Logic structure, the mobile spatial information service is usually composed of three parts, the data layer, Business Logic Layer and the Presentation Layer. Data layer complete the management and maintenance of spatial data and application data, Business Logic Layer includes Web server and application server, the Presentation Layer is the client that is mobile terminals, which is used to send request, accept result and display the result for users. Based on the above analysis, the system's overall framework as follows:

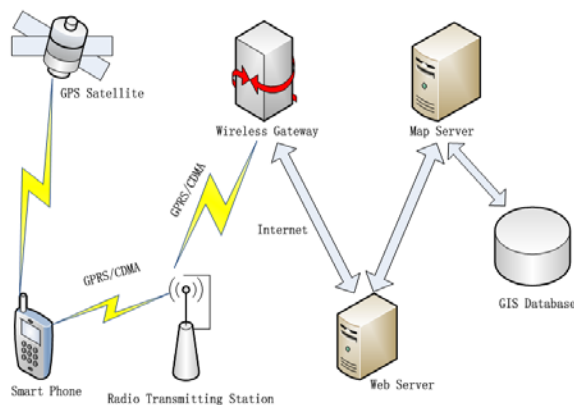


Fig 2. System's framework

As the client, through TCP/IP protocol, smart phone connect to the server via GPRS/CDMA wireless gateways. Web server accepts various GIS service requests of smart phones (including requests for LBS and mapping data, etc.), then Web server call the GIS server to satisfy the need of users, finally, Web server return the result to the smart phone, the smart phone accept the result and display it.

3.3 Module Design of System

Based on the above analysis and the actual needs of the project, the entire system is divided into two parts: service centers subsystem and mobile terminal subsystem, which constitute a service whole. Service Center subsystem provides real-time dynamic data to the client-side receive the request and process it then return the result. The mobile terminal subsystem is mainly used to receive GPS location information, send the location information and requests to the server, accept the result and displays it. The functional modules of the whole system design as follows:

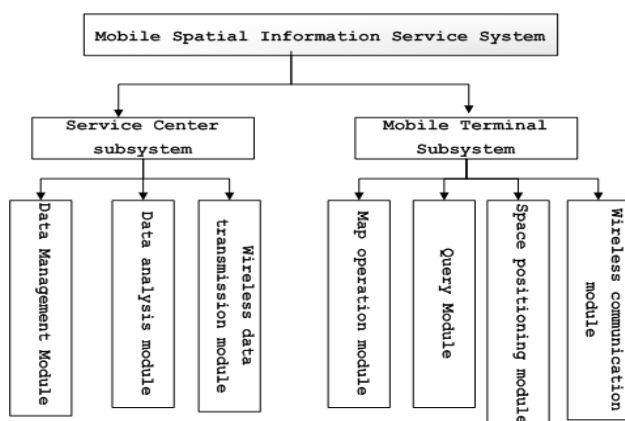


Fig 3. Functional modules of the whole system

4. SUMMARIES

Mobile spatial information service effectively narrows the gap between spatial information and people's lives; promotes the spatial information socialization process. With the development of GIS, mobile positioning, mobile Internet and mobile terminal technology, mobile spatial information services will become important information services of people's daily life, and will be a large proportion in information services in the future. In

this paper, make in-depth research in mobile spatial information service system, based on the idea of open architecture; design its overall structure and function, and functions need to be done in further study.

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