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A Study about Various Strategies of MANET for Pervasive Computing

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Abstract – In the coming future, a pervasive computing Environment can be predictable based on the current advancements in computing and Communication technologies. Next generation of Mobile Communications will consist of both prominent Infrastructures Wireless Networks and novel Infrastructure less Mobile Ad hoc Networks (MANET s). The particular features of MANET get these technology huge opportunities together with rigorous dispute. This paper illustrates the essential issues of Ad hoc Networking by giving its associated Research background consisting of the ideas, features, condition, and applications of MANET. Particular concentration is given to Network layer Routing method of MANET and main Research issues consist of fresh X-cast Routing Algorithms, Security & consistency methods, QoS model, and mechanisms for networking with outside IP Networks. Some of the technical disputes MANET cause are as well presented, based on which the paper show few of the main Research issues for future work in Ad hoc Networking technology.

The introduction of pervasive computing in the last decade has made content adaptation an important research focus. Many content adaptation approaches have been proposed for pervasive computing environments. They are, however, fully or partially centralized which makes them unsuitable to a dynamic pervasive environment such as a Mobile Ad hoc NETwork (MANET). In this paper, we propose ConAMi, a Collaboration-Based Content Adaptation Middleware, for this type of environment. In this middleware, content adaptation is performed by the collaboration between co-located devices and is done by composing available services in the vicinity. The middleware implements a novel service composition algorithm which takes the dynamicity of services into consideration.

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INTRODUCTION

As data accessibility in a MANET s is influenced by mobility and power constrain of the servers and clients, data in MANET‟s be replicated.

The IEEE 802 standards are devoted to the structure of MANs and LANs. Eminent component of this grouping are the IEEE802.3 and the now almost over and done 802.5 on the other hand the majority of the rising standards in this family arrangement with networking over the wireless medium.

The 802.15, of which blue-tooth is part of, are planned to communicate private procedure over a small area Wireless personal area network (WPAN). For the making of the Wireless corresponding of a LAN (i.e., a Wireless Local Area Network or WLAN), the IEEE planned the 8o2.11 standard; while the 802.16 (Wimax) take in hand the difficulty of city area Network or Wireless Metropolitan area Network (WMAN). Those 3 standards have in familiar the detail, which they are powerfully sustain on some types of communications. In a Wireless Personal Area Network (WPAN) - a master device focuses the entire interchange. For a WLAN, the access point shows a vital job; by depend the entire traffics between contributing wireless networks.

Furthermore, WiMax is as well communications bound; its central node is a controlling and practical base station. Although still simple to organize when evaluate to their wired corresponding item, those equipment are not practical in situation where no communications at all is accessible. For example is a tragedy region where a normal disaster or fanatic bother entirely damaged some communications. Although here is a huge deal of further frequent situation wherever communications- open network be desirable. The rising and cost-effectively test area wherever no reserves survive to put together or preserve an operational communications. A no communications or Ad-hoc Network might be the influential digital addition device desirable to lessen deficiency by way of expanding right to use to information and learning stuffing. An Ad-hoc Network

is a self-forming, self-configuring network, which allots some communications, even an access point. In such a network a node is capable to correspond with several additional nodes inside collection and as well by nodes out of instantaneous radio range. To execute the later, an Ad-hoc network based on the nodes to communicate traffic s for benefit of other nodes. An additional significant class of multihopes nodes networks is in general call Mesh Networks. In a Mesh Networks a few of the nodes are devoted to the advance of traffic s of the other nodes form a Nodes backhaul, which might be, measured its „communications". A review of such methods is able to be initiated in and an explanation of the routings protocols and metrics

The people's future living environments are emerging, based upon information resource provided by the connections of various communication networks for users. New small devices like Personal Digital Assistants (PDAs), mobile phones, handhelds, and wearable computers enhance information processing and accessing capabilities with mobility.

Moreover, traditional home appliances, e.g. digital cameras, cooking ovens, washing machines, refrigerators, vacuum cleaners, and thermostats, with computing and communicating powers attached, extend the field to a fully pervasive computing environment. With this in view, modern technologies should be formed within the new paradigm of pervasive computing, including new architectures, standards, devices, services, tools, and protocols.

In this paper, we describes the fundamental problems of ad hoc networking by giving its related research background including the concept, features, status, and applications of MANET. Some of the technical challenges MANET poses are also presented, based on which the paper points out the related kernel barrier. Some of the key research issues for ad hoc networking technology are discussed in detail that are expected to promote the development and accelerate the commercial applications of the MANET technology.

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BACKGROUND

Pervasive computing is an exciting and blooming research field, in which innovative techniques and applications are continuously emerging and aim to provide ambient and personalized services to users with high quality. Ad Hoc networks are wireless, selforganizing systems formed by co-operating nodes within communication range of each other that form temporary networks. Their topology is dynamic, decentralized, ever changing and the nodes may move around arbitrarily. The last few years have witnessed a wealth of research ideas on ad hoc networking that are moving rapidly into implemented standards. Technology under development for ad hoc networks and pervasive computing is making important steps toward this end goal possible. However, the security concerns remain a serious impediment to widespread adoption. The underlying radio communication medium for wireless network provides serious exposure to attacks against wireless networks. Wireless ad-hoc networks usually cannot depend on traditional infrastructure found in enterprise environments such as dependable power sources, high bandwidth, continuous connectivity, common network services, well-known membership, static configuration, system administration, and physical security. Finally, throw in malicious adversaries with Byzantine collusion threats and you have a very interesting and challenging problem. Without adequate security, enterprises will not be able to profit from the use of wireless ad-hoc networks and pervasive computing environment, defense organizations might be unable to guarantee the safety of their personnel in battlefield scenarios, and wireless ad-hoc networks and pervasive computing will remain on the drawing board even if the other problems associated with them are solved.

This special issue is focused on various aspects of security in ad hoc networks and pervasive computing research and development to report both in-depth research and applications-oriented works. The special issue is intended to foster state-of-the-art research in the area of security in ad hoc networks and pervasive computing. Prospective authors are invited to submit manuscripts containing original research in this area.

MANET Concept : A mobile ad hoc network is a collection of wireless nodes that can dynamically be set up anywhere and anytime without using any pre-existing network infrastructure. It is an autonomous system in which mobile hosts connected by wireless links are free to move randomly and often act as routers at the same time. The traffic types in ad hoc networks are quite different from those in an infrastructure wireless network , including:

1) *Peer-to-Peer*. Communication between two nodes which are within one hop. Network traffic (Bps) is usually consistent.

2) *Remote-to-Remote.* Communication between two nodes beyond a single hop but which maintain a stable route between them. This may be the result of several nodes staying within communication range of each other in a single area or possibly moving as

a group. The traffic is similar to standard network traffic.

3) *Dynamic Traffic*. This occurs when nodes are dynamic and moving around. Routes must be reconstructed. This results in a poor connectivity and network activity in short bursts.

MANET Status : Ad hoc networking is not a new concept. As a technology for dynamic wireless networks, it has been deployed in military since 1970s. Commercial interest in such networks has recently grown due to the advances in wireless communications. A new working group for MANET has been formed within the Internet Engineering Task Force (IETF), aiming to investigate and develop candidate standard Internet routing support for mobile, wireless IP autonomous segments and develop a framework for running IP based protocols in ad hoc networks. The recent IEEE standard 802.11 has increased the research interest in the field.

PERVASIVE COMPUTING

The idea of pervasive computing has been around for years. However, the current version was articulated by Mark Weiser in 1988 at the computer science lab of Xerox PARC. From Weiser's perspective, pervasive computing was the opposite of virtual reality. In virtual reality, the user is immersed in a computer-generated environment. In contrast, pervasive computing is invisible "everywhere computing" that is embedded in the objects around us—the floor, the lights, our cars, the washing machine, our cell phones, our clothes, and so on.

According to Estrin et al. (2000), 98 percent of all processors on the planet are not in traditional desktop computer systems, nor even in laptops. They are in household appliances, vehicles, and machines. Such existing and future applications of pervasive computing are illustrated in Figure 6.7. Notice that all 14 devices can be connected to the Internet. We will look at four applications in particular: smart homes, smart appliances, smart cars, and smart things.

Smart homes, smart appliances, smart cars, and smart things can certainly make our lives more comfortable and efficient. But pervasive computing has the potential to make an even larger contribution to society when many computing devices are linked together, creating massive intelligent systems. These systems include factories, airports, schools, offices, health-care services, and even entire cities.

Pervasive computing is viewed less as a discrete field of technology, but rather as an emerging application of information and communications technology that is integrated into the everyday world more than ever before. The goal is to meet the claim of "everything, always, everywhere" for data processing and transmission through the ubiquity of ICT systems. The following characteristics define this application paradigm:

- Miniaturization: ICT components are becoming smaller and more mobile.
- Embedding: As ICT components are integrated into everyday objects, they transform them into smart objects.
- Networking: ICT components are linked to each other and communicate generally via radio. They are therefore not part of a fixed environment or application, but are instead designed to form networks spontaneously. To prevent human attention from being overwhelmed, people are intentionally not integrated into many machine-to-machine interactions.
- Ubiquity: While embedded ICT components are increasingly ubiquitous, they are at the same time increasingly less noticeable – or even invisible – to most people. Most components will interface with their surrounding environment in several ways but will not be visible.

Pervasive computing is thus a complementary paradigm to virtual reality. Rather than reproduce and simulate the world with a computer, pervasive computing turns all objects in the real world into part of an information and communications system. Overlapping each other, the real and virtual worlds are joined.

Pervasive computing will change the ways in which we use computers drastically. Whereas today's ICT products and services are generally used consciously, this will change with pervasive computing. As computers are integrated into everyday objects, they will no longer be perceived as such and their usage will recede largely from our conscious perception. In pervasive computing, a variety of processes run automatically in the background and interact on behalf of the user. The user does not have to provide explicit instructions or make decisions. Pervasive computing involves smart environments that are envisioned as an individual's cooperative partner. However, the seeming disappearance of the computer together with the delegation of complex processes or tasks to a ubiquitous ICT infrastructure raises serious questions. How secure are these systems? How can one determine whether they act truly on behalf of their respective users? How will the enormous amounts of data generated by these processes be

handled? Can the individual user exercise the right of privacy and prevent his or her data from being passed on, stored, compared and analysed? Doesn't the vision of pervasive computing permeating our everyday environment entail an immeasurable increase in resource and energy consumption? How can a potentially fatal dependence on technology be prevented? As the majority of commercial, administration, trade and recreation transactions become impossible without pervasive computing support or are provided in the form of pervasive computing only, will this not lead to a forced usage thereof? How will pervasive computing develop and what impact will it have?

RELATED WORK

A number of content adaptation approaches have been proposed for a pervasive computing environment. We classify these approaches into two categories: those which use the concept of service composition to perform content adaptations and others without using this concept. We further classify the second category as clientbased, server-based and proxy-based adaptation approaches. In the client-based adaptation approach, the client device itself is responsible to adapt the contents according to the context of the user and his/her environment. However, this approach is difficult to be implemented in a dynamic pervasive computing environment because the client device has limited capabilities and it may not have all the required tools to carry out the appropriate adaptation.

In the server-based adaptation approach and the proxy-based adaptation approach, the server and the proxy perform content adaptations respectively. These approaches are not suitable to a dynamic pervasive computing environment since in this environment finding a device that acts as a server or a proxy is difficult.

Service composition-based content adaptation is an appropriate approach for a dynamic pervasive computing environment because it allows collaboration between co-located devices. However, there are few works in the area of service composition for a MANET. In this work, services involved to form a composite service as well as their sequences are predetermined. The environment considered by this approach is quite different with ours where different general devices (PDA, Smart Phone, Laptop, etc) are involved.

ROUTING PROTOCOLS

Routing protocols are usually engaged to determine the routes following a set of rules that enables two or more devices to communicate with each other. In an ad hoc network routes are enabled in between the nodes using multi-hop, as the propagation range of the wireless radio is limited. The nodes engaged in traversing the packets over MANET are not aware of the topology of the network. Routing protocols discovers the topology by receiving the broadcast messages from its neighboring nodes in the network and respond to accordingly. Routing protocols are classified based on the different routing techniques.

- Pure distance vector algorithms are followed by the protocols Distributed Bellman Ford, Routing Internet Protocol. Due to the poor result of these algorithms new protocols are proposed with improvement enhancing the current algorithms, such as Least Resistance Routing (LRR), Distance Sequence Distance Vector (DSDV) protocol and Wireless Routing Protocol (WRP).

- Link state algorithms are used in the protocols Fisheye State Routing (FSR) protocol, Global State Routing (GSR) protocol, Optimized Link State Routing (OLSR) protocol, Source Tree Adaptive Routing (STAR) protocol etc.

- On demand routing protocols find routes on demand i.e., when traffic arrives to the protocol for routing. No prior routes are configured and it is not necessary to exchange the routing tables frequently. A route request packet is used by source to find a route before communication is initiated. The best route is found by a route selection algorithm. Several protocols follow this strategy i.e., Ad Hoc On-Demand Distance Vector (AODV), Dynamic Source Routing (DSR), temporarily Ordered Routing Algorithm (TORA), Lightweight Mobile Routing (LMR) etc.

- Global Positioning System (GPS) in this routing algorithm protocols use the position of the nodes in traversing the packets. Protocols using this routing algorithm are Flow Oriented Routing Protocol (FORP), Distance Routing Effect.

CONCLUSION

The mobile Ad-hoc networking is one of the very significant and necessary technologies that sustain future pervasive computing situation. The particular characters of MANET get these technology huge opportunities together with rigorous disputes. Presently MANET is becoming further and further attractive research subject and there are numerous research schemes deployed by academic and companies. MANET s can be exploited in an extensive part of applications, from military, emergency rescue, law enforcement, commercial, to local and personal contexts.

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Mobile ad hoc networking is one of the most important and essential technologies that support future pervasive computing scenario. The special characters of MANET bring this technology great opportunities together with severe challenges. Currently MANET is becoming more and more interesting research topic and there are many research projects employed by academic and companies all over the world. Various interesting issues are investigated that cover all aspects of ad hoc wireless networks. Meanwhile, many routing protocols designed for ad hoc networks have been proposed as Internet Draft and RFC of IETF. MANETs can be exploited in a wide area of applications, from military, emergency rescue, law enforcement, commercial, to local and personal contexts.

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