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Social Issues of Mobile in the Wireless Market: An Overview of the Rapid Changes in the Mobile Computing Environment

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Abstract: *The use of mobile devices embedded in the surrounding physical environment, users can be provided with transparent computing and communication services at all times and in all places. The complexity of providing such services stems from the fact that the communication devices and the objects with which they interact may both be mobile. Their implementation requires advances in wireless network technologies and devices, development of infrastructures supporting cognitive environments, discovery and identification of mobile computing applications and services, security and an understanding of the cross-layer interactions between all of these components. This paper provides the idea of new mobile computing applications, including location aware and context aware applications, improved networking communication protocols to support evolving needs of mobile computing applications, and better internet backbone services to support next generation mobile computing. This paper also targets IT developers, system architects, and managers looking at how best to develop and deploy mobile applications.*

Keywords: Multimedia Distribution Protocols, Middleware, Pervasive Computing, Location-Based Services

I. INTRODUCTION

Mobile computing refers to the use of any kind of computer in a moving environment. The motion may be of the device itself, as in laptops, palmtops, wearable computers, and mobile phones; or it may refer to the dynamics of the computing process, as in digital cameras, podcasters and MP3 players. Mobile computing devices generally use wireless technologies such as LAN, Wi -Fi, GPRS and the more recently introduced MAN. It is more and more clear that wireless communications will be the natural form of communication among people, living beings and things. Virtually every appliance will be equipped with a small, cheap, lightweight wireless interface and the possibility of communicating anytime, from anywhere, to anybody/thing, in the world and beyond, is imminent. Mobile computing can be broadly classified into two categories :

Portable computing and mobility computing. Portable computing actually refers to wired communication. Portable devices themselves are movable, but in order to access them one needs to connect them to a network port. Mobility computing is also called simply mobile computing nowadays. This is true wireless communication. Not only are the devices movable, but they can also be accessed from almost anywhere. Today, portable computing is almost on the verge of extinction, mobile computing has made its foray into almost every aspect of human life.

Mobile applications can significantly increase the productivity of workers, especially if the workers can access enterprise applications in a timely and efficient manner using their mobile wireless devices. Organizations have embraced wireless e-mail, thanks to effective options that are available today for small form-factor devices. Now many organizations are working to make other data equally available. Mobile middleware platforms provide one means of achieving this objective, offering capabilities and functions that can simplify overall application deployment. Because there are many different types of mobile middleware, this paper seeks to explain how these platforms function, what their characteristics are, and how organizations can select the most appropriate solutions . Middleware is computer software that connects software components or applications, enabling services to interact over a network. The purpose of middleware is to facilitate client/server operations, access to host applications, and to enable complex distributed systems .

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II. LOCATION AND CONTEXT-AWARE SYSTEMS

One challenge of mobile distributed computing is to exploit the changing environment with a new class of applications that are aware of the context in which they are run. Such *context-aware software* adapts according to the location ofuse, the collection of nearby people, hosts, and accessible devices, as well as to changes to such things over time. A system with these capabilities can examine the computing environment and react to changes to the environment.

Three important aspects of context are: where you are, who you are with, and what resources are nearby . Context includes lighting, noise level, network connectivity, communication costs, and communication bandwidth, and even the social situation; e.g., whether you are with your manager or with a co-worker. Location is a crucial component of context, and much research in the past decade has focused on location-sensing technologies, location-aware application support, and location -based applications. With numerous factors driving deployments of sensing technologies, location -aware computing may soon become a part of everyday life. A central problem in location-aware computing is the determination of physical location. Researchers in academia and industry have created numerous location-sensing systems that differ with respect to accuracy, coverage, frequency of location updates, and cost of installation and maintenance.

III. PROTOCOLS FOR MOBILE COMPUTING APPLICATIONS

Mobile computing systems present challenges for message routing, support for disconnected operation, and providing quality of service guarantees related to latency, bandwidth and jitter. While multiple approaches have been developed, existing systems typically support only a small set of solutions in each area. In this part, a collection of communication protocols that supports multiple solutions within a single integrated framework. These protocols are constructed by subdividing the required functionality into orthogonal functions and then implementing variants of these functions as fine -grain software modules called micro-protocols. A custom service is then realized by choosing micro -protocols based on functionality and configuring them together with a standard runtime system that implements an event -oriented execution model.

IV. NEXT GENERATION MOBILE COMPUTING: TECHNOLOGICAL PERSPECTIVES 2015 AND BEYOND

The importance of mobility and digital inclusion in the future networked society are fairly well understood. Mobility is becoming an aspect that will heavily characterize both the terminals and the services and will have to be taken into consideration in future designs. The number of networked devices will increase greatly. Half the world population is already connected through mobile networks and it is expected that many more diverse devices will be connected to the network as well as directly to each other.

Users will create more of their own contents. They basically want to have the contents accessible in any way, anywhere and at any time. Moreover, it seems that a new generation of people that needs to be *always "on-line"* is appearing. This new generation is mainly characterized by the usage of social applications, such as face book, twitter. At home, there will also be major changes, for example IPTV is regarded as one of the highest growth segments providing *your own TV* channels *anywhere*. This will create triple play in a different way; live broadcast, time-shifted broadcast and Video on Demand, providing thousands of channels all available through broadband access to the extent that dedicated wireless broadcasting becomes questionable. It is expected that IPTV will be available to all kinds of mobile devices. It is not clear as which direction such important socio-economic and technical drivers will take the future Internet, but it is clear that they will drive an evolution of the current networked techno-economic landscape, even possibly cause a disruption of the next generation Internet by bringing new design goals. However, it is clear that dependency on mobility, communications, and Internet will be immense. IP as a data delivery technology was invented in the time where networks had static configurations and mobility was non-existent. Generally speaking, TCP/IP Internet solutions assume a fairly predictable and simple notion of the *end-to-end communications*. This implies that operational assumption for the TCP/IP depends on the need for availability of at least one permanently functional path between a source and a destination with relatively small end-to-end delay and packet losses for the given path. This major assumption does not always hold true in a dynamically varying mobile/wireless environment.

The future Internet must be accessible, trusted and secure, as well as able to robustly scale to meet the increasing reliance placed on it. It is anticipated that Internet governance will remain a key topic for both the current and the future Internet, and this needs to be addressed in a systematic manner, i.e. , as an issue also of relevance from a technological perspective

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by addressing it early enough when considering possible novel architectural aspects and approaches. Other non research issues also deemed of significant importance relate to openness, standards, extensibility with a low threshold to enter/join and interoperability. These are actually major features that have ensured the success of Internet such as *transparency, neutrality* and possibly users' anonymity, which should be maintained in the future. Internet-based web and peer-t o-peer applications (e.g : MSN Messenger, Gaming, Second Life., Google, Tencent, Myspace, BitTorrent, Skype, YouTube or Flickr) and their future 3D developments, as well as ubiquitous wireless sensors and actuator networks islands on global scales will dominate the amount of the traffic in the networks. New internet -based businesses are re-shaping the economic models both on the network and the application sides. The Internet applications are being complemented with really high-capacity and low-cost wireless access alternatives for finest possible access granularity and largest coverage for high speed access to the Internet.

V. MOBILE APPLICATION DESIGN

Developing an application using mobile middleware requires the creation of a mobile application model based predefined applications or templates that the developer can leverage. Only in the most simplistic cases would these precisely address a customer's needs. Modern tools emphasize a model -driven development process that reduces complexity, provides user interface controls, platform independence and comprehensive tools.

The typical steps involved in developing the application include:

- Importing the application specification
- Designing the mobile application model
- Designing the mobile application details (user interfaces, lists, fields, searches, etc.)
- Having the IDE automatically generate the application
- Testing the application with simulators
- Publishing the application for further testing on mobile devices.

Developers should:

- Consider carefully exactly what data the user needs and how he or she will interact with it. This requires a very intimate understanding of the job function, and the realization that how the job is performed may actually change due to the mobile technology.
- Realize that a single mobile-middleware code base may support multiple devices, but each device type will have to be tested and adjustments may be necessary.
- Understand the specification of the mobile device operating system such as memory and computational power. In addition, security policies may prevent the use of external cards for storage, thus limiting how much local data is available for the application.
- Understand how local data stores on mobile devices operate. For example, developers may need to know whether local databases can be encrypted and whether the middleware provides access to the encryption functions.
- Consider any compatibility issues that may exist when deploying multiple applications on a single mobile device.

In deploying mobile applications, developers and IT managers must carefully implement security policies including application security, device security and, if using a hosted service, hosted server policies.

5.1 Application and Device Security

Many middleware solutions provide security functions that can assist in security both for the device and the application. Common security functions include protection of data on the mobile device (e.g., encryption), protection of data at servers and control centers, encryption of data communications between devices, servers and control centers, user authentication, and neutralization of lost or stolen devices. Less common functions are firewalls and antivirus. For some deployments, the security functions that the middleware provides will be sufficient. For others, developers may choose to implement separate third -party security and/or management systems.

5.2 Hosted Server Policies

If using a hosted middleware server system, developers will need to evaluate the extent of protection at the data center. Ideally, the vendor stores each customer's data in a separate and distinct database. Other recommended data protection

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methods include replication of data for high availability, regular backups of data, off-site storage, and servers monitored for reliable and healthy operation.

Other important security aspects for hosted servers include policies for items such as passwords and telnet access, physical security, power management and backup, and network redundancy. Developers may also look to see whether the site has Systrust certification as set by the American Institute of Certified Public Accountants (AICPA).

5.3 Firewall Considerations

Developers and integrators will need to examine the connections between the enterprise and the mobile devices. If using a hosted service, this will consist of a connection to the hosted service. If using a behind-the-firewall approach, this will require multiple mobile devices being able to access the mobile server.

VI. CONCLUSION

In conclusion, mobile middleware can provide significant benefits in the deployment of mobile applications. It can address the variability of diverse mobile devices, and it can provide a consistent programming environment across these with high level modeling approaches. The paper has focused on cross-platform mobile middleware solutions that provide the greatest programming flexibility. However, there are also other types of systems. Such as mobile VPNs, wireless e-mail and synchronization gateways, and enterprise application mobility extensions that organizations also need to consider. Organizations also need to consider the scenarios wherein mobile middleware provides the greatest benefit. How much actual programming and development the middleware requires depends on the type of middleware and the functions it implements. Beyond application-level functions, many middleware systems also provide rich security and management features.

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