THE COMMON CHALLENGES OF MOBILE INTERNET FOR UP-COMING GENERATION

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Abstract

In this survey we concentrate on the mobile internet. Our main focus on mobile internet in two different cases of fixed connection which is provided by the telecommunication network provider and the second one is the wireless network which is getting from internet access point can be home network, Education campus .etc; in this case we also would like to discuss about network layer (protocols and Transport layer protocols).

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INTRODUCTION

There are lots of researches and modifications are going on to make shape the internet spans across the wide range on protocols, devices and standards to solve the existing problems and introducing new idea. Here we attempt to categorize some major challenges for themobile internet of upcoming generation, let's enter into a brief discussion on the recent advances and future directions. We have categorized the three-tire perspective.

1. The application perspective, which is very important on existing mobile applications and recent development applications.
2. The service Software perspective, which helps to run the applications with mobile operatingsystems.
3. The Protocols and Networks, which helps to grow the uniformity of internet speed from low speed to high speed in both wired to wireless network.

MOBILE APPLICATION SOFT WARES

A lot of existing and new applications in the market with sufficient for users but after investigating of all application are called context-ware applications, which take into account the position of the user her interest, and the capabilities of her mobile device. Some applications only used in common places and common for every one like "face-book, Twitter", which can be called location-aware because the user can expose their ideas and other can view and response their opinion (Publically).There are some consumers are let through the shop by a mobile device attached to the shopping cart, these applications are built on top of WLAN/ Internet. Our team members has investigated the most of the applications are quite narrow and misunderstanding of the service offered.

Especially in the face-book & Twitter services the users tried to set-up peer-to-peer [1,2]communication whereas the service offered was more like a public blackboard

In recent approach was the integration of sensor networks [6] into the Internet. A dominant application here is the combination of body area networks and medical sensors; a very interesting field in which a lot of open questions concerning reliability, energy consumption, security and privacy have to be addressed. In order to simplify the development of the above Mentioned applications, new platforms are needed. The new platforms should carry an abstraction of the hybrid network and Non-uniform devices, in order to assist the application Programmers to not get swamped with all details. An issue here is to find the 'golden rule' of the abstraction: it should also allow programmers to explicitly take into account the specific architecture of their networks, the constraints of their environments and the requirements of their applications. Such an engineering flexibility can be used to tune up applications according to their special needs.

MOBILE MIDDLEWARE APPROACHES

The development of distributed applications is a tedious task even in homogenous networks. However, in Non- uniform networks with a wide variety of devices, the complexity of future distributed applications may increase by several orders of magnitude. Existing middleware approaches such as CORBA, DCOM and Java RMI did not manage to meet the requirements for Developing context-aware services [4] in hybrid networks. They do not provide the technology to efficiently integrate networks, positioning systems, user and device profiles. That said, it should not be surprising that middleware platforms, which are tailored for the development of location-aware services, have attracted a lot of attention during the recent years. Some major issues such as adapting content to current location of and to the preferences of the users have been investigated thoroughly. The same holds true for the adaptation of the presentation of this content to the capabilities of the actually used mobile device: Selection of content according to the current location and the interests of the user. In the approaches investigated in the selection of the content to be displayed on the mobile device is done according to the current position of the mobile. Here, the content is known beforehand and a mapping between the content and a certain position is provided by the service provider. The latter uses information retrieval services to get content based on the current location and user preferences, whereas the former uses metadata to compile content that corresponds to the user's current position. An advanced version of what can be done with user profiles is presented. The Shark approach allows information exchange between mobile devices, Based on the personal profiles of their users. Adapting content to the capabilities of the actually used mobile device. Authors describe architecture that allows protocols to adapt the presentation of given content to the capabilities, e.g. size of the display, of the device on which the content is going to be displayed. The content adaptation is realized using XML/XSL, I.e. the content itself is described using XML and its representation on a certain mobile device is defined in XSL. The aforementioned approaches focus primarily on how to enable application programmers to exploit the new features of the wired/wireless Internet [5]. However, they Ignore or at least neglect the different characteristics of the end devices and the reliability of the transport media in the fixed and the wireless part of the Internet. † In contrast to handheld devices, PCs and Workstations that are usually used in the fixed Internet have indeed sufficient resources, i.e. energy and processing power to run complex algorithms. The different capabilities of the end devices are very important with respect to security issues. On one hand in wireless networks eavesdropping is trivial due to the medium's ease of accessibility. On the other hand exhaustive use of security means, i.e. cipher mechanisms, is not possible due to the limited resources of the handheld devices. Here the user is always forced to decide between secure communication and convenience of his mobile device. † The deployment of wireless data networks has only extended partially the traditional Internet. For example, there are still places where connectivity cannot be guaranteed. This might be caused by the error rates of the wireless link, which are several orders of magnitude higher than the corresponding rates in wired networks, or by the fact that no access points or base stations are deployed in some regions. In parallel, the capabilities of mobile devices are increasing constantly. For example the 'high-end-class' of mobile devices is equipped with processors that run at 400 MHz. Nevertheless, the question that calls for an urgent answer is what platform developers can do tounify the system behavior from the applicationperspective and to allow programmers to take advantage of specific performance improvements of the underlying technology. Such platforms, which are designed with the hybrid network and the high variety of devices in mind, are definitely needed.

A vertical approach, that takes into account the limitations of the mobile devices, the special characteristics of the underlying networks and protocols as well as hardware/software co-design for platform components, will hopefully lead to better results. To justify the expectation, we can consider that up to now most middleware platforms did not differentiate between mobile devices during run time. They considered mobile devices to be thin or fat clients, but they did not provide means to configure the platform to the current needs of the mobile and its user. There is some work towards a more flexible approach, which allows to support disconnected operations [21] and to configure the platform in order to reduce power consumption [22].The better a platform can adapt to the measured network parameters, the better the application performance, and the longer the duty cycles of the mobile devices. Very interesting topics here are energy management and load balancing. Optimizing the energy consumption and optimizing the performance of the whole system are contradicting goals, at least in certain situations. Authors in Ref. [23] discuss an approach in which the security component of the platform enables mobile devices to shift the computational intensive operations of public key algorithms into the infrastructure. From the Viewpoint of each single mobile device this approach may be very appealing. But, the performance of the whole system may be degraded. The infrastructure servers are now taking an additional burden, which may, for example, increase their response times, etc. If the performance of the whole system is the major optimization goal, it might be desirable to shift Workload to the mobile devices. At least for the 400 MHz devices it seems feasible to run parts of the platform locally, e.g. the selection of content to the current location could be done at the mobile device. Flexible concepts that allow the realization of different optimization goals should be integrated into platforms within the next years. These concepts should enable application programmers and users to adapt the behavior of the platform to their needs. From the energy viewpoint it may be interesting to think about hardware/software co-design on the platform level. In the protocol area this is done quite successfully [24,25].In the middleware area the integration of energy awareness is rather new. The integration of hardware accelerators for cipher mechanisms into a location-aware middleware is discussed in Ref. [26]. The interesting point in this architecture is that the integration of the accelerators is completely transparent to applications and even to the platform. In Ref. [27] a broker-based approach towards an energy-aware middleware is presented. Here it is proposed to make operating system services energy-aware and to enable applications to monitor and control parameters such as voltage and task scheduling. Privacy is a crucial issue when it comes to the acceptance of new services. A significant proportion of the users of the fixed Internet are already concerned about their privacy [28,29]. By using mobile devices to access the Internet, it becomes possible to connect the real- and cyber-world behavior of Internet users. So, privacy becomes more and more important. There are approaches [30–32] in which the user gets the possibility to decide how much information she is willing to reveal. In Ref. [33] the middleware intentionally reduces the accuracy of the position information. This helps to protect privacy but it cannot be used in systems that need an accurate position to work properly. Ensuring privacy can only be achieved by applying security mechanisms, i.e. authentication, authorization, de-/encryption and digital signatures. Especially the public key algorithms used for authentication and digital signatures are computationally expensive. So, here the limited resources of the wireless devices have to be taken into account. An open point still, is privacy enforcement, i.e. what can be done to ensure that service providers adhere to what they promise in accordance with their privacy policies.

CONVERGENCEOFNON-UNIFORM COMMUNICATION CHANNELS

There is a lot of ongoing research on issues of convergence of wired and wireless networks.

The research spans across a variety of subtopics from the architectural aspects, which deal with the question 'where is the right place to achieve convergence' to protocol design issues, which address the questions of best dealing with the assumptions of wired networks or even with issues of defining new metrics and methodologies for the evaluation of protocol behavior. In the architectural arena, the end-to-end argument was once again evaluated and criticized. The real issue here is to provide means that enable error detection and classification [34]. The informative source can be the local base station, the protocol sender, or even the protocol receiver. Given the nature of wireless networks, a local source may play a very informative role in the protocol engineering strategy and it may proxy the communication. The proxy can actually locally correct the detected problems, buffer un-acknowledged packets, preserve the transmission order, and leave the transport layer unchanged, at least theoretically Issues of concern here are plenty: Shall we add a burden to the base station for managing the inefficiencies of TCP? 910 P. Langendo¨rfer, V. Tsaousidis / Computer Communications 27 (2004) 908–913 shall we end up with sophisticated base stations instead of sophisticated transport protocols? Can we really resolve all the operational conflicts between TCP and local protocols, such as the timers? Can we expect that device heterogeneity—in terms of Functionality and sophistication—will eclipse in the near future? Since some level of heterogeneity in terms of protocol version or device functionality is inevitable, the real question here is whether it is more appropriate to deal with issues of heterogeneity at the proxy level or at the transport level. And finally and more generally, † when we detect an inefficiency at the transport protocol, such as TCP's inefficiency to detect the nature of the error (i.e. congestion or not), shall we change the network to deal with the problem or shall we change the protocol itself? The other category of proposals discusses modifications to existing protocols, esp. TCP. Some proposals deal with very specific problems, such as the handoff's impact on TCP's performance. A reasonable proposal here is TCP Freeze. However, there are several proposals that attempt to deal with a wider range of problems. For example, TCP-Probing deals with the error Classification prior to recovery and hence it targets efficiency beyond the handoff procedure. Similarly, TCP Real attempts to improve the impact of wireless errors on smoothness, competing with TCP-Westwood. The desirable behavior of TCP-Real is precisely to demonstrate efficiency in Non-uniform environments with wired or wireless networks and delay-sensitive or – tolerant applications. Receiver-oriented error control incarnates the property of the receiver to determine with better accuracy the data delivery rate and the potential level of data loss. This abrogates the impact of false assessments at the sender due to lost or delayed acknowledgements. TCP-Real estimates the level of contention allowing for early measures towards congestion avoidance, which, in turn, reduces the damaging transmission gaps. TCP-Westwood relies on bandwidth estimation to set the slow start threshold and the congestion window upon three duplicate acknowledgments or timeout. No specific mechanism exists to support error classification and the corresponding recovery tactics for wired/wireless networks, albeit the proposed mechanism appears to be relatively effective over symmetric wireless links due to its efficient congestion control. In summary, the framework for potential improvements is circumscribed by the application requirements and the Limitations of TCP's congestion control. We identify four distinct subtopics of protocol engineering related with the convergence of wired/wireless networks.

Additive increase is not efficient when the network dynamics encompass rapid changes of bandwidth availability. For example, when short flows that cause congestion complete their task, bandwidth becomes available. Similarly, when a handoff is completed in a cellular network, the entire channel's bandwidth becomes available.

Multiplicative decrease causes transmission gaps that hurt the performance of real-time applications that experience jitter and degraded good put. Furthermore, multiplicative decrease with a factor of 1/2 or a window adjustment to two packets characterizes a rather conservative strategy Note that multiplicative increase applies also in cases of wireless errors. Departing from AIMD show that, by removing a—what can be characterized as a minor technical flaw, both smoothness and responsiveness of the algorithm can be improved.

Error detection lacks an appropriate classification module that would permit a responsive strategy, oriented by the nature of potential errors. That is, when errors appear to be transient due to short-lived flows or random wireless interference, congestion control mechanisms (i.e. timeout extension and multiplicative window adjustment) are triggered unduly. The insufficient error detection/classification may also lead to unfair bandwidth allocation in mixed wired/wireless networks. By default, flows that experience wireless errors do not balance their bandwidth loss with a more aggressive recovery although such behavior could be justified: flows that experienced no losses have occupied extra bandwidth at the router temporarily, when the wireless errors forced some senders to back off. This situation is discussed as an open issue in Ref. [34].

Source-based decision on the transmission rate, based on the pace of the acknowledgements, necessarily incorporates the potentially asymmetric characteristics (e.g. ack delays and/or losses) of the reverse path, which is common in wireless and satellite networks. Hence, the sender's transmission rate does not always reflect the capacity of the forward path. This situation has a direct impact on efficiency since available bandwidth remains unexploited. In addition to the wired/wireless convergence, heterogeneity exists also at the level of bandwidth and capacity. Being designed with persistent congestion in mind, traditional TCP does not scale well to G-bit networks and beyond. Congestion itself exhibits different properties in such networks (i.e. more transient), the amount of transported data increases rapidly and consequently the amount of lost data can be in the order of hundreds or P. Langendo¨rfer, V. Tsaoussidis / Computer Communications 27 (2004) 908–913 911 thousands of packets, the timeout and RTT-based transmission does not allow for efficient bandwidth exploitation, and the ack–clock limits further the transmission rate. Some mechanisms have been proposed to improve the performance of the protocol over high-speed links. Fast TCP attempts to predict the highest data at which data can be transmitted without losses. XCP appears to be a promising approach but requires router level assistance. AIMD-FC on the other hand, relies on'fixing' the details of original AIMD in order for it to reach an equilibrium faster and achieve much higher efficiency. The above three approaches correspond to different fixes but they all improve the enhancements of TCP to allow communication at higher rates. We note that it is important to reach a standard that does not only allow TCP to work well in high-speed networks but also in low-speed ones. Else, the solution will not bridge the gap but instead, it may make it worse. New TCPs therefore, including Fast TCP, should be evaluated from this perspective as well.

CONCLUSIONS

There is a lot of research going on in different fields with the aim to diminish the differences between the wired and the wireless part of the Internet. People are looking at the limited resources of the wireless devices from the operating systems viewpoint, from the protocol viewpoint and from the middleware viewpoint. This clearly indicates that the integration of the mobile and the fixed Internet is a very complex task. In addition the question of how protocol and platform functionality is realized is crucial to what can be achieved. For example, the use of hardware accelerators helps to reduce the power consumption dramatically.

The achievements so far are very promising. Despite the complexity of the task, there already applications available, which work well, even with the hybrid architecture of the Wireless Internet. We expect that the number of successful mobile applications will significantly increase as soon as handheld devices become more common and a better coverage with WLAN and 3G networks is provided. From the technical point of view, there are still several problems to be solved. On one hand, it appears a natural approach to isolate these problems and to try to tackle them independently; applying layer-specific methods. On the other hand, an integrated approach in which a problem is considered from a global perspective may lead to a better solution. There are several groups that follow this approach. In the end, both methodologies may provide complementary results.

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