Report on the Third Annual ACM/IEEE International Conference on Mobile Computing and Networking (MobiCom '97)

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Introduction

MobiCom'97, the Third Annual ACM/IEEE International Conference on Mobile Computing and Networking, was held September 26–30, 1997, in Budapest, Hungary. The conference sessions took place in the beautiful Hungarian Academy of Sciences building, near the historic Chain Bridge, in the most scenic part of Budapest.

MobiCom'97 marks the third consecutive year of growth for this conference series. We received 101 research paper submissions, a growth in number of about 10% over last year, from which 26 "best of the best" papers were selected for presentation at MobiCom'97. The largest number of submissions came from the United States, although papers were submitted from 18 different countries and well over half of the submitted papers came from outside the United States, demonstrating the truly international flavor of the conference and the research area. The paper review process was double blind (reviewers were not provided author information) and almost all papers received three or more independent detailed reviews from Technical Program Committee members.

The first two days of the conference were devoted to tutorials, with the main technical sessions of the conference on the following three days. Full-day tutorials were offered on Wireless ATM, Mobile IP, and simulation of large mobile wireless networks. Half-day tutorials were offered on cellular wireless networks, and on disconnected and weakly connected access to the World Wide Web. Two workshops were held in parallel on the day followed the conference on October 1, 1997: The Second International Workshop on Satellite-based Information Systems (WOSBIS'97) and The First International Workshop on Discrete Algorithms and Methods for Mobile Computing and Communications (DIAL-M).

Research Paper Presentations

The first session of paper presentations, chaired by Nigel Davies (University of Lancaster), featured three papers on reconfiguration and adaptation, an important research area as mobile users and computers move about and encounter differing environments. The first paper in this session, "Composable Ad-hoc Mobile Services for Universal Interaction," by Todd Hodes, Randy Katz, Edouard Servan-Schreiber, and Lawrence Rowe (University of California at Berkeley), was awarded the MobiCom'97 Best Student Paper Award. This paper describes a system that allows a device to adapt its functionality to exploit services it discovers as it moves into a new environment. The next paper in this session described an architecture for dynamically adjusting to varying network connectivity and availability of network interfaces in a mobile environment, and the final paper presented a scheme for location-aware mobile applications based on X.500 and the lightweight directory access protocol LDAP.

The next session, chaired by Prathima Agarawl (AT&T Laboratories), included three papers on different types of wireless network architectures. The first of these papers described a reliable broadcast protocol for use in mobile multi-hop packet radio networks. A protocol for optimizing connection routes in a mobile ATM network was the topic of the second paper, and the third paper described the design and lessons learned from building Wireless Andrew, a very large campus wireless LAN network. These papers illustrate just some of the breadth of wireless network architectures in use today and planned for the future.

Ian Akyildiz (Georgia Tech) chaired the third session, containing three papers on mobile and wireless data delivery. GeoCast, a new routing mechanism that routes messages based on the geographic coordinates of receivers, was described in the first paper. The second paper focused on the effects of asymmetry on TCP performance, including not only bandwidth asymmetry, but also latency and media-access asymmetry. The final paper in this session considered efficient algorithms for scheduling broadcast transmission of items of common interest to a collection of wireless users, noting the relationship of this problem to packet fair queueing.

The next session, chaired by Pierre Humblet (Eurécom), covered multimedia and QoS, largely focusing on lower layer issues in cellular/PCS systems. The first paper in this session provided the results of simulations of the performance of multimedia communication over PACS PPC, concentrating on PPC's slot aggregation techniques. The last two papers examined uplink performance for applications with diverse QoS requirements, covering the sharing of slots of an uplink TDMA frame among VBR applications, and the uplink access control problem for cellular CDMA systems.

Session 5 presented two papers on wireless error control, both using a combination of ARQ and FEC schemes; this session was chaired by On-Ching Yue (Bell Labs). In the first paper, a hybrid ARQ scheme with concatenated FEC was used in order to provide sufficient error performance for wireless ATM. Focusing instead on the energy limitations of battery operated devices, the second paper examined the energy efficiency tradeoffs in a dynamic combination of ARQ and FEC.

In session 6, chaired by Ramón Cáceres (AT&T Labs), three papers on Mobile IP were presented. The first of these described a new protocol for routing multicast packets to mobile hosts, based on the use of a designated multicast service provider for each group. Also on the subject of multicasting, the second paper described an alternative to Mobile IP, in which multicast addresses are used for individual mobile hosts and multicast routing is used to track the location of each host. The last paper in this session presented a new public-key based key management infrastructure for Mobile IP, focusing on the scalability of key management.

The area of location management and handover in cellular/PCS systems was the topic of session 7, chaired by Amotz

Dr. William P. Osborne, General Chair of MobiCom '98 and Dean of Engineering and Computer Science at the University of Texas at Dallas, invites MobiCom '97 participants to Dallas for MobiCom '98

Bar-Noy (Tel-Aviv University). The first paper in this session described the use of a genetic algorithm to optimize the location update strategy for each user in a system based on location areas. The next paper proposed the use of a "velocity class" for each user to narrow the area over which a mobile terminal must be paged. A new connection handover and re-routing protocol for LEO satellite networks was proposed in the final paper, combining a route augmentation phase and a footprint rerouting phase.

Session 8, chaired by Martha Steenstrup (BBN), presented three papers dealing with protection issues in mobile computing. The first paper addressed the protection of mobile agents on Java, in which software capabilities are used for access control. The second paper proposed the use of tickets for allowing a mobile user may gain access to services without relying on any notion of a home location as the point through which such access is validated. The problem of dealing with replicated data servers that may be corrupt, where servers must run on portable machines that may be less secure and trustworthy than traditional servers, was addressed by the third paper in this session.

The final session of the conference examined proxy-based architectures and was chaired by B.R. Badrinath (Rutgers University). The first paper in this session described a client/proxy/server architecture that extends graphical applications to mobile, pen-based devices. In the second paper, a system was described in which dynamically controllable filters can be downloaded to interpose into the middle of client-server connections. Concluding this session, the final paper described the extension of ARTour Web Express to support both disconnected and asynchronous operation.

Panel Discussions

The first panel addressed the topic of "Building and Managing Large Wireless LANs: Real-World Experiences," and was moderated by Victor Bahl (Microsoft). Wireless LAN products have been commercially available for many years, but actual deployment and usage of large wireless LAN systems today is still uncommon. This panel brought together engineers and scientists who have actually built large scale wireless LAN systems, to share their real-world experiences meeting real user demands. The discussion focused on matters ranging from technical and economic, to political and regulatory.

Scott Corson (University of Maryland) moderated the second panel, covering the topic "Commercial Applications of Mobile Ad Hoc Networking: Are We Kidding Ourselves?". The vision of mobile ad hoc networking is to support host mobility in wireless networks consisting of mobile nodes, where a node is both a host and a router. There is widespread agreement as to the usefulness of this technology in mobile military systems. This panel, instead, focused on the *commercial* viability of ad hoc networking technology, touching on topics such as industrial applications, community-based networking, and wearable computing.

In the third panel, moderated by Mooi Choo Chuah (Lucent), the topic "Integration of Wireless and Wired Networks: Visions and Reality" was addressed. This panel presented the current activities carried out by different standards bodies in defining Third and Fourth Generation wireless architectures. Discussion ranged from the roles played by ATM and IP in linking local, metropolitan, and regional coverage, spanning LANs, cellular phones, and satellites; to the charging model for wireless access that can make users happy and at the same time provide incentives for service providers to improve their access networks.

The topic of the final panel was "QoS in the Next Generation Mobile Internet: What is Feasible?" and was moderated by Andrew Campbell (Columbia University). The next generation IPv6 Internet will be required to extend existing integrated services to mobile hosts with suitable quality of service (QoS) guarantees. This panel discussed to what extent existing IETF transports, integrated services, and signaling protocols are capable of delivering voice, video, and data to mobile hosts with high quality. Topics included assessing the role of Mobile IP, wireless ATM, and QoS adaptation strategies in a future mobile/QoS-capable Internet.

Conclusion

In all, MobiCom'97 featured an excellent technical program on the cutting edge of mobile computing and networking. We also had an enjoyable, fun-filled social program, that included a welcoming reception at the Museum of Ethnography on Sunday, the conference dinner banquet at Visegrád on Monday (featuring a 13th century castle with a medieval knight's tournament before a dinner), and a dinner cruise on the Danube River on Tuesday. We hope you were able to join us for the conference and that you found it both productive and enjoyable. MobiCom'98 will be October 25–30, 1998, in Dallas, Texas. We look forward to seeing everyone again there next year.