

# Towards Mobile Internet: Location Privacy Threats and Granular Computation Challenges

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## **Abstract**

The bulk of contents out on the Internet continue to grow at an astounding pace. As computing and communications become ubiquitous, we are entering the Mobile Internet Computing era, where people, devices, and vehicles are connected at all time and the Internet access capability is being embedded in billions of wireless devices such as PDAs, cellular phones, and computers embedded in vehicles (e.g., navigational systems on cars). By extending the Internet through mobile information access, the Mobile Internet is on a trajectory to offer all of the same features and value propositions as the traditional Internet, with the promise of greater information access opportunity, richer and device-spanning Internet services and experiences, thanks to continuous availability and location awareness.

While location-aware computing promises convenience, new business opportunities, and a wide array of new quality of life enhancing services, the ability to locate users and mobile objects accurately also opens door for new threats - intrusion of location privacy. Location privacy is defined as the ability to prevent other unauthorized parties from learning one's current or past location. In location-aware computing, there are conceivably two types of location privacy - personal subscriber level privacy and corporate enterprise-level privacy. Companies need enterprise-level privacy to preserve corporate secrets and maintain competitive edge. Location privacy aware computing studies the general computational intelligence and theory for effectively using granules such as clusters, subsets, groups and intervals to build an efficient and yet location privacy preserving computational model for location-aware computing applications.

In this keynote, I will discuss location privacy threats and the granular computing challenges for protecting location privacy in the mobile Internet era. I will first

review the concept of location privacy and the risks of unauthorized location disclosure. Then I will describe some representative location privacy models and techniques effective in either the privacy policy based framework or the location anonymization based framework. The discussion will address a number of important issues in location privacy research, including the location utility and location privacy trade-offs, the need for a careful combination of policy-based location privacy mechanisms and location anonymization based privacy schemes, as well as the set of safeguards for secure transmission, use and storage of location information, reducing the risks of unauthorized disclosure of location information. I will end the talk by discussing some important computational intelligence challenges in location privacy aware computing.

### **Presenter biography**

Ling Liu - is an Associate Professor in the College of Computing at Georgia Institute of Technology. There she directs the research programs in the Distributed Data Intensive Systems Lab (DiSL), examining performance, security, privacy, and data management issues in building large scale data intensive systems. Dr. Liu and the DiSL research group have been working on various aspects of distributed data intensive systems, ranging from decentralized overlay networks, mobile computing and location based services, sensor network and event stream processing, to service oriented computing and architectures. She has published over 200 international journal and conference articles in the areas of Internet Computing systems, Internet data management, distributed systems, and information security. Her research group has produced a number of open source software systems, including WebCQ and XWRAPelite. Dr. Liu has received distinguished service awards from both the IEEE and the ACM and has played key leadership roles on program committee, steering committee, and organizing committees for several IEEE and ACM conferences, including IEEE International Conference on Data Engineering (ICDE), IEEE International Conference on Distributed Computing (ICDCS), International Conference on Web Services (ICWS), International Conference on Collaborative Computing (CollaborateCom), ACM International Conference on Information and Knowledge Management (CIKM). Dr. Liu is currently on the editorial board of several international journals, including IEEE Transactions on Knowledge and Data Engineering, International Journal of Very Large Database systems (VLDBJ), International Journal of Web Services Research, International Journal of Wireless Networks (WINET), and Springer International Journal on Peer to Peer Network and applications. Dr. Liu is a recipient of the best paper award of WWW 2004 and the best paper award of IEEE ICDCS 2003, and the 2005 Pat Goldberg Memorial Best Paper Award, and a recipient of IBM faculty award in 2003, 2006. Her research is primarily sponsored by NSF, DARPA, DoE, and IBM.

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