

# Chapter 4.40

## A Roadmap for Ambient E-Service: Applications and Embracing Model

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### ABSTRACT

Most of the existing mobile services were designed based on the client/server architecture. Those mobile services neither paid much attention to mobile users' interactions with their environments nor considered the collective efforts between the mobile users in a dynamic peer group. In this article, the notion of ambient e-service is so defined as to identify a new scope of mobile e-service, which address dynamic collective efforts between mobile users (enabled by mobile peer-to-peer technology), dynamic interactions with ambient environments (envisioned by location-based service), the moment of value (empowered by wireless technologies), and low cost service provision. The notable features of ambient e-services are the exhilarated linkage based on social context and significantly rapid growth of connections. We also present an ambient e-service framework that characterizes ambient e-services with three dimensions (value stack, environment stack, and technology stack), followed by several exemplars of ambient e-service applications. Moreover, we present the

ambient e-service embracing model (ASEM) that addresses the integrated consideration of trust, reputation, and privacy required for fostering the growth of ambient e-services and steers the directions of future fruitful relevant research.

### INTRODUCTION TO AMBIENT E-SERVICE

The notion of ambient e-service is defined to identify a new scope of mobile e-services. Until now, there have been two different design paradigms in mobile commerce. Most of the current mobile commerce applications are grounded in the client/server architecture, where the only interactions involved are between a service provider and a mobile user. Mobile users are standalone. Users under such service environments cannot interact with each other easily. Although the issues of human-computer interaction with mobile devices has been brought to public attention for the last several years (Paternò, 2003). In current mobile service scenarios, interactions, or cooperation

between mobile users are not considered as important issues. Therefore, collective efforts from mobile user groups cannot be produced.

Fortunately, the Peer-to-Peer (P2P) technology with mobile devices makes it possible for mobile users to communicate with each other easily. Mobile users can exchange information wirelessly under a sensors-enabled environment. Ambient e-service is designed based on the P2P architecture that highlights the collaborative interactions of mobile users.

The notion of ambient e-services addresses dynamic collective efforts between mobile users (enabled by mobile-P2P), dynamic interactions with ambient environments (envisioned by location-based services), moment of value, and low cost service provision. The collective effort is based on the collaborative interactions of mobile users, which facilitate the low cost service provision. In a sensor-enabled environment, information presentations are embedded in everyday objects such as pens, walls, or doors. It makes the environment become an interface of the context information. Using the Mobile P2P Technology, users can exchange their information wirelessly and proceed highly extensive interactions. Grounded on location-based service, location information of mobile users can be retrieved. Hence, ambient e-service can provide personal, timely, and relevant services to mobile users.

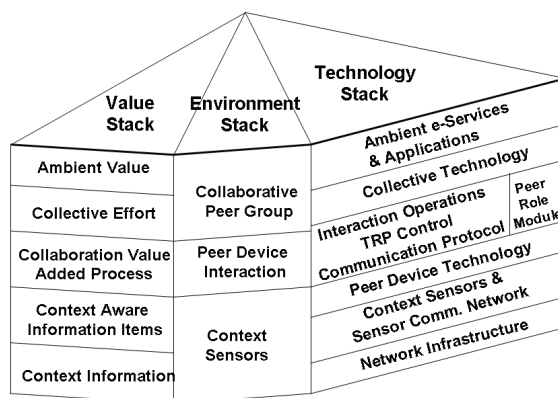
Comparing with the client/server design, an ambient e-service has two major distinguished features. First, under the client/server architecture, it is not possible to effectively attain the collective efforts that are tailored to the contexts of the user. Second, with the P2P design, the number of connections grows by a significantly rapid pace especially in an open space. For a better understanding of ambient e-services, we will use an ambient e-service framework (as shown as Figure 1) to identify some possible deliverables (values) of ambient e-services and address the technologies required to support the applications of ambient e-services.

This framework is composed of three dimensions, the value stack, the environment stack, and the technology stack. The descriptions of the stacks will be detailed as follows.

**Value Stack**

The ambient value stack comprises five layers indicating the supporting value layers for ambient e-services (deliverables of higher levels requiring the provision of deliverables of lower levels). The basic layer is the “context information,” which is attained from the ambient sensor environments. A mobile user can interact with the environments (e.g., entering a room) and the context sensors, then retrieve context information with the device

*Figure 1. Ambient e-service framework*



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