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Chapter X

Amalgamating Ontological Modeling with Bluetooth Service Discovery

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Abstract

This chapter introduces ontology conceptual modeling for discovering Bluetooth Services in m-commerce. Discovery services in a dynamic environment, such as Bluetooth, can be a challenge because Bluetooth is unlike any wired network, as there is no need to physically attach cables to the devices you are communicating with. Regular Bluetooth service discovery protocol may be inadequate to match different service naming attributes. To support the matching mechanism and allow more organized service discovery, service relation ontology is proposed to extend and

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enhance the hierarchical structure introduced in the Bluetooth specification. Frame-based and XML-based approaches are used to codify the service relation ontology, which represents the relations of service concepts. A semantic matching process is introduced to facilitate inexact matching, which leads to a situation in which a simple positive or negative response can be meaningful. The Bluetooth ontology modeling represents a broad range of service descriptions and information. The semantic matching process improves the quality of service discovery. We believe that Bluetooth wireless networks' amalgamation with the ontology conceptual modeling paradigm is a necessary component of creating a new path in the field of m-commerce infrastructures.

Introduction

Bluetooth™ is set to be the fastest growing technology since the Internet or the cellular phone (Bray & Stuman, 2002). Bluetooth has created the notion of a Personal Area Network (PAN), a close range wireless network set to revolutionize the way people interact with the information and technology around them. Bluetooth is unlike any wired network, as there is no need to physically attach a cable to the devices you are communicating with. In other words, you may not know exactly what devices you are talking to and what their capabilities are. To cope with this, Bluetooth provides inquiry and paging mechanisms and a Service Discovery Protocol (SDP). Service discovery, normally, involves a client, service provider, and seek out or directory server. Bluetooth does not define a human-machine interface for service discovery; it only defines the protocol to exchange data between a server offering services and a client wishing to use them. The SDP in Bluetooth provides a means for applications to discover which services are available and to determine the characteristics of those available services (Bluetooth Specification, 2001). However, service discovery in the Bluetooth environment is different from service discovery protocol in traditional network environments. In the Bluetooth environment, the set of services that are available changes dynamically based on the RF proximity of the device in motion.

The Bluetooth SDP uses 128-bit university unique identifiers (UUIDs) that are associated with every service and attributes of that service. However, UUID-based description and matching of services are often inadequate (Avancha,

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