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Evaluating the Energy Consumption of Web Services Protocols in Ad Hoc Networks

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Abstract

Due to the continuous change in the topology of ad hoc networks and the lack of a central directory for publishing web services, makes the process of finding web services a very difficult challenge, several approaches have been proposed, all these solutions are based on either a keyword or ID representing the service to be searched, or using a specific scenario of discovery, all this with trying to respect the constraints of ad-hoc networks such as energy, bandwidth ... etc. In this work we proposed a model for measuring the cost of the overall energy consumption in ad hoc networks depending on the mechanisms proposed by the approaches and protocols for discovering web services.

1. Introduction

Like any innovation, the emergence of services has resulted in a set of opportunities and new applications. Today, Web services are everywhere in numbers. Whether services online reservations or management of bank accounts and even business applications, all these services share in common the fact of being accessible

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as Web services. Web services speaks XML, they are described in a WSDL (Web Services Description Language) [1] format specifying the methods that can be invoked, their signature and service's access points (URL, Port, Etc.). These methods are accessible via SOAP (Simple Object Access Protocol) [2]. Web services are centralized (their publications) in a common repository UDDI (Universal Description Discovery and Integration) [3] in order to facilitate their research.

Because of frequent changes in network topology in an ad hoc mobile environment, the absence of a fixed centralized directory, the limits of wireless connection and energy constraints of mobile devices makes the achievement of discovery protocols web services designed for ad hoc networks a very sought challenge, several approaches and protocols have been developed in that regard, in this article we present our model to calculate, verify and validate protocols of web services discovery in mobile ad hoc networks depending on energy cost to respect in these types of networks.

2. Web service discovery protocols in ad hoc networks

The key elements in web service discovery protocols are: service description, search mechanisms and the type of network. The discovery of services in ad hoc network is an important problem, in the works that exist; each one is based on the above elements.

In KONARK [4], which is a protocol for discovering web services for ad hoc networks, which aims mobile e-commerce applications, each node in the network acts as a directory of services available in the network, the authors use a tree in each node to classify the available services in the network, the classification is generic in top-level (root) and becomes increasingly accurate down the tree. The authors proposed a mechanism for web services discovery and publication. In publication, each provider broadcasts its new services in the network, so that each node incorporates this service in its tree (Replication of information about services available in the network). In Discovery Phase, if a client looks for a service, he broadcasts a request based on a Name or Type of service, the relevant servers returns responses containing the desired services and the URL of their WSDL descriptions, the client records this information in his local tree of services. The major disadvantage of KONARK protocol is the significant waste of resources due to the recording of the same information in each node of the network, even if the information will not be used by the node.

In the approach proposed by [5], the authors have segmented the network to reduce traffic areas because it is not obvious that each node acts as a registry to record all the services, even less a replication of the same information in all nodes of the network, So they assume that in each area there are a Master-Host who acts as a UDDI registry, it can also recognize all the nodes that connects in this area, They also proposed a mechanism for replication and synchronization of UDDI registries information to ensure the reliability and consistency of the information available in the network (bandwidth consumption). The major inconvenient in [5] is the use of the principle of Master-Host as access point! It means they assume it is fixed so it returns to a network with infrastructure, otherwise it begs the next question, what happens when the Master host is disconnected from the area?

In [6] the authors proposed a web services discovery and publication protocol that interacts with routing protocols to optimize the services research, they assumed two types of services (ordinary and special) each provider broadcast advertisements of special services it offers, and if a client wants to find an ordinary service it sends a request based on the distance (HOP) and the type of service looked for, this mechanism requires the client interaction for the selection of desired services and will be repeated with increasing HOP until the client satisfaction, the intermediate nodes uses a cache to store the common services found. The disadvantage in this approach is the replication of information about special services in all nodes of the network and a high consumption of bandwidth by the messages of the research and the additional use of storage resources for intermediate storage of the services found even if they will not be used.