

Targeted Content Delivery to IoT Devices Using Bloom Filters

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Abstract. The increasing number of smart interactive devices connected to the network opens new business opportunities for digital content and advertisement providers, interested in reaching out to new customer audiences. To this end, they employ various device discovery and data collection techniques to gather user- and device-specific information in order to build a user profile and deliver targeted content accordingly. However, the extreme (and constantly growing) number of smart devices, dynamically connecting to and disconnecting from a network in the IoT scenario, renders existing routing techniques, such as multicasting and broadcasting, unscalable, especially when using the IPv6 128-bit addresses. Moreover, these existing solutions can hardly provide information about technical capabilities of end devices. To address this limitation, this paper discusses the potential of implementing the IoT device discovery for device-specific content delivery, based on device properties, such as screen size and resolution, network connectivity, presence of speakers, supported languages, etc., and presents an approach to enable property-based access to IoT nodes using Bloom filters. The proposed approach demonstrates space- and network-efficient characteristics, as well as provides an opportunity to perform device discovery at various granularity levels.

Keywords: Internet of Things · Edge computing · Content delivery · Device discovery · IPv6 · Bloom filter

1 Introduction

According to recent statistics [1], there are already about 10 billion connected smart objects – a constantly growing number, which has already exceeded the human population, and is expected to reach hundreds of billions in 10 years from now. This opens up several issues, targeted by joint research efforts of both academia and industry, collaboratively working towards fulfilling the vision of the ubiquitous Internet of Things (IoT). Among these issues, networking aspects, concerning how to deal with this increasing population of Internet-connected