A Passive Interoperability Testing Approach Applied to the Constrained Application Protocol (CoAP)

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Abstract. Constrained Application Protocol (CoAP) is an application protocol designed for the Internet of Things, where smart devices cooperate to provide machine-to-machine Web services. In this context, a high level of interoperability is crucial. This paper addresses the interoperability testing of CoAP applications. It proposes a methodology based on passive testing, which is a technique to test a running system by only observing its behavior without introducing any test input. The methodology (the proposed method and a corresponding testing tool) was put into operation during the CoAP interoperability testing event (Plugtest) organized by ETSI in Paris in March 2012, where a number of CoAP applications were successfully tested, showing the validity and efficiency of this approach.

1 Introduction

Internet of Things (IoT) is an integrated part of future Internet and could be defined as a dynamic global network infrastructure with self configuring capabilities based on standard and interoperable communication protocols where physical and virtual things use intelligent interfaces, and are seamlessly integrated into the information networks. One of the objectives of the IoT is using the captured information by smart objects (e.g. automation systems, mobile personal gadgets, building-automation devices, cellular terminals, the smart grid, etc.) to improve peoples life in a large range of fields: healthcare, environment monitoring, smart energy control, industrial automation and manufacturing, logistics, etc. Promoted by IoT, more and more devices are becoming connected and benefit from interacting with each other to achieve cooperative services. Over the next decade, this could grow to trillions of embedded devices and will greatly increase the Internet's size and scope. On the other hand, the evolution of technologies also brings challenges: devices behind Machine-to-Machine (M2M) applications are generally have limited resources. Typically, they are battery-powered and frequently asleep, limiting them to an average consumption on the order of micro-watts. Power limitations also lead to constraints on available networking. Most devices connect wirelessly as stringing wires are prohibitively expensive and sometimes not applicable. In consequence, packet losses might occur during data transfer.