Practical Implementation of Named Data Networking for Internet of Things

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Abstract

The Internet of Things (IoT) Technology has ushered in a new era where billions of heterogenous devices are connected to the internet for making smart decisions by sensing the surroundings. This has put the current Internet architecture to the test by highlighting the performance and scalability issues among others. Researchers are looking at an alternative design called Information-centric Networking (ICN) which provides features that suit current Internet usage patterns. Named Data Networking (NDN) which is the most prominent of ICN architectures is based on naming content as opposed to the host-centric approach of currently used Internet Protocol. It promises to solve the various issues plaguing the Internet of Things due to its reliance on decades-old Internet Protocol. We will develop an NDN application on a resource-constrained device using the NDN-RIOT library considering the Internet of Things scenarios. Named Data Networking (NDN) is a new architecture which is in the experimental stages and has not been implemented widely outside of research corridors. Hence, we present an incremental deployment approach where the NDN networks will be able to communicate with external networks like NDN applications developed for IoT devices over UDP/IP. This will be achieved by designing a Gateway node among the NDN network responsible for communication with the external IoT networks. Finally, we will compare this with existing solutions and list the major contributions made as part of this dissertation.

Keywords: Internet of Things, Information-centric Networking, Named Data Networking, IoT applications, Resource constrained devices, NDN deployment