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Yaser Jararweh, Mahmoud Al-Ayyoub, Du'a Al-Zoubi, Elhadj Benkhelifa

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An Experimental Framework for Future Smart Cities Using Data Fusion and Software Defined Systems: The case of Environmental Monitoring for Smart Healthcare

Yaser Jararweh, Mahmoud Al-Ayyoub, Du'a Al-Zoubi
Jordan University of Science and Technology, Irbid, Jordan
Emails: {yijararweh, maalshbool}@just.edu.jo
Elhadj Benkhelifa
Cloud Computing and Application Research Lab, Staffordshire University,UK
Email: e.benkhelifa@staffs.ac.uk

Abstract

With the evolution of the concept of Internet into the Internet-of-Things (IoT), in which sensors, devices, and everyday objects (things), are interconnected through the Internet, a large number of interconnected things are expected to produce massive amounts of data, which needs efficient processing in order to provide various services. IoT is of little worth without the ability to process, manage, and control a large amount of heterogeneous data in a timely and efficient manner. The concept of Data Fusion (DF) is based on combining heterogeneous multi-source data in order to produce high quality information, and reduce network traffic. On the other hand, the highly dynamic and heterogeneous nature of IoT requires very flexible and efficient management. The recent software defined systems paradigm is an appealing solution to reduce complexity and overhead in managing complex systems such as IoT by separating the control plane from the data plane. In this work, we present a novel experimental framework for IoT based environmental monitoring applications using concepts from DF and software defined systems (SDS). It is built on top of the software defined networking platform where the core components (the host, switch and the controller) are expanded to support other software defined systems components (such as software defined storage and security) and enable the applications of different DF techniques in IoT environments. We conduct several experiments to highlight features of the presented framework.

Index Terms

Internet of Things; Data Fusion; Software Defined Systems; Smart City. Smart Healthcare, Environment Monitoring.

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