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Abstract

Smart cities is an emerging concept that allows the usage of technology to improve the quality and efficiency of services delivered to the population of a given city, considering a vast application domain. Some applications, like smart surveillance using Internet of Things sensors demand the transmission of high amounts of traffic with strict quality of service, what may not be available at all times. One solution to deal with this traffic overload is to implement the concept of resources sharing. Considering this context, in this article, a heterogeneous network scenario is considered to implement a multi-purpose real time video surveillance application which can be applied to both smart cities and military surveillance such as borderline security. The proposed solution considers three crucial aspects: the QoS requirements of the real time video application; the cost-benefit of the spectrum allocation; and the time constraints involved in a vertical handover operation to avoid interference. The main contribution of the article are: (I) inclusion of a multilevel resources broker in the Smart Cities architecture, (II) a QoS-enabled solution for video surveillance to provide borderline security, and (III) a low overhead control mechanism to avoid interfering with the legitimate network traffic. Results obtained via simulations show that after the proposed solution is implemented delay and jitter are kept below their specific thresholds and therefore the QoS is guaranteed considering the coexistence of up to 500 IoT sensors. Nearly 70% of the traffic is accommodated either in IEEE 802.11 or IEEE 802.22 networks, which offer relatively low cost resources. These results are also compared with two state of the art related works and show that the proposed solution performs better than the related work in the analyzed scenarios. Finally, with respect to the time constraints, the implementation of the proposed solution leads to fast vertical handover, attaining times up to 46% lower than the maximum allowed handover duration.

Keywords: Resources Allocation, Video Surveillance, Internet of Things, Smart Cities

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