

## Development and Range Testing of a LoRaWAN System in an Urban Environment

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**Abstract :** This paper describes the construction and operation of an experimental LoRaWAN network surrounding the University of Southampton in the United Kingdom. Following successful installation, an experimental node design is built and characterised, with particular emphasis on radio range. Several configurations are investigated, including different data rates, and varying heights of node. It is concluded that although range can be great (over 8 km in this case), environmental topology is critical. However, shorter range implementations, up to about 2 km in an urban environment, are relatively insensitive although care is still needed. The example node and the relatively simple base station reported demonstrate that LoraWan can be a very low cost and practical solution to Internet of Things type applications for distributed monitoring systems with sensors spread over distances of several km.

**Keywords :** long-range, wireless, sensor, network

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