Geophysical Research Abstracts
Vol. 20, EGU2018-17520, 2018
EGU General Assembly 2018

A LoRaWAN based network for monitoring operation of environmental pollution and meteorological parameters using public transport

Lorenzo Carosso (1,2), Silvano Bertoldo (1,2), Claudio Lucianaz (1,2), Marco Allegretti (1,2)

(1) Politecnico di Torino, DET - Dipartimento di Elettronica e Telecomunicazioni, Turin, Italy, (2) CINFAI (Consorzio Interuniversitario Nazionale per la Fisica delle Atmosfere e delle Idrosfere), local research unit c/o DET, Politecnico di Torino, Turin, Italy

The LoRa (Long Range Low Power) technology and in particular the LoRaWAN (LoRa Wireless Area Network) is a Low Power Wide Area Network (LPWAN) is used to connect different sensors in a regional, national or global network and making sensed data available on the Internet of Things (IoT). LoRaWAN provides secure bi-directional data transfer and communication. Equipment using such technology can work over for years without a battery change.
LoRaWAN specification provides seamless interoperability among IoT without the need of complex local installations and gives back the freedom to the user. At the same time, the number of fields of application of LoRa sensors is continuously increasing. Among them, LoRa technology can be used in meteorology.
LoRa uses adaptive data rate, which allows receiving messages from a high number of devices. Considering that a node can send unlimited messages per day, a set of meteorological sensors (e. g. rain gauges, disdrometers, hygrometers, thermometers, etc.) can be thought as nodes of a star topology network in order to capillary monitor a portion of territory, improving also weather forecasting, services and operations.
The present work aims to realize a control network for pollutant emissions (including sound emissions) and meteorological purpose by exploiting the vehicular traffic of public transport. A specific detection system is placed on a fleet of public transport vehicles to measure both the level of emissions and meteorological parameters along the tracks of the vehicles, thus defining hourly and daily trends. Concerning pollution, it is possible to identify where levels are higher than what required by the law.
In order to connect the individual sensors to the central data collection and processing server, a LoRaWAN is implemented. The network is made up of individual slave nodes, corresponding to the sensors mounted on each vehicle. Each slave node is connected with a cluster node (placed at a maximum distance of 10 km) installed on the poles present at public transport stops. All the cluster nodes receives and re-transmits the information until reaching the final cluster represented by a centralized server.
The presented project is intended to be sustainable from both environmental and economic point of view and allows to acquire information with high spatial and temporal resolution.