ORIGINAL RESEARCH PAPER

Engineering

SMART CITIES USING INTERNET OF THINGS

KEY WORDS: Constrained Application Protocol (CoAP), Efficient XML Interchange (EXI), network architecture, sensor system integration

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ABSTRACT

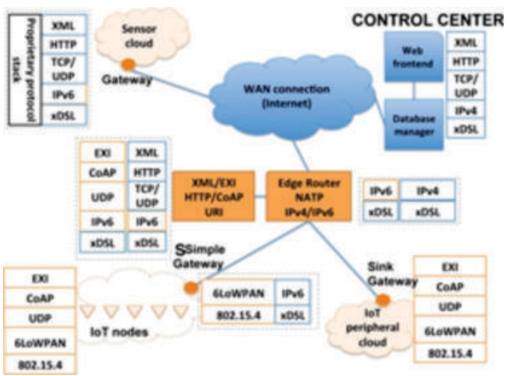
The Internet of Things (IoT) shall be able to I refer their collective network of connected devices and the technology that facilities can be communicated between the devices and cloud and also between the devices itself. Its general architecture for the IOT is very complex tasks, because various technologies are involve in a digital systems. In this paper , we mainly focus on the urban IOT system, that will quite a broad categories are characterized by their specific applications. In urban IOT to support the smart city vision , which aims to more exploiting the most advanced communication technologies that support their value services for the administration of the city and for the citizens. This paper provides a valuable survey of the enabling technologies , conventions and architecture for the urban IOT. In future we discuss about the technical solutions and their best guidelines are adopted in the smart city projects, a proof of formation of an IOT in the cities and the collaboratives are performed to be made by the municipality cities.

INTRODUCTION

The Internet of Things (IoT) is a most recent technology communication in during days. In that envisions a near future, in which the objects of everyday life will be occupied with some of their communications such that microcontrollers, transceivers for digital communication, and suitable protocol stacks these are will be able to communicate with one another and with the uses of Internet . The IoT concept, hence, aims at making the Internet even more immersive and pervasive. Furthermore, this can be enabling easy access by interaction with a wide variety of devices such as, for instance, home appliances, surveillance cameras, monitoring sensors, actuators, displays, vehicles, and so on, the IoT will foster the development of a number of applications that make use of the potentially enormous amount and variety of data generated by such objects to provide new services to citizens, companies, and public administrations. This model indeed finds application in many different domains, such as home automation, industrial automation, medical aids, mobile healthcare, elderly assistance, intelligent energy management and smart grids, automotive, traffic management, and many others. In this concept, the application of the IoT model to an urban context is of particular interest, as it responds to the strong push of many national governments to adopt ICT solutions in the management of public affairs, thus realizing the so-called Smart City concept. . An urban IoT, indeed, may bring a number of benefits in the management and optimization of traditional public services, such as transport and parking, lighting, surveillance and maintenance of public areas, preservation of cultural heritage, garbage collection, salubrity of hospitals, and school.1 Furthermore, the availability of different types of data, collected by a pervasive urban IoT, may also be exploited to increase the transparency and promote the actions of the local government toward the citizens, enhance the awareness of people about the status of their city, stimulate the active participation of the citizens in the management of public administration, and also stimulate the creation of new services upon those provided by the IoT. application of the IoT paradigm to the Smart City is particularly attractive to local and regional administrations that may become the early adopters of such technologies, thus acting as catalyzers for the adoption of the IoT paradigm on a wider scale. The objective of this paper is to discuss a general reference framework for the design of an urban IoT. We describe the specific characteristics of an urban IoT, and the services that may drive the adoption of urban IoT by local governments. We then overview the web-based approach for the design of IoT services, and the related protocols and technologies, discussing their suitability for the Smart City environment. Finally, we substantiate the discussion by reporting our experience in the "Padova Smart City" project, which is a proof-of-concept deployment of an IoT island in the city of Padova (Italy) and interconnected with the data network of the city municipality. In this regard, we describe the technical solutions adopted for the realization of the IoT island and report some of the measurements that have been collected by the system in its first operational days.

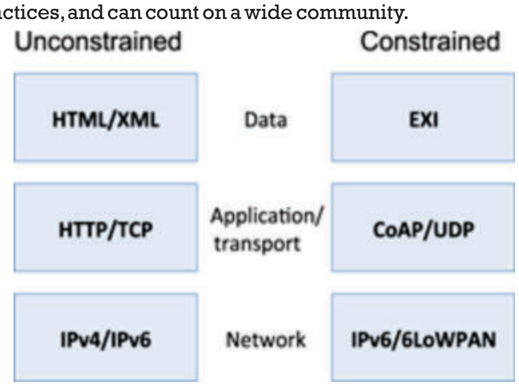
URBAN IOT ARCHITECTURE

A primary characteristic of an urban IoT infrastructure, hence, is its capability of integrating different technologies with the existing communication infrastructures in order to support a progressive evolution of the IoT, with the interconnection of other devices and the realization of novel functionalities and services. Another fundamental aspect is the necessity to make (part of) the data collected by the urban IoT easily accessible by authorities and citizens, to increase the responsiveness of authorities to city problems, and to promote the awareness and the participation of citizens in public matters



Web Service Approach for IOT Service Architecture.

Although in the IoT domain many different standards are still struggling to be the reference one and the most adopted, in this section we focus specifically on IETF standards because they are open and royalty-free, are based on Internet best practices, and can count on a wide community.



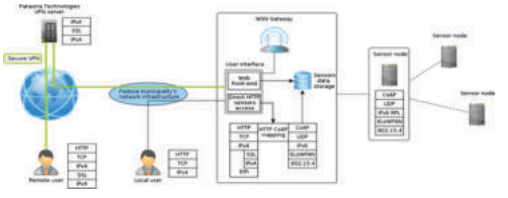
The First consists of the protocols that are currently the defacto standards for Internet communications, and are commonly used by regular Internet hosts, such as XML, HTTP, and IPv4. These protocols are mirrored in the constrained protocol stack by their low-complexity counterparts, i.e., the Efficient XML Interchange (EXI), the Constrained Application Protocol (CoAP), and 6LoWPAN, which are suitable even for very constrained devices.

System architecture of" Smart City."
The framework discussed in this paper has already been successfully applied to a number of different use cases in the context of IoT systems.

smart city components: A conceptual sketch of the Padova Smart City system architecture is given in Fig. 3. In the following, we describe in more details the different hardware and software components of the system.

Street light: : It is the leaf part of the system where IoT nodes are placed. Each streetlight is geographically localized on the city map and uniquely associated to the IoT node attached to it, so that IoT data can be enhanced with context information. The moni- toring of the correct operation of the bulbs is performed through photometer sensors that directly measure the intensity of the light emitted by the lamps (or, actually, by any source whose light reaches the sensor) at regular time intervals or upon request.

Constrained link layer technologies: The IoT nodes mounted on the streetlight poles form a 6LoWPAN multihop cloud, using IEEE 802.15.4 constrained link layer technology. Routing func- tionalities are provided by the IPv6 Routing Protocol for Low power and Lossy Networks (RPL) Each node can be individually accessible from anywhere in the Internet by means of IPv6/6LoWPAN.



WSN gateway: The gateway has the role of interfacing the constrained link layer technology used in the sensors cloud with traditional WAN technologies used to provide connectivity to the central backend servers. The gateway hence plays the role of 6LoWPAN border router and RPL root node.

CONCLUSION

In this paper, we analyzed the solutions currently available for the implementation of urban IoTs. The discussed technologies are close to being standardized, and industry players are already active in the production of devices that take advantage of these technologies to enable the applications of interest, such as those described in Section II. In fact, while the range of design options for IoT systems is rather wide, the set of open and standardized protocols is signi cantly smaller. The enabling technologies, furthermore, have reached a level of maturity that allows for the practical realization of IoT solutions and services, starting from eld trials that will hopefully help clear the uncertainty that still prevents a massive adoption of the IoT paradigm. A concrete proof-of-concept implementation, deployed in collaboration with the city of Padova, Italy, has also been described as a relevant example of application of the IoT paradigm to smart cities.

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