STRUCTURE OF LOCAL NETWORK OF IOT

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Annotation. The analysis of structure of local network of UoT are given. Some elements of such structure are discussed.

The Internet of things belongs conceptually to the next generation of networks, so its structure is similar to the well−known four layer of NGN architecture, which includes smart sensors, transport environment, services and applications [1].

The lowest level of the IoT structure consists of smart objects integrated with sensors. Sensors connect the physical and virtual (digital) worlds, providing real-time data collection and processing. Miniaturization, which reduced the physical size of hardware sensors, made it possible to integrate them directly into objects in the physical world. There are different types of sensors for the relevant purposes, for example, for measuring temperature, pressure, speed, location, etc. Sensors can have a small memory, allowing it to record a certain number of measurement results. The sensor can measure the physical parameters of the monitored object / phenomenon and convert them into a signal that can be received by the corresponding device.

Most sensors require a connection to a sensor aggregator (gateway), which can be implemented using a local area network (LAN) such as Ethernet and Wi-Fi, or a personal network (PAN) such as ZigBee, Bluetooth, and ultra-wide-band wireless communication over short distances (UWB – Ultra-Wide Band). For sensors that do not require connection to the aggregator, their connection to servers/applications can be provided using global wireless WAN networks such as GSM, GPRS, and LTE.

The large amount of data generated at the first level of IoT by miniature sensors requires a reliable and high-performance wired or wireless network infrastructure as a transport environment (network level). To implement a wide range of services and applications in IoT, it is necessary to ensure that multiple networks of different technologies and access protocols work together in a heterogeneous configuration. These networks must provide the required values for the quality of information transmission, especially for latency, bandwidth, and security. This layer consists of a converged network infrastructure that is created by integrating heterogeneous networks into a single network platform.

There are four levels of management in the IoT network: the application level; the support level for applications and services; the network level; and the device level (sensor + handler) [1].

The application and service support layer includes capabilities for various IoT objectsThe service level contains a set of information services designed to automate technological and business operations in the IoT: support for operational and business activities (OSS/BSS – Operation Support System/Business Support System), various analytical information processing (statistical, data and text mining, predictive analytics, etc.), data storage, information security, Business Rule Management (BRM), BPM – Business Process Management, etc.

At the fourth level of the IoT architecture, there are different types of applications for the relevant industrial sectors and fields of activity (energy, transport, trade, medicine, education, etc.). Applications can be "vertical" when they are specific to a particular industry, as well as "horizontal" (for example, fleet management, asset tracking, etc.), which can be used in various sectors of the economy.

The network layer includes network capabilities (access and transport network resource management, mobility management, authorization, authentication, and billing functions, AAA) and transport capabilities (providing network connectivity for transmitting IoT application information and services). The device layer includes the device's capabilities for retrieving information, preprocessing it, and gateway capabilities.

The capabilities of the device include direct exchange with the communication network, exchange through the gateway, exchange through the wireless dynamic ad-hoc network, as well as temporary stop and resume operation of the device for energy saving. The gateway features support multiple interfaces for devices (CAN bus, ZigBee, Bluetooth, Wi-Fi, etc.) and for access/transport networks (3G, LTE, DSL, etc.). Another feature of the gateway is support for protocol conversion, if the protocols of the device and network interfaces differ from each other [4].

There are also two vertical levels, the management level and the security level, covering all four horizontal levels. Vertical operational management capabilities include managing the consequences of failures, network capabilities, configuration, security, and billing data.

List of literature sources:

1. Roslyakov, A.V. Internet of things: studies. manual /A.V. Roslyakov, S. V. Vanyashin, A. Yu. Grebeshkov. – Samara, Phuthi, 2015. − 115 p.