EDGE COMPUTING FOR SOLUTIONS
BASED ON THE INTERNET OF THING

Mnushka O.V., Savchenko V.M.
Kharkiv National Automobile and Highway University,
Kharkiv

A typical architecture of systems based on the Internet of Things (IoT) includes a lot of low-cost computational units or "smart devices" and service provider's servers that collect data and provide services based on data processing for customers. Such architecture is very cost-effective but means that servers located geographically far from IoT devices. For some safety-critical applications, there are characteristics like predictable network reliability, security, low-latency for data processing critical and we need to find alternatives for standard solutions based on a typical architecture.

Edge computing provides data processing close to field devices, IoT objects and customers. As a result, reduced distances, low-latency, less network traffic for remote service's provider servers in many applications, a less solution complexity that results in a better outcome for end-users. As edge computing means processing data close to IoT devises the private networks may be used for data transmissions that lead to better privacy and security control for critical applications such as various health applications.

There are four basic components for typical edge-computing solutions:

- *IoT devices (smart devices, smart sensors)* as basic components for IoT solutions. These devices have constrained computational resources and use mobile (from 2G to 5G) or low power WAN (LoRa WAN) networks for data transmission. For some applications it is possible to use Ethernet, WiFi or various industrial data exchange protocol like Profibus, Modbus, CAN.

- *Customer edge devices (CED)* are like to data processing servers that located close to sensors or sensor network. These devices used to control IoT devices, data collection and data processing.

- *Mobile edge devices (MED)* are used for reducing transmission costs and providing fast interactive responses in the computation off-loading service, so they are focused on data aggregation, data compression, and data transformation and to collect data from CED.

- *Centralized IoT platforms* are used to collect data from MED and they provide powerful resources for data processing and control all devices on lower levels, provide system configuration on all the levels.

There are two basic strategies for build edge computing for IoT solutions:

- *The Customer Premises Edge Compute (C-PEC)* strategy relates to the computing device or devices installed on LAN close to IoT devices and controlled objects.

- *The Communication Service Provider Premises Edge Compute (CSP-PEC)* strategy relates to the computing resources such as MEC servers installed in the provider's domain.