COMARCH
INTERNET OF HEALTHCARE THINGS

IoT Solutions for Healthcare

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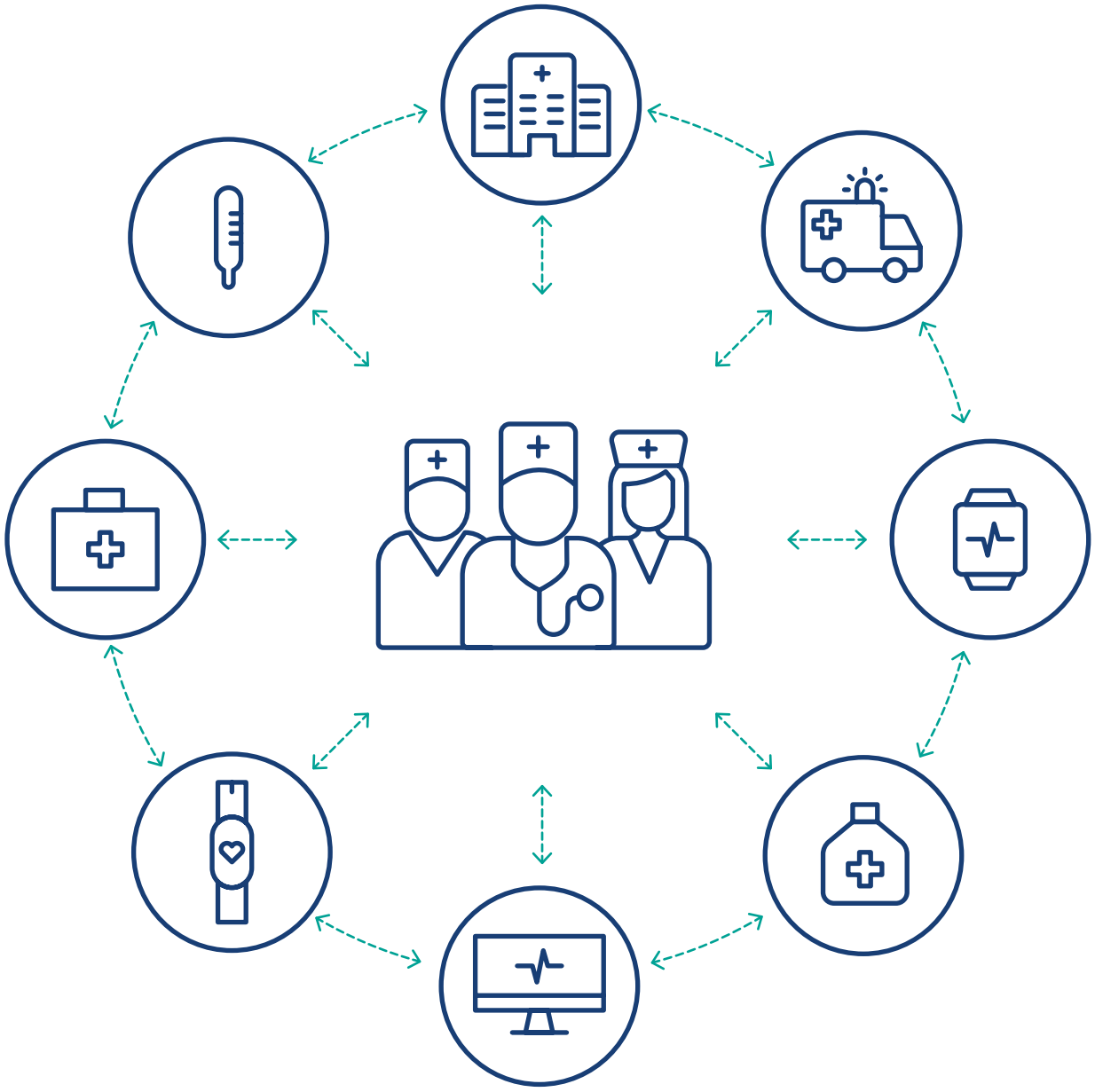
THE INTERNET OF HEALTHCARE THINGS

IoHT in short, is a concept that describes uniquely identifiable devices connected to the Internet and able to communicate with each other, used in the medical area. These solutions enable, for example, localization and real-time information about assets. Remote or automatic management of resources is possible too. This leads not only to higher quality care and time savings, but also ensures patient safety. Thanks to the IoHT, managing medical facilities is more efficient with uninterrupted access to equipment, data and patients' information. The most important features of most IoHT solutions are flexibility and personalization. Systems can be adapted to every facility, no matter what specialization or size. They can also be integrated with existing technologies and software, connected and modified.



ADVANTAGES OF IOHT SOLUTIONS

For Patients

Fast and easy notification of personnel about problems, by the patient or a device

Continuous monitoring of patients' conditions and saving their parameters

Increasing safety by providing remote medical care and detection of dangerous events

Faster and more effective access to medical care, and therefore to diagnosis and treatment

Comprehensive care outside medical facilities

Automatic transfer and analysis of data collected by devices

Remote medical consultations

Automatic reminders

For Medical Staff

Constant access to patients' full medical history including latest data

Help of algorithms which can detect abnormalities

Easy location of patients with orientation difficulties (e.g. those suffering from dementia)

Quick and easy location of devices and other equipment

Constant access to essential information about the patients from mobile application

Patients' database available through a web browser

For Managers and IT Staff

Geofencing/protection against theft, notifications when devices leave a defined area

Control of access to data and resources

Automatic or remote control of lighting systems, which can save energy and regulate patients' circadian rhythm

Analysis of resource consumption

Movement detection via sensors and alerts

Preventive/predictive maintenance

Quick data access and transfer in the event of emergency

Real-time fault and error detection

Maintenance automation

THE ARCHITECTURE OF AN IOHT SOLUTION

THINGS

Devices which perform certain actions such as taking measurements (glucometers and holters) or have specific functions (lamps). Importantly, retrofitting means that even older machines can be adapted to an IoHT solution.

CONNECTIVITY

Communication modules integrated with final devices. This allows the transfer of data and remote control. Information is collected from IoHT objects and transmitted to the cloud platform. There are various communication standards, therefore it is important that providers are flexible and able to choose the right one for each system.

Communication Within the Facility	Communication Outside the Facility
Bluetooth Low Energy	2G, 3G, 4G, LTE
RFID	5G
WiFi	LPWAN - Low Power Wide Area Network
Mesh technology - allows the devices to serve as network transmitters, providing a signal even in the most remote parts of the facility	▪ NB-IoT, ▪ LTE cat.M1 ▪ LoRA ▪ Sigfox

CLOUD PLATFORM

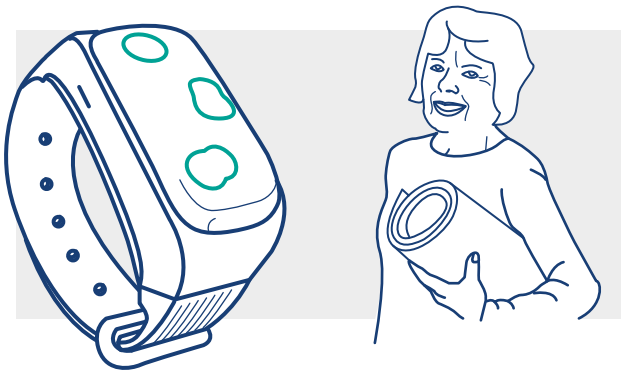
Both software and platform can function as a service. This provides secure and constant access to data and easy transmission, which is crucial for every medical facility and patients. The cloud allows different elements to use the same infrastructure, whilst offering various functionalities. An IoHT platform can be integrated with other internal systems, making cooperation fast and easy. Cloud platforms such as Comarch e-Care are designed specifically for the healthcare sector and can be adjusted for every customer. Comarch E-care and Comarch IoT Platform are complementary and compatible solutions.

IOHT SOLUTIONS

Comarch IoHT solution consists of elements which can be used in a number of variations. Apart from those functions directly intended for the healthcare sector, there are also other applications intended to simplify processes within a building. All elements can be connected and tailored to every need.

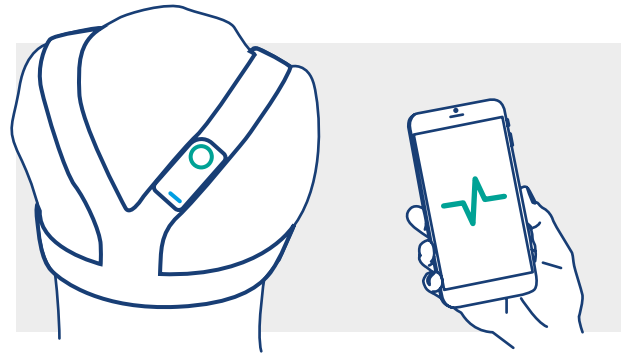
SYSTEMS FOR PATIENTS

Remote Medical Care – medical care within or outside the facility, supported with proper, integrated and communicative technology, such as:



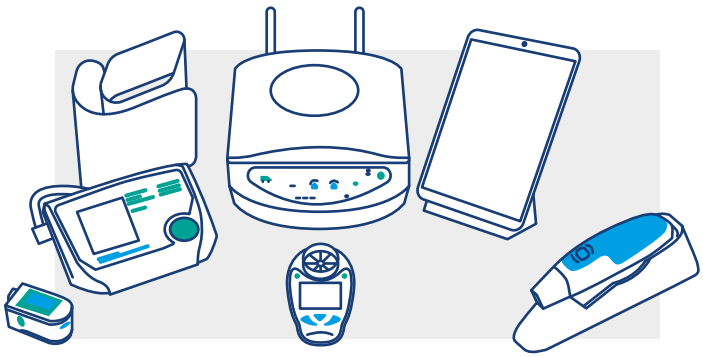
COMARCH E-CAREBAND®

A wearable device, used to monitor the patient's status, for example via an SOS button or fall and removal sensors. It also enables localization based on GPS.



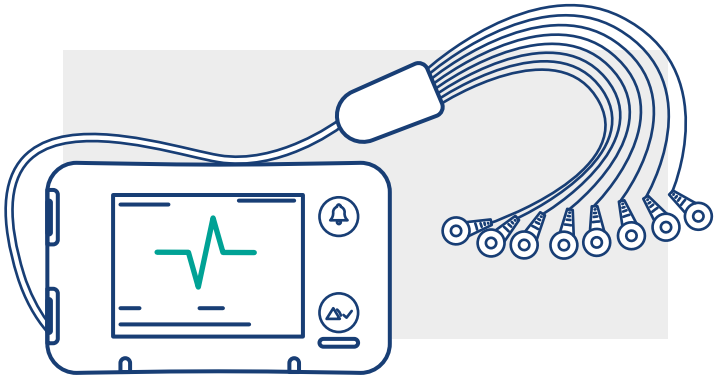
COMARCH CARDIOVEST

Records and transfers ECG data to the platform, whilst an implemented algorithm interprets the data and conducts analysis of signals, automatically detecting crucial disorders and deviations from standard.



COMARCH HMA

Collects data from peripheral devices and transmits them to the e-Care platform.



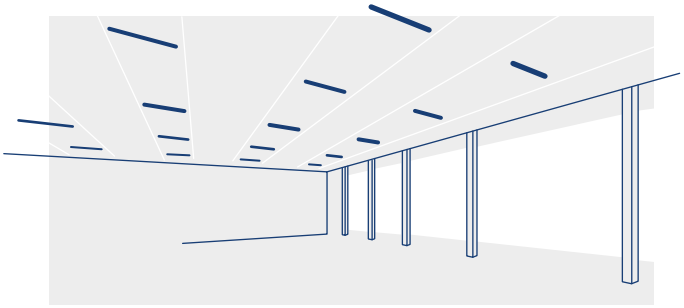
COMARCH HTA

A telemetry system, that allows continuous monitoring of a patient's health condition via wearable devices, as well as insight into their medical history.

SYSTEMS FOR MANAGING MEDICAL FACILITIES

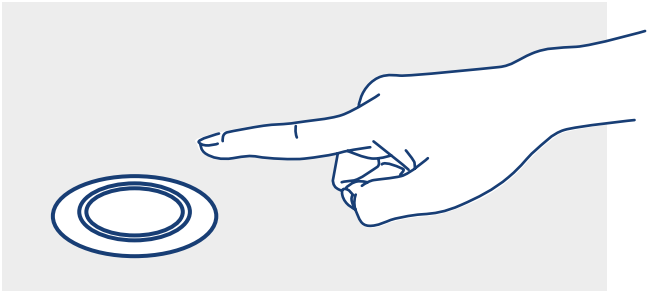
COMARCH SMART LIGHTING

Flexible and scalable smart lighting solution, allowing automatic or remote control of illumination infrastructure.



COMARCH SMART BUTTON

A small, battery-powered button that communicates with the IoT platform, integrated with the hospital's internal systems. It offers a wide range of applications, depending on individual needs.



ASSET TRACKING

Depending on a client's needs, this can be implemented using RFID or Bluetooth Low Energy technology. A solution based on BLE technology includes **Comarch IoT Hub** and **Comarch Beacon.**

Comarch IoT Hub

Enables secure, two-way communication between the device and a cloud platform, by transmitting data from connected devices to the server/cloud. What is more, Comarch IoT HUB has modular architecture for the provision of required communication modules. The self-owned operating system can run applications and perform "fog computing".

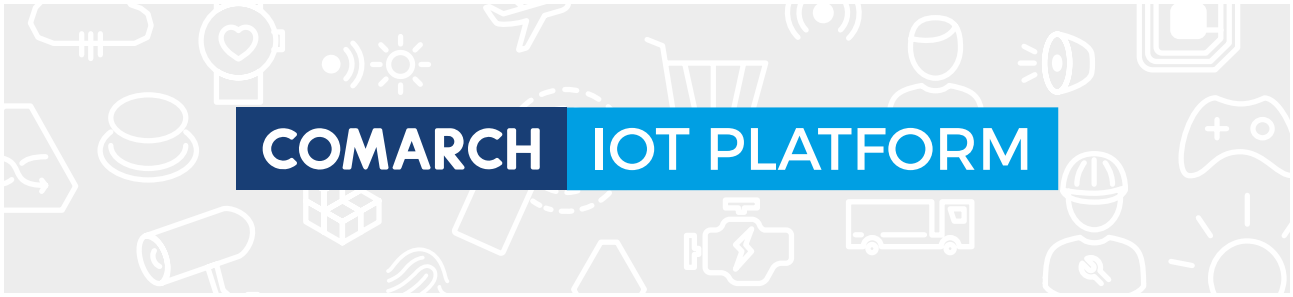
Comarch Beacon

A small, battery powered BLE transmitter with built in accelerometer and temperature sensor. The signal transmitted by a Comarch Beacon is encrypted. Beacons can be used to determine a users' location (location-based services) and location of an asset by connecting to the IoT HUBs network (asset tracking).

CLOUD PLATFORM

COMARCH IOT PLATFORM

Transfers information from IoHT devices to the cloud, and makes it available through the web interface or mobile app.



COMARCH E-CARE PLATFORM

Collects and processes data from measuring instruments, and supports medical staff in the realization of specific procedures.

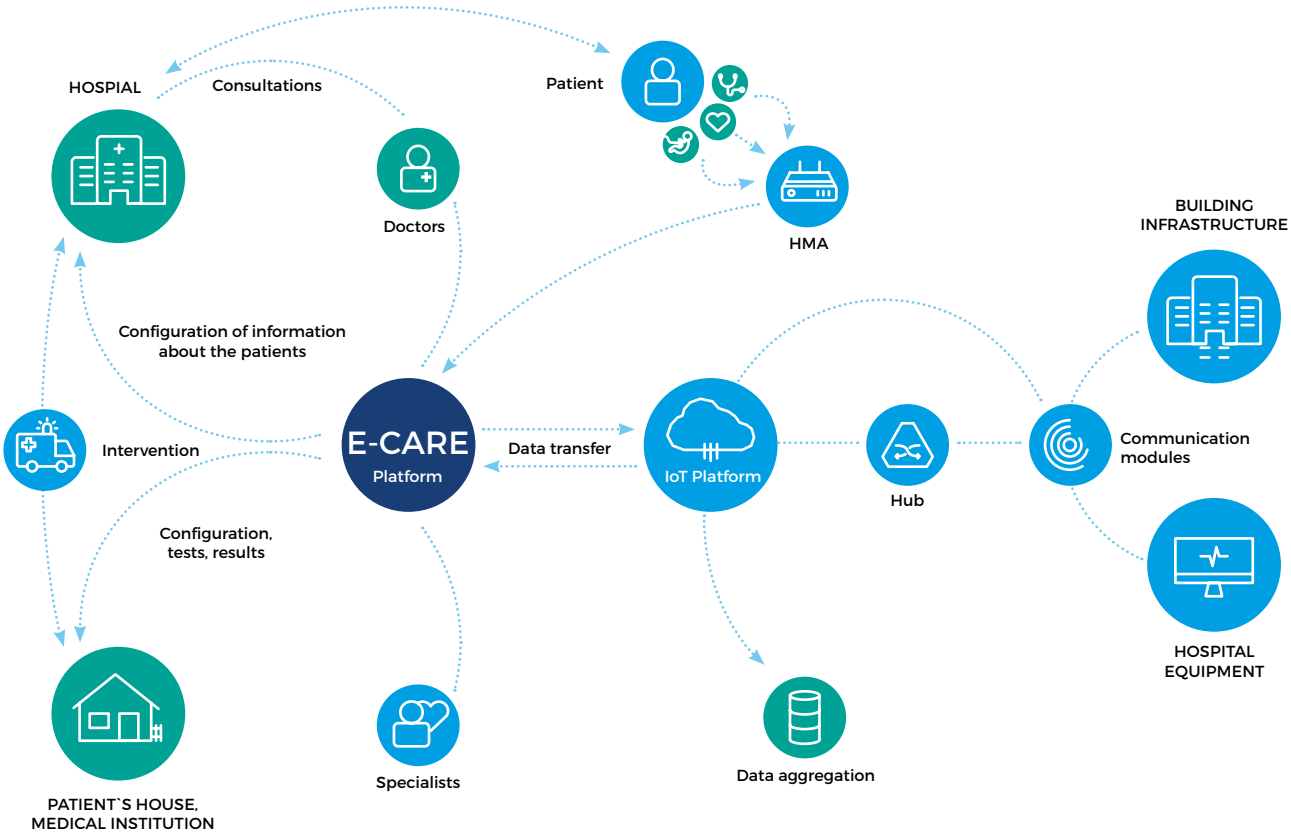
Quality of IoHT devices is crucial. They have to be reliable, thoroughly tested and adjusted to each case. **Comarch IoT Plant** offers sophisticated infrastructure facility for short/medium-series manufacturing and rapid prototyping, suitable for the healthcare sector. The IoT Plant supports clients along the whole production process, from product development and mechanical prototyping to electronics manufacturing.

EXEMPLARY FUNCTIONALITIES:

- Two-way / multilateral communication with IoHT device
- Patient health status monitoring
- Patient navigation
- Device localization
- Remote or automatic control over facility systems and equipment
- Collecting data from every device
- Remote medical care and diagnostics
- Retrofitting of medical devices
- Flexibility and adaptability to each client and need
- Personalization
- Preventive maintenance
- Indoor tracking

EXAMPLES OF USE

- Monitoring patient health status, parameters and localization
- Patient identification
- Asset tracking
- Facility management and environment control
- Telecare and telemedicine



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ABOUT US

Comarch is a leading Central European IT business solutions provider specializing in forging business relationships that maximize customer profitability while optimizing business and operational processes.

Comarch Technologies draws from a wide expertise Comarch has accumulated during 25 years of its business activity in the field of delivering comprehensive IT solutions. Its main concern is to provide the customers with the most reliable and secure solutions that consist of advanced software along with innovative hardware infrastructure supported by professional services.

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