Mobile networks

Mobile networks development

- **1G** – network oriented to voice services, poor quality of provided services.

- Analogue radio systems - users could only make phone calls, they could not send or receive text messages.

- The 1G network was first introduced in Japan in 1979 before it was rolled out in other countries such as the USA in 1980.

Mobile networks development

- **2G** – use of digital system, reduction of transmission power, better resistance to errors, increase in security, SMS, e-mail.
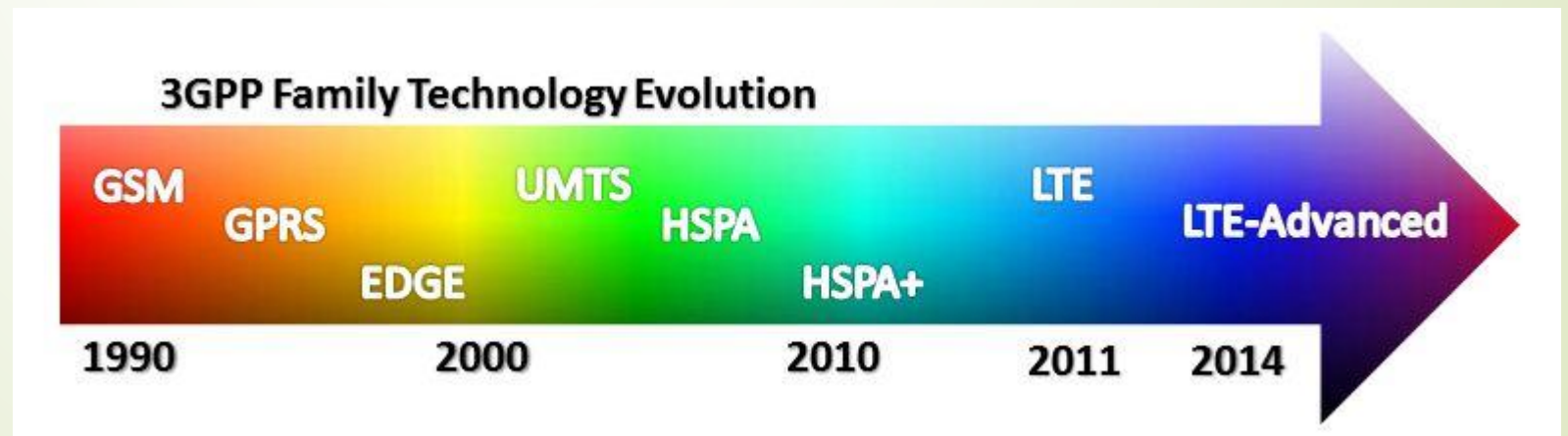
Mobile networks development

- **3G** – high-speed and high-capacity systems, more efficient use of the transmission spectrum.

- 3G revolutionized mobile connectivity and the capabilities of cell phones.

4G LTE

- LTE – Long Term Evolution – technology intended for high-speed Internet in mobile networks.

- LTE is the result of the evolution of GSM/UMTS standards and its goal was to increase the capacity and speed of wireless data networks.

- Another goal was to reduce the signal delay compared to 3G and to simplify the architecture in general.

3GPP Family Technology Evolution

GSM · GPRS · EDGE · UMTS · HSPA · HSPA+ · LTE · LTE-Advanced

1990 · 2000 · 2010 · 2011 · 2014

LTE speed

- Maximum theoretical data download speed– 300 Mb/s (37,5 MB/s)

- Maximum sending speed – 75 Mb/s (9,375 MB/s)

- However, speeds depend on bandwidth and other signal parameters, so in practice you will more often encounter speeds of **100/50** (download/upload in megabits per second).

Mb or MB

- The download speed indicated for the Internet connection indicates how much data we will be able to download per unit of time.

- Internet speed – Mb/s – megabit per second

- Size of data files (movies, music...) – MB – megabyte

- Units with a capital B are always eight times greater than units with a small b.

1 MB = 8 Mb resp. 1 Mb = 0,125 MB

5G

- 5G - 5th generation mobile network. It is a new global wireless standard after 1G, 2G, 3G, and 4G networks.

- 5G enables a new kind of network that is designed to connect virtually everyone and everything together including machines, objects, and devices.

Other facts about5G?

- No one company or person owns 5G, but there are several companies within the mobile ecosystem that are contributing to bringing 5G to life.

- 5G technology has a theoretical peak speed of 20 Gbps, while the peak speed of 4G is only 1 Gbps.

- The 5G network will also simplify mobility, with seamless open roaming capabilities between cellular and Wi-Fi access.

Why do we need 5G?

- It should handle new video formats, such as Ultra HD (4K), 8K, as well as holographic display.

- Another area is IoT, including autonomous cars and flying machines.

- 5G networks must handle up to a million IoT devices per square kilometer.

- Thanks to the parameters with which 5G networks will be able to compete with most of today's fixed Internet connection technologies, there will also be a migration of customers from fixed networks to mobile networks.

IoT – Internet of Things

- The collective network of connected devices and the technology that facilitates communication between devices and the cloud, as well as between the devices themselves.

- Technologies enabling low-cost wireless connection and communication of various sensors and devices for the purpose of automation, speeding up and streamlining processes, remote measurement of quantities, remote control, increasing comfort and quality of life.

- The origins of IoT are connected to RFID (Radio Frequency Identification).

- Miniaturization and a significant drop in component base prices have enabled the production and mass deployment of inexpensive sensors and devices that we can easily connect to the network.

How does IoT work?

- **Smart devices** - this is a device, like a television, security camera, or exercise equipment that has been given computing capabilities. It collects data from its environment, user inputs, or usage patterns and communicates data over the internet to and from its IoT application.

- **IoT application** - an IoT application is a collection of services and software that integrates data received from various IoT devices. It uses machine learning or artificial intelligence (AI) technology to analyze this data and make informed decisions. These decisions are communicated back to the IoT device and the IoT device then responds intelligently to inputs.

- **A graphical user interface** - the IoT device or fleet of devices can be managed through a graphical user interface. Common examples include a mobile application or website that can be used to register and control smart devices.
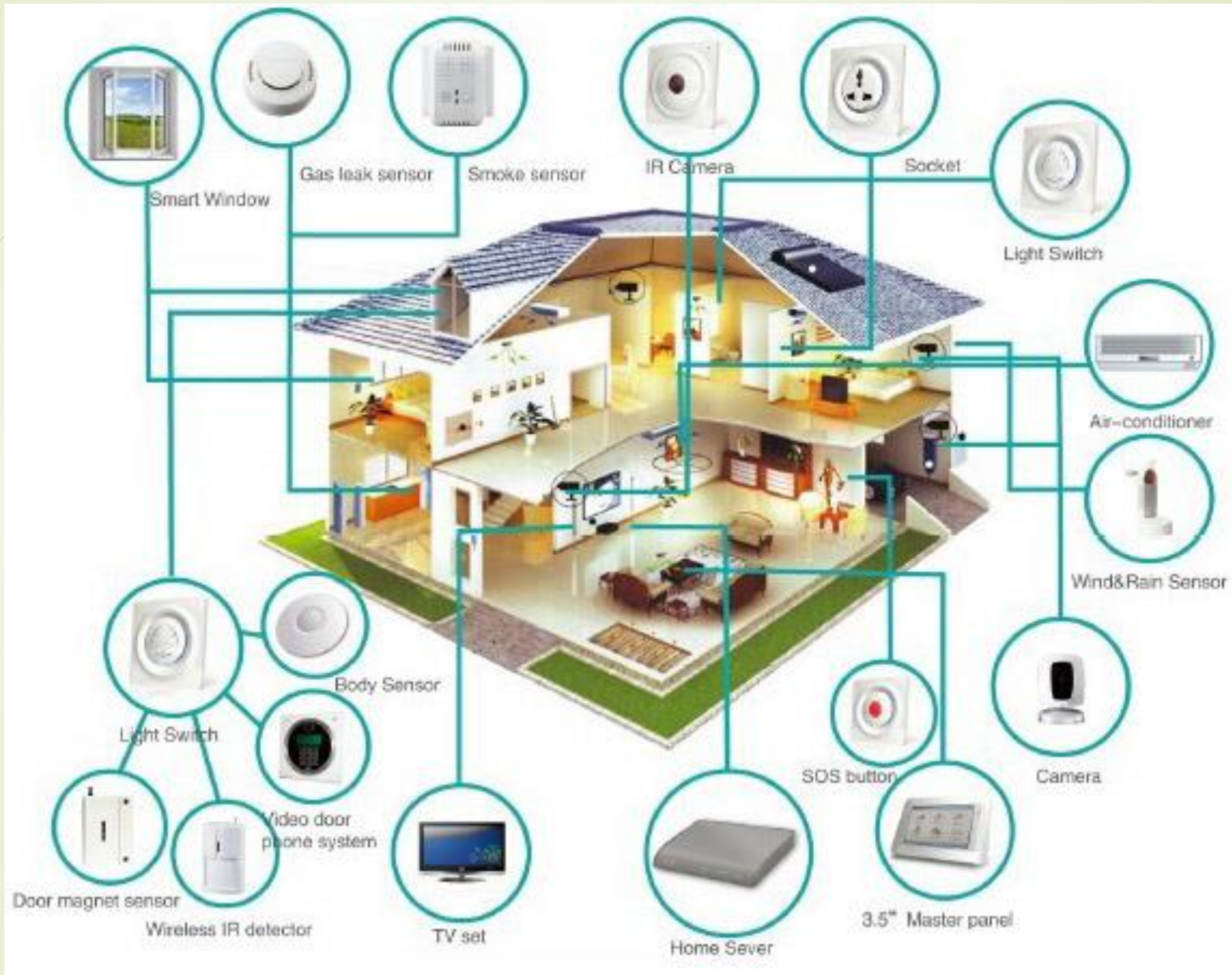
What are examples of IoT devices?

- **Connected cars** - there are many ways vehicles, such as cars, can be connected to the internet.

- It can be through smart dashcams, infotainment systems, or even the vehicle's connected gateway.

- They collect data from the accelerator, brakes, speedometer, odometer, wheels, and fuel tanks to monitor both driver performance and vehicle health.

SMART HOME

- Smart home devices are mainly focused on improving the efficiency and safety of the house, as well as improving home networking.

- Devices like smart outlets monitor electricity usage and smart thermostats provide better temperature control.

- Home security systems like door locks, security cameras, and water leak detectors can detect and prevent threats, and send alerts to homeowners.
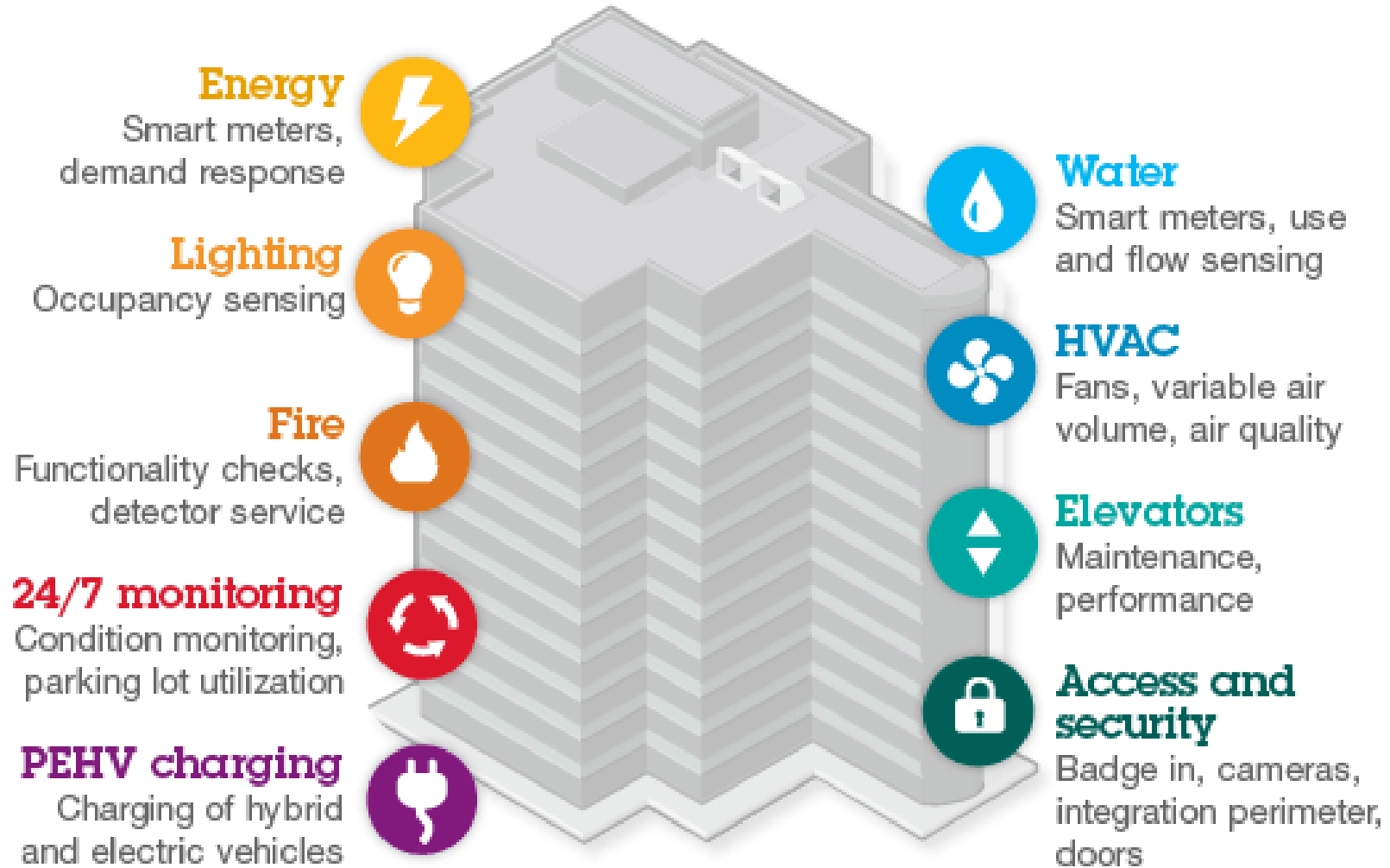
Smart Window • Gas leak sensor • Smoke sensor • IR Camera • Socket • Light Switch • Air-conditioner • Wind&Rain Sensor • Body Sensor • Light Switch • Video door phone system • Door magnet sensor • Wireless IR detector • TV set • Home Sever • SOS button • 3.5" Master panel • Camera

SMART CITY

- IoT applications have made urban planning and infrastructure maintenance more efficient.

- Governments are using IoT applications to tackle problems in infrastructure, health, and the environment.

- Examples: measuring air quality and radiation levels, reducing energy bills with smart lighting systems...

SMART BUILDINGS

- Buildings such as college campuses and commercial buildings use IoT applications to drive greater operational efficiencies.

- Examples: reducing energy consumption, lowering maintenance costs, utilizing work spaces more efficiently.

Energy
Smart meters, demand response

Lighting
Occupancy sensing

Fire
Functionality checks, detector service

24/7 monitoring
Condition monitoring, parking lot utilization

PEHV charging
Charging of hybrid and electric vehicles

Water
Smart meters, use and flow sensing

HVAC
Fans, variable air volume, air quality

Elevators
Maintenance, performance

Access and security
Badge in, cameras, integration perimeter, doors

Mobile operators in Slovakia

- O2 Slovakia, s.r.o.
- Orange Slovakia, a.s.
- Slovak Telekom, a.s.
- SWAN Mobile, a.s.

They have their own network.
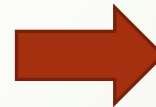
Which phone suits me?

- What size do you want?

- What do you find important about the camera?

- Which operating system do you want?

- How long should your battery last?

- Do you need a fast and powerful device?

- Do you want to receive regular updates?

How to choose the right phone?

- mobile phone by construction – smartphone, button mobile, rugged phone,

- mobile phone manufacturer,

- mobile phone operating system,

- mobile phone processor,

- mobile phone memory,

- battery capacity,

- phone and display dimensions,

- display resolution,

- brightness and display properties of the display,

- quality speaker,

- design, accessories and price.

Smartphones and their characteristics

- fast operating system,

- larger memory capacity than,

- significant increase in display,

- high resolution camera,

- a large number of mobile accessories,

- short battery life,

- higher failure rate.

Button phones and their characteristics

- greater resistance,
- much longer battery life,
- they age much more slowly and have a long life,
- smaller display size and resolution,
- smartphone operating system is missing,
- the camera cannot compete with smartphone cameras.

Rugged phones and their characteristics

➤resistance certification,

➤resistant to falls from a height, they resist frost and higher temperatures and are not damaged even by water,

➤specific purpose and you cannot expect nice design or modern equipment from them,

➤they are difficult to compete with ordinary smartphones.

Mobile phone manufacturers

- APPLE
- SAMSUNG
- GOOGLE
- SONY
- MOTOROLA
- HUAWEI
- ONE PLUS
- NOKIA

Mobile phone operating system

- mediates and processes all communication between the user and the device,

- responsible for all functions of the mobile phone,

- it must work perfectly precisely, without errors,

- Basic systems: Android, iOS, Windows Phone, Symbian,

Mobile phone processor

- component that controls everything going on in your smartphone and ensures it functions correctly,

- processor frequency - the speed at which a processor processes a certain action,

- the best processors:

    1. Snapdragon 8 Gen 3
    2. Dimensity 9300
    3. A17 Pro
    4. Dimensity 9200 Plus
    5. A16 Bionic
    6. Snapdragon 8 Gen 2
    7. Dimensity 9200

Mobile phone memory

- choose a mobile phone with the highest possible memory capacity, both user and internal (RAM – Random Access Memory),

- RAM should not be less than 2GB,

- the more user memory the better, the minimum should be 16 GB

Best phones of 2023

- Apple iPhone 15 Pro Max
- Samsung Galaxy S23 Ultra
- Google Pixel 8 Pro
- Samsung Galaxy Z Fold 5
- Samsung Galaxy Z Flip 5
- Asus Zenfone 10
- Sony Xperia 1 V
- OnePlus 11
- Google Pixel 7a
- Apple iPhone 13 mini

THANK YOU FOR YOUR ATTENTION!