22. INFORMATION SOCIETY

The information society statistics aim is to provide data on the production and supply of advanced information and communication technologies, including data on investments, international trade, qualified human resources in this field and, simultaneously, on the penetration, rate, and forms of these technologies and systems usage in enterprises, households, public administration, education, and health.

The term of ***information and communication technologies*** *(hereinafter only referred to as the ICT) shall mean technologies as mobile phones, computers, and the Internet and systems, activities, and processes connected to them, which contribute to the display, processing, storage, and transmission of information and data in an electronic form.*

Data given in this chapter were acquired, in most cases, from regular statistical surveys of the CZSO, that is, first of all, from annual surveys on the ICT use in respective sectors of the society and, furthermore, from statistics of the Czech Telecommunication Office, Ministry of Education, Youth and Sports, and the Institute of Health Information and Statistics of the Czech Republic.

Notes on Tables

Tables ***22****-1 and* ***22****-2* ***Telecommunication and Internet infrastructure***

Data in the tables are based on data sources of the Czech Telecommunication Office.

The reference period is related to 31 December of the reference year.

Data in the tables on the telecommunication and Internet infrastructure are only related to services provided on a retail level, i.e. services provided to end users.

The total telephone traffic originated in public fixed or mobile telephone networks shows the number of actually called minutes (minutes really called, not the invoiced ones).

The number of subscribers of a voice service in a mobile telephone network is measured by means of the number of active SIM cards that were used at least once during the last three months for voice operation.

The number of subscribers of a voice service in a fixed telephone network is measured by the number of telephone lines (active subscribers' telephone stations) in a traditional public switched telephone network (PSTN) and the number of telephone numbers used for Voice over Internet Protocol service (VoIP).

The number of subscribers with a fixed access to the Internet is measured based on the number of so-called access points (active subscriptions).

The number of subscribers with the broadband mobile access is measured by the number of active SIM cards with an access to the Internet in mobile networks.

Fixed access *includes broadband Internet access i) by means of technologies provided within fixed communication networks (xDSL, cable modems, optical fibre) and ii) by means of fixed wireless access (FWA) at a fixed place in the licensed (including fixed LTE) and non-licensed (including fixed WiFi) frequency bands. Since 2019, the fixed wireless access to the Internet also includes services of broadband Internet access at a fixed place provided by means of SIM cards in a mobile network (so-called fixed LTE).*

Mobile broadband Internet access *(mobile access) here includes a broadband access to the Internet in a mobile network for mobile phones provided within a voice service with a monthly data subscription.*

Internet access by means of optical fibre *(Fibre To The x – FTTx) includes the optical connection of the Fibre to the Home (FTTH) type, when the optical fibre delivers optical connectivity up to the subscriber's dwelling (flat) and the optical connection of the Fibre to the Building (FTTB) type, when the optical fibre only delivers optical connectivity to the building and the indoor distribution to the subscriber's dwelling (flat) is ensured in a different way (e.g. by a radio network or a fixed local network).*

Internet access by means of a fixed telephone network *(xDSL) includes using of a modem and of a digital subscriber line (DSL) technology by means of a metallic line (telephone line). At present, the most frequently used types are the Asymmetric Digital Subscriber Line (ADSL) and mainly the Very High Bit Rate Digital Subscriber Line (VDSL). Since 2013, it also includes accesses using the VDSL technology combined with an optical line of the Fibre To The Cabinet (FTT Cab) type.*

Internet access by means of cable television network *(CATV) is ensured by a cable modem with the Data Over Cable Service Interface Specification (DOCSIS). Cable modems communicate in both directions with the central station of the Cable Modem Termination System (CMTS) on allocated frequencies and channels according to the frequency plan of the cable television.*

The ***SIM card*** *is a subscriber's card serving for the identification of the subscriber in the public mobile telephone network. There are two basic types of SIM cards, namely pre-paid and post-paid ones. Within pre-paid SIM cards, the customer does not conclude any contract with the provider, only prepays a certain amount, from which the provider gradually deducts payments for services. On the other hand, customers with a* ***subscription SIM card*** *(also called* ***post-paid SIM card****) concluded a contract with the operator, on the basis of which they pay for provided services a certain amount every month according to invoices made.*

The ***broadband (high-speed) Internet access*** *used to be defined in the past by International Telecommunication Union as an access to the Internet with the nominal speed ≥ 256 kbps towards the subscriber. European Commission for Europe defines basic broadband connection to the Internet as such that enables to download with the minimum speed of 2 Mbps. A fast broadband connection enabling to transmit data with the speed of 30–99.9 Mbps is considered to be standard nowadays and an ultra-fast broadband with the speed over 100 Mbps is considered to be ideal.*

A ***subscriber's PSTN*** (*public switched telephone network*) ***station*** *is a set of technical means defined by an active end-point of the public switched telephone network and by clearly determined telephone exchange ending. Subscribers' stations are further divided into residential ones and business ones.*

A ***subscriber's Voice over Internet Protocol (VoIP) telephone station*** *is a voice service provided by means of the VoIP technology also called IP (Internet Protocol) telephony, which enables to transmit voice over data networks.*

Tables ***22****-3 and* ***22****-4* ***ICT specialists***

The data on the ***numbers of ICT specialists*** *given in the Table* ***22****-3 are taken from the Labour Force Sample Survey. In order to ensure higher reliability and to eliminate considerable year-on-year fluctuations of values for this group of employees, data in the table are provided as three-year moving averages (i.e., for example, the value for 2019 is calculated as an average from the values for 2018, 2019, and 2020).*

The occupations of ***ICT specialists*** *are subdivided into two major groups while their classification is based on the Classification of Occupations (CZ-ISCO) the corresponding national classification in the Czech Republic (CR) based on the International Standard Classification of Occupations (ISCO-08) developed by the International Labour Organization (ILO). From 2011, ICT specialists are defined and assigned to the major groups, groups, and subgroups of the CZ-ISCO based on recommendations of Eurostat and of the International Labour Organization as follows:*

ICT managers, engineers and professionals

133 Information and communications technology services managers;

2152 Electronics engineers;

2153 Telecommunications engineers;

2434 Information and communications technology sales professionals;

25 Information and communications technology professionals;

251 Software and applications developers and analysts;

252 Database and network professionals.

ICT technicians, installers and servicers

3114 Electronics engineering technicians;

35 Information and communications technicians;

351 Information and communications technology operations and user support technicians;

352 Telecommunications and broadcasting technicians;

742 Electronics and telecommunications installers and repairers.

*In the Table **22**-3, the 133 group and 2152, 2153, and 2434 subgroups are merged into one category called managers, engineers and ICT sales professionals. More detailed data on the Labour Force Sample Survey are available in the Chapter **10** Labour Market, Part B.*

*Data on **wages of ICT specialists** (Table **22**-4) come from the structural employee wage statistics, which is generated by merging of databases of the sample survey of the **Information System on Average Earnings** of the Ministry of Labour and Social Affairs, which covers the **wage sphere**, and of the administrative data source of the **Salary Information System** of the Ministry of Finance, which exhaustively covers the **salary sphere**.*

Data in the table are only available for the ICT specialists defined rather narrow, which includes the two sub-major groups of CZ-ISCO as follows:

25 Information and communications technology professionals (hereinafter only referred to as the ICT professionals);

35 Information and communications technicians (hereinafter only referred to as the ICT technicians).

*Detailed data on the structural employee wage statistics can be found in the Chapter **10** Labour Market, Part A, namely in Notes on Tables **10**-4 and **10**-5.*

*Table **22**-5 **Students of and graduates from ICT fields of education at universities***

Education at universities presented in the table belongs to the tertiary level of education and includes a bachelor, a follow-up master, a master, and a doctoral study programme. The follow-up master and the master study programmes are given in tables together as master study programmes.

The system of universities consists of public universities (of university and non-university type), private universities, and state universities (now there are two state universities, one founded by the Ministry of Defence and one founded by the Ministry of the Interior). However, data on students of and graduates from state universities are governed by a different methodology and therefore cannot be summarised with data on students of and graduates from public and private universities. Data in the table provide information on public and private universities.

*Information and communication technology studies are defined by the **international classification of the ISCED-F 2013**, class 06 Information and Communication Technologies, which involves fields of education defined in detail as follows:*

Computer use (0611);

Database and network design and administration (0612);

Software and applications development and analysis (0613);

Information and communication technologies not elsewhere classified (0619);

Inter-disciplinary programmes and qualifications involving information and communication technologies (0688).

*Since a field of education with the same code may have various contents at different universities and thus it is problematic to classify students to relevant groups of fields of education according to the ISCED-F 2013, **expert estimates** made by experts of the Ministry of Education, Youth, and Sports are given for the breakdown by field of education.*

Numbers of students and graduates in tables are given as headcount, i.e. each student is included in a particular piece of data only once, including students, who study in more study programmes or more fields of education at the same time. The total numbers of students and graduates thus do not

have to be equal to the sums of students and graduates of respective types of study programmes and groups of fields of education.

The data were obtained from data sources of the Ministry of Education, Youth, and Sports, namely from the Union Information from Students' Registers (the "SIMS"*). The source database of* SIMS *is continually completed and updated, including retrospective corrections. Data published in this Yearbook correspond to the state of processing as at 20 January 2021. Data on students of universities are always related to 31 December of the relevant year; data on graduates are related to the entire school year.*

Table ***22****-6* ***Investments into ICT equipment and software***

Data in the Table ***22****-6 come from the annual national accounts statistics.*

Investments into ICT equipment and software in the table shall mean the gross fixed capital formation (P.51), which includes acquisitions less disposals of fixed assets (P.511) and costs of ownership transfer on non-produced assets (P.512) classified to the groups of the Classification of Products by Activity (CZ-CPA) as follows:

ICT equipment

26.2 Computers and peripheral equipment;

26.3 Communication equipment;

26.4 Consumer electronics.

Software

58.2 Software publishing services;

62.0 Computer programming, consultancy and related services;

63.1 Data processing, hosting and related services; web portals.

Investments into computer and telecommunication equipment are a part of an item of 'Non-financial assets as ICT equipment' (AN.1132). Computer software and databases (AN.1173) involve two sub-items as follows: 'Computer software' (AN.11731) and 'Databases' (AN.11732).

Data for 2020 are preliminary.

More detailed information is available in the Chapter ***5*** *National Accounts.*

Table ***22****-7* ***Household consumption expenditure on ICT equipment and services***

Data in the Table ***22****-7 come from the annual national accounts statistics.*

The table gives data on the final consumption of households in the national concept, which includes expenditure of residents in the Czech Republic and abroad spent on ICT products and services dedicated to direct satisfaction of personal needs and wishes of individuals.

The Czech version of the international standard of the Classification of Individual Consumption by Purpose (CZ-COICOP) was applied to define the ICT area by item as follows:

ICT equipment

Telephone and telefax equipment (CZ-COICOP 08.2)

Computers and other ICT equipment

- Equipment for the reception, recording and reproduction of sound and picture (CZ-COICOP 09.1.1);

- Photographic and cinematographic equipment and optical instruments (CZ-COICOP 09.1.2);

- Information processing equipment (CZ-COICOP 09.1.3);

- Recording media (CZ-COICOP 09.1.4);

- Repair of audio-visual, photographic and information processing equipment (CZ-COICOP 09.1.5).

ICT services

- *Wired telephone services (CZ-COICOP 08.3.0.1);*
- *Wireless telephone services (CZ-COICOP 08.3.0.2);*
- *Internet access provision services (CZ-COICOP 08.3.0.3);*
- *Bundled telecommunication services (CZ-COICOP 08.3.0.4).*

Data for 2020 are preliminary.

*More detailed information is available in the Chapter **5** National Accounts.*

*Table **22**-8 **International trade in ICT services***

*Services in the field of information and communication technologies (hereinafter only referred to as the **ICT services**) are defined as services, the core function of which is to implement or to enable communication or information processing by electronic means, including their record, transmission, and display.*

***Data on exports and imports of ICT services** come from the CZSO direct survey on exports and imports of services. Respective items of ICT services are defined according to the international classification of Extended Balance of Payment Services (EBOPS 2010) as follows:*

***Telecommunications services** (code SI1) include, first of all, transactions of Czech and foreign telecommunication operators for implemented international calls by means of fixed or mobile telephone networks. A payment the Czech operator receives from the foreign operator for the arrangement of the international call from abroad to the Czech Republic is considered exports. A payment from the Czech operator to the foreign operator for the arrangement of the international call is considered imports. Other telecommunications services involve payments for the access to the Internet, cable television, and to other computer networks, including providing of services as electronic mail, video conferences, or transmitting of audio-visual signal over the Internet, cable networks, or by means of satellites.*

***Computer services** (Other computer services, code SI22) consist mainly of consulting services in the fields of hardware and software of computers, including maintenance and repair services of both hardware and software and services related to data processing.*

***Computer software** (codes SI21 and SH3) involves purchase and sale of tailor-made software and its applications (original computer software), including purchase and sale of ownership rights to such software or licence fees for the software use. Furthermore, it also includes purchase and sale of standard software and applications supplied over the Internet, including purchase and sale of ownership rights to such software or licence fees for the software use. Computer services does not include purchase and sale of standard software packages supplied on physical media carriers (CD-ROMs, flash disks, etc.) or as a part of hardware (as Microsoft products, for instance), which are considered to be goods and are reported within the statistics on international trade in goods (change of ownership). The computer software category here also includes **licences to reproduce and/or distribute computer software** (code SH3).*

*Table **22**-9 **Basic indicators of businesses of the information economy industries***

Indicators in the table were obtained from the annual structural business survey in businesses of selected production industries (economic activities).

*The **information economy sector** is an alternative grouping of economic activities defined by the Organisation for Economic Co-operation and Development within the International Standard Industrial Classification of All Economic Activities (ISIC), Revision 4 for economic activities included in the ICT sector and in the information and media sector.*

*The **ICT sector** is defined as a combination of economic activities producing goods and providing services, which are primarily intended for processing, communication, and distribution of information by electronic means, including the capture, storage, transmission, and display.*

*The **information and media sector** is defined as a combination of economic activities producing, issuing, and/or dispersing content primarily intended to inform, educate, and/or entertain people by the mass media and means of mass communication.*

*The **information economy sector** involves businesses of the business enterprise sector, principal (prevailing) economic activities of which belong to the CZ-NACE groups and classes as follows:*

ICT manufacturing

Group 26.1 – Manufacture of electronic components and boards;

Group 26.2 – Manufacture of computers and peripheral equipment;

Group 26.3 – Manufacture of communication equipment;

Group 26.4 – Manufacture of consumer electronics;

Group 26.8 – Manufacture of magnetic and optical media.

ICT trade

Group 46.5 – Wholesale of information and communication equipment.

Telecommunications

Group 61.1 – Wired telecommunications activities;

Group 61.2 – Wireless telecommunications activities;

Group 61.3 – Satellite telecommunications activities;

Group 61.9 – Other telecommunications activities.

IT services

Group 58.2 – Software publishing;

Class 62.01 – Computer programming activities;

Class 62.02 – Computer consultancy activities;

Class 62.03 – Computer facilities management activities;

Class 62.09 – Other information technology and computer service activities;

Group 63.1 – Data processing, hosting and related activities; web portals;

Group 95.1 – Repair of computers and communication equipment.

Information and media sector

Group 58.1 – Publishing of books, periodicals and other publishing activities;

Group 59.1 – Motion picture, video and television programme activities;

Group 59.2 – Sound recording and music publishing activities;

Group 60.1 – Radio broadcasting;

Group 60.2 – Television programming and broadcasting activities;

Group 63.9 – Other information service activities.

More detailed information on the publishing of data from the annual structural survey of business entities from selected production industries, including definitions of respective indicators, is available on the CZSO website in the section Statistics - Information Technologies - Information Economy.

*Tables **22**-10 to **22**-15 **ICT usage in enterprises***

*The data are based on an **annual survey on ICT usage in the business enterprise sector**. The survey is carried out on a sample of about 8 thousand enterprises with 10+ employed persons in*

selected economic activities. Results are then grossed up to the whole population of the enterprises monitored.

*The reference period for data shown in the Tables **22**-10 to **22**-15 is the month, in which the enterprise filled in the report (questionnaire), i.e. usually February to April of the relevant year.*

***Enterprises having an Internet connection, total** include enterprises using any type of fixed connection to the Internet (e.g. DSL technologies, fixed wireless connection, leased data lines, connection via optical fibre networks) or with connection via mobile networks (by means of a data tariff / subscription from mobile operators).*

*Surveyed **Internet connection speed** (Mbps or Gbps) only applies to fixed connection to the Internet and it is the maximum download speed stipulated in a contract with the Internet connection provider.*

***Enterprises having websites** have a web presentation on the Internet. In this survey, it means websites the content of which can be influenced by the enterprises. A joint website with another legal entity is also included.*

***Product configuration** is a possibility for website visitors or customers to choose or to tailor offered goods or services according to their needs or preferences. As for goods, it is e.g. a selection of the size, composition, equipment/accessories, materials used; as for services, it is the scope, in which they are to be provided.*

***Enterprises having an account on social networks** are enterprises, which have made their own user profile or an account on social networks (e.g. Facebook, LinkedIn). By means of these user accounts enterprises are, for example, able to communicate with other users, share information with them or share multimedia content with them.*

***Enterprises using online communication platforms** are such ones, employees of which use applications for video calls, chats, or online lectures. The most famous communication platforms are Skype, MS Teams, Google Meet, Hangout, Zoom, or Cisco Webex. Communication platforms are used by means of the Internet; users can be connected from anywhere (from work, from their home) and the communication can be internal (among employees of an enterprise) or also between an enterprise and its clients or business partners.*

***Enterprises using Internet of Things** (IoT) are enterprises using mutually interconnected smart devices, which can be remotely monitored, checked, and controlled over the Internet. Devices used within the Internet of Things are equipped with sensors, chips, programmes, or applications, moving parts, and network connectivity. Interconnection of those devices or systems thereof into a network enables them to communicate with each other.*

*A **sensor** (a detector) is a device measuring a certain quantity or condition of things and transforms it into a signal that can be remotely transmitted and further processed. A sensor is a source of information for a control system. It may apply to sensors of a position, motion, temperature, etc.*

***Enterprises using Artificial Intelligence technologies** (AI) are enterprises that use machines, programmes, or systems created in order to perform tasks efficiently and to facilitate human work. Artificial Intelligence uses technologies such as advanced text analysis, computer vision, speech recognition, human language generation, machine or deep learning. It is used, for example, to predict (development of) events, in process automation, in management of enterprises.*

***Employees having access to the Internet at work** are those workers who use employers' ICT devices, e.g. a desktop or a portable computer, a tablet or a mobile phone with internet access for work-related functions. It includes any type of connection to the Internet including connection by means of a data tariff / subscription from mobile operators.*

*Tables **22**-16 to **22**-28 **ICT in households and their usage by individuals***

*The data are based on the **Sample Survey on ICT Usage in Households and by Individuals**, which had been carried out within the LFSS since 2005 and since 2012 it has been performed within the Integrated Household Surveys (IHS). The survey is carried out using the Computer Assisted Personal Interviewing (CAPI) method on the sample of about 10 000 individuals (persons) aged 16+ years. The results were grossed up to the whole population of the Czech Republic (persons 16+ years).*

*Concerning data on **households**, the current status in the reference period (the 2nd quarter of the reference year) is surveyed; data for **individuals** (persons) are for the last three months before the survey is carried out, except for data on the Internet use for interaction with public authorities (Table **22**-22 and **22**-25), in which data are for the reference period of 12 months before the survey takes place.*

***Households of persons aged 65+ years without children** refer to households, in which only persons aged 65+ years live.*

***Households of persons aged up to 40 years without children** refer to households, in which only persons aged up to 40 years who do not have children live.*

***Households with children** refer to households with children up to 15 years of age (the age of 15 is included).*

***Income quintiles** subdivide households into five categories by their net income per household member. The first quintile (the bottom one) represents 20% of the poorest households. The fifth quintile (the top one) represents 20% of the wealthiest households.*

*A **student** shall mean an individual who stated that studies is his or her prevailing activity. He or she may carry out some gainful activity as a minor activity.*

*A **pensioner** shall mean an individual who stated that he or she receives an old-age pension (a regular or a premature one). He or she may carry out some gainful activity as a minor activity.*

***Educational attainment** is published for the age group 25–64 years. Setting of some age groups aside shows the influence of education on information technologies usage better. For example, there is a big share of persons in the age group 16–24 years whose educational paths were not finished when the survey was carried out. Their educational attainment is thus conditioned rather by their age than their educational aspirations. Similarly, the educational attainment of persons aged 65+ years is influenced primarily by the time, in which these persons received the education. Among persons aged 65+ years, there is much higher share of persons with primary education than among younger ones.*

***Households with a computer** involve households, which at the time of the survey stated that at least one of the household members used a personal computer at home. Ownership of the personal computer is irrelevant. What is relevant is the usage of the computer. In the case of a portable computer it may be even a work computer, which was, at least sometimes, used at home.*

*A **portable computer** shall mean a **notebook** (a **laptop**) and a **tablet**, i.e. a keyboard free computer equipped with a touchscreen.*

***Households with internet access** shall mean households, which at the time of the survey stated that at least one of the household members uses the Internet at home. The way of connection to the Internet is irrelevant as well as the type of the device, on which the Internet was used.*

***Households having a WiFi router** shall mean households, which at the time of the survey stated they distribute fixed connection to the Internet across the household by means of a WiFi router or a modem.*

*A **WiFi router** is a device enabling individuals (persons) in the given household to get connected to the Internet from multiple devices at the same time and also from any location, which is within the WiFi network range.*

***Individuals** (persons) **using information and communication technologies** are such individuals (persons) who have used a computer or the Internet at least once in the last three months anywhere (e.g. at home, at work, at school, etc.) and for whatever purpose (private or work).*

*Before 2018, **mobile phone** usage was surveyed for the last three months prior to the survey date. Since 2018, the survey takes into account neither the reference period nor frequency of the usage. Therefore, data are not fully comparable with those for the previous years.*

***Individuals** (persons) **using a mobile phone to access the Internet** are individuals (persons) who stated that they had used a mobile phone to access the Internet at least once during the last three months. It does not matter whether the phone was a private one or an employer's one as well as it does not matter what type of connection was used to access the Internet (mobile networks, WiFi).*

***Individuals** (persons) **using social networks on the Internet** are those who in the last three months at least once logged into their user profile on such networks and used available services such*

as, for example, browsing through posts of other users, communication with other users, and/or sharing of their own posts.

***Individuals** (persons) **purchasing on the Internet** shall mean individuals (persons) who in the last three months purchased or ordered any goods or services on a website. A purchase shall mean a purchase for private purposes. This does not include a purchase for the employer, a school, or other organisations. Goods or services ordered may not be paid over the Internet, they could be paid in cash upon delivery or while delivered in person. In Statistical Yearbooks issued in 2019 and before, data on individuals (persons) purchasing on a website in the last 12 months are provided.*

*Table **22**-29 **Personal computers in basic schools***

Data on ICT hardware and software in schools in the Czech Republic come from data sources of the Ministry of Education, Youth and Sports, which collects data on available IT infrastructure in basic, secondary, and higher professional schools.

The reference period of data in the table is September of the given year.

*Tables **22**-30 and **22**-32 **Independent surgeries of physicians having selected information technologies***

Data on equipment penetration and usage of information technologies in health in the Czech Republic come from a survey of the Institute of Health Information and Statistics of the CR.

***Electronic medical prescription** (ePrescription) makes it possible for physicians (medical practitioners) to issue a medical prescription on their computer. The Central Repository of Electronic Prescriptions then assigns an identification code to the prescription and after that the physician tells the code to the patient. Based on the code, a pharmacist afterwards obtains the electronic prescription from the central repository.*

***Drug interaction alerts** serve to a physician to find out whether a certain patient is not prescribed drugs that interact with each other.*

***Laboratory tests ordering and receiving of the results** means that a physician sends an electronic order for a laboratory test from his/her computer in the surgery and afterwards he/she receives the test results in the form of a secure protocol.*

***Making appointments with a physician via a web form** is making an appointment for an examination / a medical intervention via an online form, which is sent directly from web pages of a surgery or via a system for making appointments electronically; it does not include making appointments by e-mail.*

***Consultations with a physician via a web form** is an opportunity to send health-related queries via web pages; a physician answers them by e-mail or an answer is published on the website of the surgery.*

* * *

Further information can be found on the website of the Czech Statistical Office at:

– www.czso.cz/csu/czso/information_technologies