

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, external trade, qualified human resources in this field and, simultaneously, on the penetration, rate, and forms of these technologies and systems utilisation in enterprises, households, public administration, education, and health.

The term of **information and communication technologies** (hereinafter as the ICT) shall generally 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 and on the Ministry of Education, Youth and Sports.

Notes on Tables

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

Data are taken from data sources of the Czech Telecommunication Office, except for the number of registered domains.

A **subscriber to publicly accessible services of electronic communications** (voice and data services in fixed and mobile communication networks) shall mean a person, which has concluded a contract on the use of such services with a provider. Data in the tables include solely services provided in the retail segment, i.e. services provided to end users.

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 unambiguously determined by the telephone exchange ending. The subscribers' stations are further classified as **residential telephone lines** and **business telephone lines**.

A **subscriber's Voice over Internet Protocol (VoIP) telephone station** shall mean voice service provided by means of the VoIP technology also called IP (Internet Protocol) telephony, which enables voice transmission over packet-switched data networks and signal transmission by means of Internet Protocol (IP) packets. Voice services by means of the VoIP technology are an alternative to voice services provided by means of the traditional public switched telephone network. The number of subscriber's VoIP stations corresponds to the number of active geographic numbers, i.e. the number of telephone numbers used by the subscribers.

A **subscriber's telephone station of a public fixed telephone network** includes public accessible telephone services provided by means of public switched telephone network (PSTN) lines and by means of VoIP lines.

The **SIM card** is a subscriber's identification card serving for the identification of the subscriber in the public mobile telephone network. They involve both **prepaid SIM cards**, when the customer does not conclude any contract with the provider and only prepays a certain amount, which the provider deduces payments for services provided from, and **subscription SIM cards**, also called **post-paid SIM cards**, when customers have concluded an agreement with the operator, on the basis of which they pay for services according to monthly invoices.

Only SIM cards, which were used at least once in the last three month for originating and terminating of calls, sending of SMS, MMS, or for data services, are considered to be the **active prepaid SIM cards**.

The **broadband Internet access** is a **permanently** available access to the Internet with nominal speed ≥ 256 kb/s towards the subscriber (download). The service subscriber can be both natural and legal person, which has a contract concluded with a service provider. The number of subscribers to this service is measured on the basis of the number of access points where subscribers are provided with the service for one of below mentioned technologies employed for the Internet access. In majority of cases the number corresponds to the number of agreements concluded for the services providing in the retail segment.

The broadband Internet access by means of **Digital Subscriber Line (DSL)** technology enables broadband connectivity by means of the metallic line (telephone line). At present, the most frequently used types of this connection are Asymmetric Digital Subscriber Line (ADSL) and Very High Bit Rate Digital Subscriber Line (VDSL), including Fiber To The Cabinet (FTT Cab), which feature asymmetric connection when the speed of data transmission to the user (downloaded) is higher than that of data sent from the user towards the Internet (uploaded).

The broadband Internet access by means of a **cable television network (CATV)** is expressed as the number of **cable modems** by means of which subscribers are provided with broadband Internet access.

The broadband Internet access by means of **optical fibre** (Fiber To The x - **FTTx**) includes optical connections of the type of Fibre to the Home (FTTH), when the optical fibre takes the optical connectivity to the dwelling, and Fibre to the Building (FTTB), when the optical fibre takes the optical connectivity to the building only and indoor the connection is distributed by other means (by a radio network or over a fixed local network, for instance).

The broadband **wireless** Internet access includes the connection by means of a radio line both in licensed frequency bands (in common use by technologies of Fixed Wireless Access (FWA) and in frequency bands with no licence required, most frequently based on the Wireless Fidelity (Wi-Fi) technology.

Fixed Wireless Access (**FWA**) is the description of fixed wireless access by means of a radio connection. It is characteristic by the permanent and fixed placing of the end point device. Sometimes this alternative is also called Wireless Local Loop (**WLL**).

The **WiFi** is the broadband connection by means of a radio network using technologies compliant with the standard IEEE 802.11. This type of connection is sometimes called Wireless Local Access Network (WLAN) as well.

The broadband **mobile Internet access** includes the connection by means of mobile telephone networks within standard voice and data services (**temporary / ad hoc access**) or offered as separated from voice services with potential of **permanent** accessibility (**dedicated access**). This access is implemented by means of SIM cards or data cards/modems compliant with the standards of Code Division Multiple Access (CDMA), or Universal Mobile Telecommunication System (UMTS), or Long Term Evolution (LTE). The number of standard (temporary) Internet accesses by means of a mobile network is expressed as the number of active SIM cards which use ad-hoc service of internet access. The number of permanent Internet accesses by means of a mobile network is expressed as the number of active SIM cards or data cards which use the permanent (dedicated) service of Internet access.

A **domain** (an **Internet domain** or also a **domain name**) is a unique name (identifier) of a computer or a computer network connected to the Internet. The domain of second level, i.e. a domain name is registered at a registrar authorized to administer respective top level domains as .cz or .com, for instance.

Tables 22-3 and 22-4 ICT specialists

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 based on the International Standard Classification of Occupations (ISCO-08) developed by the International Labour Organisation (ILO). The ICT specialists are assigned to the major groups, groups, and subgroups of the CZ-ISO based on recommendations of Eurostat and the International Labour Organization as follows:

ICT managers, engineers and professionals

- 133 Information and communications technology service 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.

The data on the **numbers of ICT specialists** (Table 22-3) come from the Labour Force Sample Survey (LFSS) of the CZSO. The table presents average annual data for a given year. Data since 2011 are not fully comparable with data for the previous years because of transition to the ICT professionals' definition by the CZ-ISCO in 2011. Detailed data on the LFSS are available in Chapter 10 Labour Market, Part B.

Data on **wages of the 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 from the database 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 available only 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 as the ICT professionals); and
- 35 Information and communications technicians (hereinafter as the ICT technicians).

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

Table 22-5 Investments into ICT equipment and software

Investments into ICT equipment and software in the table shall mean the gross fixed capital formation (P.51), which includes acquisitions fixed assets (P.511) and expenses for transition of non-produced assets into

ownership (P.512) classified to the groups of the Classification of Products by Activity (CZ-CPA), the national version of the European standard of the Statistical Classification of Products by Activity in the European Economic Community, 2008 version (CPA 2008), as follows:

ICT equipment

- 26.2 Computers and peripheral equipment;
- 26.3 Communication equipment; and
- 26.4 Consumer electronics

Software

- 58.2 Software publishing services;
- 62.0 Computer programming, consultancy and related services; and
- 63.1 Data processing, hosting and related services; web portals.

In 2014 the calculation of ICT investments was changed within the revision of national accounts according to a new standard of the European System of National and Regional Accounts (ESA 2010). This change, which brought an important increase in investments in this field, was implemented back in the whole time series observed.

This means mainly that expenditure on small property as smartphones, notebooks, or tablets, which are used in the production process for a period longer than one year, is included into investments (small property capitalisation). According to the previous standard of the European System of National and Regional Accounts (ESA95) this expenditure was taken as consumed materials, energy, and services. The calculation of the own development software capitalisation was also made more precise within the national accounts revision.

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

The data come from the annual national accounts statistics. Detailed information is available in Chapter 5 National Accounts.

Table 22-6 Household consumption expenditures on ICT equipment and services

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.

In order to define the ICT areas the national version of the international standard of the Classification of Individual Consumption by Purpose (CZ-COICOP) was applied to set the areas by items 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).

Tables 22-7 and 22-8 External trade in ICT goods and services

Goods and services in the field of information and communication technology (hereinafter as the **ICT goods and services**) are defined as goods or services, which core function is to implement information processing and communication by electronic means, including transmission and display (Organisation for Economic Co-operation and Development, 2009).

The **list of ICT goods**, that is used for the external trade statistics, is based on the Harmonised System Nomenclature (HS Nomenclature 2007), a classification of goods used for the international trade. ICT goods, for purposes of the external trade statistics, is divided into the five main categories as follows:

- Computers and peripheral equipment;
- Communication equipment;
- Consumer electronics;
- Electronic components; and
- Miscellaneous ICT components and goods.

Detailed definitions of mains groups of the ICT goods are available on the CZSO website in the section Statistics – Information Technology – Information Economy under the link External Trade in the ICT Goods.

Data on exports and imports of the ICT goods come from data outputs of the external trade statistics (External Trade Statistics Database of the CZSO in the cross border concept). These data are internationally comparable and may be used as an indicator of the ICT goods trade value development yet they do not show the actual change in the goods ownership. Conversely, this change is reflected in the national concept of external trade which, however, does not enable to capture exports and imports of the ICT goods according to the aforementioned Harmonised System Nomenclature. Detailed information on the various concepts applied in the external trade statistics is available in Chapter 11 External Trade.

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

Telecommunication 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 telecommunication 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 (code SI22) consist mainly of **consultancy services** in the fields of hardware and software of computers, including maintenance and repairs 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 application (original computer software), including purchase and sale of ownership rights to such software or licence fees for the software use. Furthermore, it is also 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 external trade in goods. The computer software category here includes also **licences to reproduce and/or distribute computer software** (code SH3).

Table 22-9 Basic indicators of enterprises of the information economy industries

The **information economy sector** is a new 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 both in the ICT sector and into the information and media one.

The **ICT sector** is defined as a combination of economic activities of manufacturing products and providing services primarily dedicated to processing, communication, and distribution of information electronically, including information capture, storage, transmission, and display.

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

The **information economy sector** involves businesses, which dominating economic activities 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; and
- Group 26.8 – Manufacture of magnetic and optical media.

Trade in ICT

- Group 46.5 – Wholesale of information and communication equipment.

Telecommunication activities

- Group 61.1 – Wired telecommunications activities;
- Group 61.2 – Wireless telecommunications activities;

Group 61.3 – Satellite telecommunications activities; and

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; and

Group 95.1 – Repair of computers and communication equipment.

Information and media activities

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; and

Group 63.9 – Other information service activities.

Indicators in these tables were obtained from the annual structural survey of business entities from selected production industries.

Detailed information on the publishing of the 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 22-14 ICT and their utilisation in enterprises

The data are based on the **annual survey on the ICT utilisation in the business sector**. This survey is carried out on a selected sample of approx. eight thousand enterprises with 10+ employees in selected economic activities. Results are then grossed up to the whole population of the enterprises monitored.

The **reference period** shall mean January of a given year for Tables 22-10 to 22-12. In the case of business e-commerce, Tables 22-13 to 22-14, the data relate to the whole year.

Enterprises with an internal computer network shall mean enterprises using an internal computer network interconnecting at least two computers for the purpose of sharing of data, as internal email files, and for communication and internet connection within the enterprise.

Enterprises with the intranet shall mean enterprises using internal websites with content and services designed exclusively for authorized users within the enterprise

Enterprises with the extranet shall mean enterprises using special websites or extension to the intranet to communicate (transmission of information and documents online) with its authorised suppliers, resellers, dealers, partners, customers, and other entities that due to organisation, commercial, or locality reasons out of the enterprise headquarters. Solely authorized users can access the extranet (via log in or sign in).

Enterprises with websites shall mean enterprises using the web pages, which content they may affect themselves for the purposes of official presentation and offering of products and/or services. These also include web pages shared with other legal person. These do not include information on the enterprise solely on information servers (in so-called catalogues of companies).

Cloud computing shall mean the use of paid services enabling to share and have remote access to calculation tools and data storage facilities by means of the Internet. The cloud service provider lease computing tools and devices (hardware and software) to the users as their needs may be. This way the users may not own, maintain, or update the tools and devices. The services are reimbursed proportionally to their consumption or as at in advance agreed volume.

Enterprise Resource Planning (ERP) is business process management software that allows an organization to use a system of integrated applications to manage the business and automate many back office functions related to technology, services and human resources.

Customer Relationship Management (CRM) shall mean software application used to collect, integrate, process and analyse information on customers to manage business relationships.

Enterprises using social media shall mean enterprises that have used their profile, account, or licence of social media. The main social media communication platforms and tools are social networks (e.g. Facebook, LinkedIn), blogs or microblogs (e.g. Twitter), multimedia content sharing websites (e.g. YouTube, Instagram, Flickr), or Wiki-based knowledge sharing tools (e.g. Wikipedia).

The **use of electronic invoicing** shall mean a form of electronic billing. There are two types of invoices sent via electronic way as follows:

- The electronic invoices (e-invoice) processable by automated data processing tools. Issuer of the invoice (seller or service provider) upload the invoice into the recipient (customer) software applications which deal with it. The transmission format may be, for instance, edi, xml, isdoc, idoc, csv, or other formats used by invoicing software producers; and
- The electronic invoices in a format that does not enable them to be processed automatically (non-structured invoices). These are, for instance, invoices sent in as a text by means of standard email, or invoices sent in as an email attachment in the pdf format, for example.

Electronic commerce (e-commerce) shall mean purchases or sales (placing or accepting orders) is performed by means of the Internet or other computer networks through websites or the electronic data interchange (EDI), regardless the method of payment or delivery. Purchases (sales) implemented on the basis of orders prepared from information obtained on the Internet but placed in a traditional way (in person, by phone, fax, or written order), or by electronic mail are not included.

Tables 22-15 to 21-24 ICT in households and its utilisation by individuals

The data are based on the **Sample Survey on the ICT Utilisation 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 aged 16+ years. In line with the LFSS and ISH methodologies, the results were imputed to the whole population of the Czech Republic.

Concerning data on households the existing status in the reference period (2nd quarter of a year monitored) is obtained; data for individuals are for the last three months before the survey implementation, except for data on the Internet use for shopping (Table 22-23), data on the computer use for dealing with public administration (Table 22-24) in which data are for the reference period of 12 months before the survey implementation.

Households with 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.

The **portable computer** shall mean a **notebook** or **laptop**, respectively, and a **tablet**, a keyboard free computer equipped with a touchscreen.

Households with the Internet shall mean households, which at the time of survey stated, that at least one of the household members uses the Internet at home. It does not matter what type is the device used for the Internet connection, or the way of connection.

A **method the household is connected to the Internet** includes merely the type of household connectivity delivered by the provider and not a method of potential sharing of this connectivity by multiple computers within one household.

Households having a WiFi router shall mean households, which in the time of survey stated they distribute the Internet connection across the household by means of a WiFi router.

WiFi router is a device enabling 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.

Households of persons aged 65+ years with no children shall mean households in which merely persons aged 65+ years live.

Households of persons aged up to 40 years with no children shall mean households in which merely persons aged up to 40 years, who have no child, live.

Households with children shall mean households with children up to 15 years of age, included.

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

Till 2017 the use of the **mobile phone** used to be monitored for the last three months prior the survey date. Since 2018 the survey monitors neither the reference period nor frequency of the use. Therefore data for 2018 are not comparable in full with those for the previous years.

Individuals using the Internet in the mobile phone are persons who gave that they had used a mobile phone to access Internet services. It does not matter if the phone was private or employer's and also it does not matter what type of connection was used to access the Internet (mobile networks, WiFi).

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

A **purchaser over the Internet** shall mean a person who in the last 12 months purchased or ordered any goods or services on a website. The act of purchase shall mean purchase for private purpose. This does not include purchase for the employer, school, or other organisation. Goods or services ordered may not be paid over the Internet, they could be paid in cash on delivery or while delivered in person.

Data on individuals by **educational attainment** are surveyed for the age group 25+ years. There is a lot of students in the age group 16–24 years, who have a low educational attainment, yet they use ICT in a very intensive way. Thus if the age group 16–24 years is not included it enables to make a more accurate assessment of the educational attainment effect on the ICT use.

A **student** shall mean an individual who stated that studies are their prevailing activity. They may have some gainful activity as a minor one.

Table 22-25 University students and graduates of ICT fields of education

Numbers of students and graduates in the table 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 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.

Information and communication studies are defined by the international classification of the ISCED-F 2013, class 06 Information and Communication Technologies that involves detailed defined fields of education 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); and

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

Up to now the ISCED-F 2013 was based on classifying of students into respective fields of education. An amendment to the Higher Education Act from 2016 **cancelled the system of fields of education and replaced it by a system of study programmes**. All data on the numbers of students and graduates are thus newly presented only according to the new system and have been adjusted retroactively for the previous years as well. The data thus may not be identical to information published in the previous years.

The data were obtained from data sources of the Ministry of Education, Youth, and Sports, being concrete from the Union Information from Students' Registers (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 2018. Data on university students are always as at 31 December of the reference year; data on graduates are for the entire school year.

Table 22-26 Personal computers in schools in 2017

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

Due to the methodology the total average numbers for the Czech Republic are lower than appropriate numbers of respective stages of schools. The reason is that in many school buildings classes are taught to multiple stages and/or types of schools and therefore the same computer is often available to and thus counted for pupils of several stages and/or types. Yet the computer is counted into the average of all school stages and/or types only once.

Table 22-27 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.

Making an appointment with a physician online shall mean setting an appointment for an examination or intervention using an on-line form sent right from a website of a given surgery or by means of an online appointment booking system. Making an appointment using emails is not included.

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

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