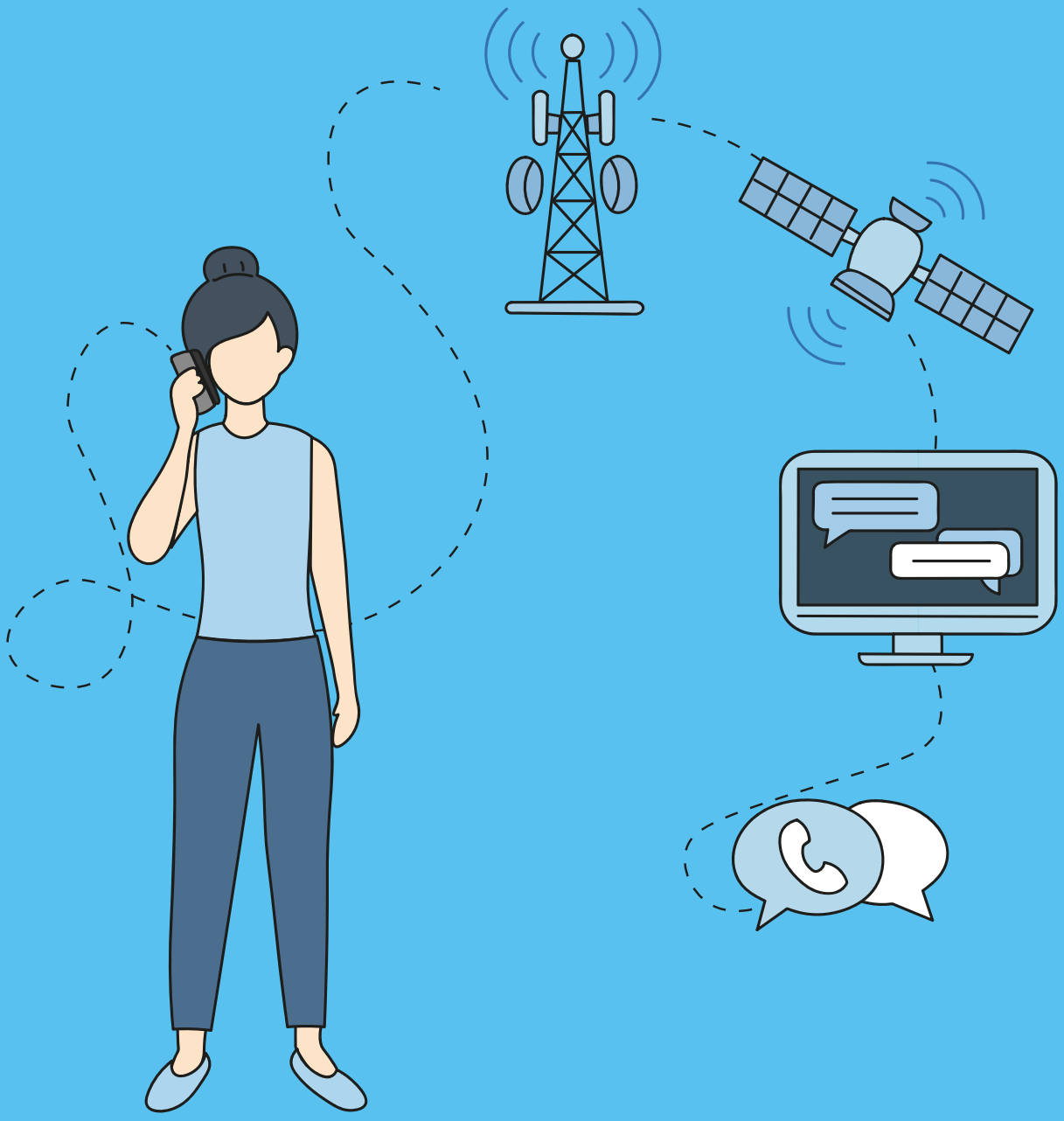
INTEGRATED QUALIFICATIONS SYSTEM



UPDATED SECTORAL QUALIFICATIONS FRAMEWORK FOR TELECOMMUNICATIONS (SQF TC)

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1. Definition of the sector

The telecommunications sector is an industry involved in the transmission of information using wired and wireless technologies within the scope defined by the sectoral determinants.

Sectoral determinants:

I. Planning and preparing telecommunications investments

This determinant covers the following competence series (in the categories of knowledge and skills):

- defining objectives,
- financial analysis,
- analysing the technology (selecting the technology and network architecture),
- developing the concept,
- designing and deploying services.

II. Passive infrastructure

This determinant covers the following competence series (in the categories of knowledge and skills):

- designing the physical components of a telecommunications network,
- constructing the physical elements of a telecommunications network,
- maintaining and managing passive infrastructure, including telecommunications structures.

III. Active infrastructure

This determinant covers the following competence series (in the categories of knowledge and skills):

- designing active infrastructure,
- installing, configuring, and commissioning active telecommunications infrastructure,
- maintaining active telecommunications infrastructure.

IV. Telecommunications services

This determinant covers the following competence series (in the categories of knowledge and skills):

- selling, providing, and managing retail telecommunications services,
- wholesale telecommunications services—sales,
- wholesale telecommunications services—infrastructure.

V. Applications that support the management of telecommunications networks and services

This determinant covers the following competence series (in the categories of knowledge and skills):

- applications used in telecommunications.

VI. Communication and collaboration

This determinant covers the competence series for social competence (relating to sectoral determinants I–V):

- communicating and collaborating within the organisation,
- communicating and cooperating outside the organisation.

VII. Responsibility

This determinant covers the competence series for social competence (relating to sectoral determinants I–V):

- taking responsibility for tasks and development,
- taking responsibility for safety.

VIII. Autonomy and work standards

This determinant covers the competence series for social competence (relating to sectoral determinants I–V):

- organising work,
- decision-making.

2. Practical application of the Sectoral Qualifications Framework for Telecommunications

The Sectoral Qualifications Framework for Telecommunications (SQF TC) is a universal tool for managing the competences in the telecommunications sector. Due to the fact that the structure of SQF TC does not impose specific business solutions, it can be used in any number of ways by many different audiences.

Employers

With the help of SQF TC, employers can take a broader view of the industry competences present in their business environment, enabling them to manage their human resources more efficiently and compete more effectively in the labour market. The main advantages of using this tool include support in analysing competence gaps in the industry or company, planning human resource development and the salary grid of job positions, as well as gaining help with recruitment and the selection of personnel.

The table of competences allowed me to determine the criteria for recruiting staff based on the key competences in the industry, as well as to prepare job descriptions.

Schools and educational institutions

After identifying the main competence gaps in the industry, we launched an apprenticeship programme to prepare our students to successfully enter the labour market.

On the basis of SQF TC, schools and educational institutions can adapt the curricula they offer to the current and real needs of the labour market. This means that the table of competences supports these institutions in expanding and modifying their teaching programmes as well as filling in the competence gaps of students, such as those relating to practical or soft skills. Additionally, it can be a useful tool in career counselling for students and in monitoring the success of school leavers.

Higher education institutions

SQF TC is a tool that supports higher education in aligning study programmes with current trends in the sector's development. As a result, students are better prepared to enter the labour market and achieve career success. The table of competences also makes it possible to monitor students' progress and evaluate the effectiveness of study programmes.

We use SQF TC to analyse students' level of skills against those needed by the telecommunications sector and the effectiveness of our study programmes.

By better matching the needs of our customers, we have become more competitive in the training market.

Training companies

Using SQF TC allows training companies to effectively design specialised courses, enabling them to prepare a tailor-made offer for a specific sub-sector, and to meet the expectations of their clients. With the help of the sectoral qualifications framework, they can select individual competences and match them to the outcomes of a given training programme. They can also prepare exams to assess knowledge, skills, and social competence. In addition, the gradation of the complexity of competences in SQF TC makes it easier to prepare training offers at various levels of proficiency.

IQS stakeholders

Among the broad audience of the Integrated Qualifications System (IQS), the groups most likely to benefit from the SQF TC are primarily industry organisations and those describing market or sectoral qualifications. Among others, industry organisations are tasked with establishing educational agreements that strengthen cooperation between schools and employers, as well as providing information on the demand for sectoral competences to educational institutions and

labour market institutions. In turn, persons describing market or sectoral qualifications can use the framework to more easily define sets of learning outcomes.

Other entities

SQF TC can be used for a wide range of other purposes, depending on the current needs of the industry. In the telecommunications sector, it serves as a tool to prepare staff for the increasingly important field of applications supporting the management of telecommunications networks and services. In today's software-defined networks, any error can result in a failure. Developing expertise in this area helps protect the company from system instability and costly service interruptions.

Moreover, the TC sector is currently facing a shortage of skilled workers. The Sectoral Qualifications Framework for Telecommunications can be used to retrain and launch the professional careers of people from related sectors.

As a telecommunications network specialist, I understand the importance of automating the processes within these networks. My analysis of Sectoral Determinant V – applications that support the management of telecommunications networks and services – has allowed me to identify the essential competences in this area.

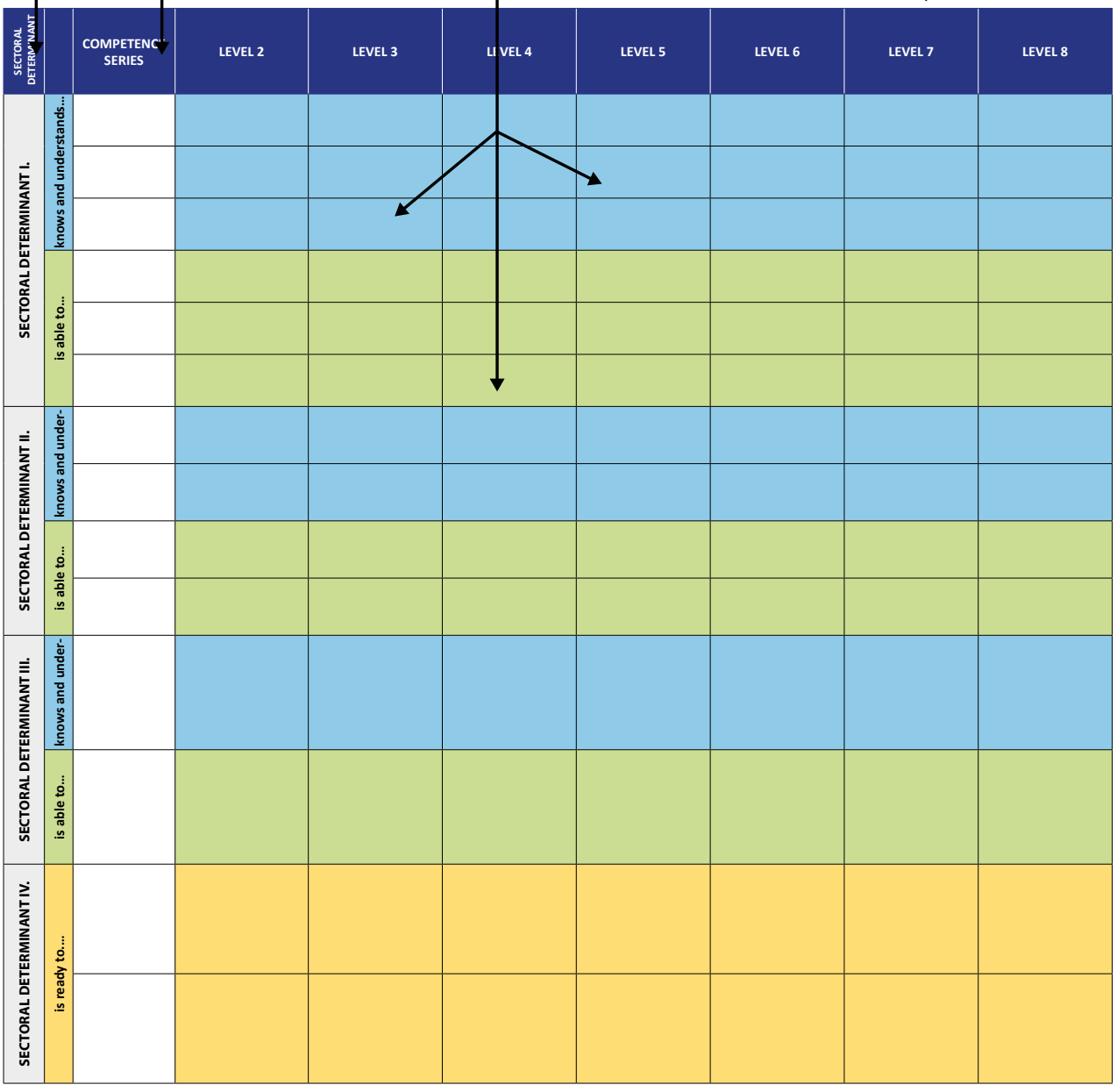
3. Instructions for using the Sectoral Qualifications Framework for Telecommunications

1 Familiarise yourself with the sectoral determinants, as they indicate the main areas of the sector's activities.

2 Familiarise yourself with the competence series, as they further describe each sectoral determinant.

3 Familiarise yourself with the competences in a given series at specific levels.

The competences in the SQF at particular levels correspond to second stage Polish Qualifications Framework levels for vocational education and training



Competences are grouped into their appropriate categories by colour:

knowledge (knows and understands...),

skills (is able to...),

social competence (is ready to...).

Remember!
Green competences are designated in bold and indicated as **(GC)** in front of the description.

Important!
A specific process can often be fully described only by combining competence series from the categories of **knowledge** and **skills**.

4. Updated Sectoral Qualifications Framework for Telecommunications, indicating the green competences identified in the sector

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
I. Planning and preparing telecommunications investments	knows and understands...	**Defining objectives**	the terminology relating to the preparation and implementation of telecommunications investments; the types of telecommunications services	**(GC) the technologies used in telecommunications;** the stages of the investment process in telecommunications	the analytical methods and tools for planning telecommunications investments; the analytical methods and tools for developing and planning telecommunications services; telecommunications market regulator policies	the complex technologies used in telecommunications; **(GC) at an advanced level, the technical norms, standards and best practices for defining the objectives of a telecommunications investment, including ESG requirements;** the legal framework and its interpretation as it relates to defining objectives in telecommunications		
	is able to...	**Defining objectives**	use telecommunications documentation	provide telecommunications services to other sectors	**(GC) identify and analyse all factors influencing investments in telecommunications;** use market analysis in planning telecommunications investments	define options for telecommunications investment objectives; **(GC) assess the risk of telecommunications investments**	**(GC) identify and analyse strategic objectives for telecommunications investments;** **(GC) determine investment priorities in the telecommunications sector**	define strategic objectives for the telecommunications sector

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
I. Planning and preparing telecommunications investments	knows and understands...	Financial analysis		**(GC) the factors influencing the cost of building and operating telecommunications infrastructure, including the energy efficiency of the technical solutions analysed;** the factors affecting the cost of preparing and launching a telecommunications service and its sale; the market of suppliers of telecommunications services, materials, and equipment from a financial perspective; the standardised systems for the financial analysis of telecommunications investments	**(GC) the principles of estimating the costs of telecommunications investments, taking into account the energy efficiency of technical solutions, the circular economy, and sustainable supply chain management;** the principles of drawing up financial plans for telecommunications investments; the principles of regulatory economics concerning telecommunications operators with significant market power; the economic principles of preparing price lists for telecommunications services	**(GC) capital expenditure (CAPEX) costs, taking into account sustainable supply chain management, eco-design of infrastructure, and sustainable procurement;** **(GC) operating costs (OPEX), taking into account energy efficiency, easily recyclable materials, and emissions management;** telecommunications costing principles, taking into account legal aspects; the complex systems of the financial analysis of telecommunications investments		

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
I. Planning and preparing telecommunications investments	is able to...	**Financial analysis**		distinguish between the capital costs and operating costs of a planned telecommunications investment; estimate the costs of a simple telecommunications investment	analyse the demand for a telecommunications service; analyse the costs of selling a telecommunications service; analyse the time required to implement a telecommunications investment; analyse the economic indicators of a telecommunications investment	manage a team's work on the financial analysis of a single telecommunications investment; analyse the competition in the telecommunications market; **(GC) conduct a technical and economic analysis of a telecommunications investment, including its various options;** conduct a financial analysis of the costs of a telecommunications investment in terms of defining and reporting financial indicators; **(GC) assess the impact of investment and operating costs on the financial performance of a telecommunications investment, including those relating to ESG requirements and the mitigation of negative environmental impacts;** diagnose and optimise the final economic outcome of telecommunications investments for all their variants	lead a team in developing and optimising the budget for a telecommunications investment	

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
I. Planning and preparing telecommunications investments	knows and understands...	**Analysing the technology (selecting the technology and network architecture)**	the terminology relating to telecommunications infrastructure; the standards for telecommunications systems and networks; **(GC) telecommunications network construction technologies**	the methods and tools for identifying telecommunications network technologies and architecture; **(GC) the types, parameters, and use of telecommunications equipment and apparatus;** the network standards and protocols used in telecommunications; the modulation, coding and multiple access methods used in telecommunications systems; the impact of the selection of telecommunications system parameters on network quality and capacity; the rules for using frequency resources, including radio planning and the coordination of frequency use; the principles of granting radio licences; the fundamentals of cybersecurity in telecommunications	**(GC) the equipment used in telecommunications;** **(GC) the technological solutions available in the telecommunications market**	**(GC) the technical and technological solutions from other sectors used in the telecommunications investment process**	the rules on the interoperability of equipment in relation to the provision of telecommunications services	
	is able to...	**Analysing the technology (selecting the technology and network architecture)**	.	identify telecommunications infrastructure and its components	**(GC) analyse the potential for utilising existing technical infrastructure for telecommunications purposes, taking into account the reduction of the investment's environmental impact;** determine the elements of the telecommunications infrastructure needed to implement the investment; use allocated radio frequency bands in accordance with their intended purpose	**(GC) analyse alternative technological solutions for a telecommunications project;** analyse radio spectrum occupancy and restrictions arising from regulations, radio licences, and environmental parameters	**(GC) optimise the architecture of a telecommunications network**	

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
I. Planning and preparing telecommunications investments	knows and understands...	**Developing the concept**		the basics of telecommunications network planning; spatial development plans and maps for the purpose of implementing a telecommunications project	the organisational and technical conditions for telecommunications projects, including site selection; the principles of radio planning, including propagation models, coverage and capacity planning	the market for telecommunications equipment and service providers, including the applicability of available technologies; the legal conditions for telecommunications investments; the principles of drawing up the functional and utility programme (FUP) for a telecommunications investment	available telecommunications sector documents addressing socio-economic issues	
	is able to...	**Developing the concept**	use Numbering Allocation Tables in public telecommunications networks	use the National Frequency Allocation Table	**(GC) analyse and identify legal, technical, administrative, and market conditions relating to the preparation of a telecommunications investment;** analyse opportunities for securing partners to collaborate on the implementation of a telecommunications investment; **(GC) analyse the possibilities of utilising existing technical infrastructure to implement telecommunications projects, taking into account the reduction of both ground disturbance and the carbon footprint;** **(GC) identify telecommunications investment options, including the location of radio network elements, while minimising environmental impact and optimising spectrum utilisation**	use IT tools to develop concepts for the preparation of telecommunications projects, including those used for radio network planning; analyse the market for telecommunications equipment and service providers; **(GC) analyse telecommunications investment options;** **(GC) facilitate the development of various telecommunications investment options, including through technical dialogue with stakeholders;** analyse and optimise technical solutions in telecommunications, ensuring compliance with technical and construction regulations and standards, as well as economic efficiency	optimise the parameters of telecommunications investments in light of development trends; develop frequency allocation plans	**(GC) develop strategies for the development of the telecommunications sector in terms of technology and infrastructure;** develop short- and long-term strategies for the telecommunications sector in terms of services, including broadband services

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
I. Planning and preparing telecommunications investments	knows and understands...	**Designing and deploying services**	the basic telecommunications services available in the market	the definitions of the technical and quality parameters of telecommunications services; the basic principles of telecommunications service scalability; the methods of conducting tests to assess the quality of telecommunications services; the principles of using frequency resources	telecommunications market regulations regarding service quality parameters, including minimum and guaranteed standards; the advanced principles of telecommunications service scalability; the charges incurred by businesses in connection with the provision of telecommunications services	the advanced telecommunications services available in the market; the frequency allocation process	local and global trends in the design and deployment of telecommunications services	
	is able to...	**Designing and deploying services**		identify the expectations of telecommunications service users	**(GC) analyse the possibilities for accessing other operators' telecommunications infrastructure and services, taking into account the reduction of the investment's carbon footprint;** analyse reports and other information derived from telecommunications market research; define the parameters of telecommunications services	analyse customer expectations with a view to developing new telecommunications services; analyse the possibilities for reconfiguring the existing network to provide the designed telecommunications service; analyse trends in the local and national telecommunications market; analyse the impact of charges incurred by businesses for the telecommunications services provided; design, test, and reconfigure telecommunications services	analyse global trends in the design and deployment of telecommunications services	

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
II. Passive infrastructure	knows and understands...	**Designing the physical components of a telecommunications network**	the terminology relating to the physical components of telecommunications networks; the materials and equipment used in the construction of passive telecommunications infrastructure; **(GC) the technologies used in the construction of passive telecommunications infrastructure;** the technical terminology in English relating to passive telecommunications infrastructure	**(GC) the principles of technical knowledge and good construction practices governing the construction of telecommunications structures, including the use of energy-efficient solutions;** the principles of preparing bills of quantities and project cost estimates for telecommunications projects; the software used for designing passive telecommunications infrastructure, including CAD/GIS software; fire safety regulations on the installation of telecommunications infrastructure; **(GC) the websites serving as sources of information used in the design process of passive telecommunications infrastructure (e.g., Geoportal)**	the legal provisions and procedures, in particular administrative ones, for obtaining opinions, permits, agreements, and decisions at the design stage of passive telecommunications infrastructure; the rights and obligations of participants in the construction process, including the designer, during the design and construction of telecommunications structures; the principles of preparing design documentation, including the construction design and detailed design in telecommunications	the regulations governing the selection of a contractor to perform the design work for telecommunications structures		

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
II. Passive infrastructure	is able to...	**Designing the physical components of a telecommunications network**	identify the elements of passive telecommunications infrastructure and technical infrastructure in the field	use the base map employed in the design process, in particular to read and analyse the map to identify telecommunications and technical infrastructure; determine the scope of the map required to produce design documentation for passive telecommunications infrastructure; **(GC) obtain the right to use land for construction purposes when designing telecommunications structures, taking into account the reduction of both ground disturbance and the carbon footprint;** **(GC) obtain access to the existing technical infrastructure to construct passive telecommunications infrastructure, taking into account the reduction of the project's environmental impact;** obtain the right to co-use structures for the purposes of developing passive telecommunications infrastructure	use software for designing passive telecommunications infrastructure, including CAD/GIS software; read and utilise technical documentation from other sectors for designing passive telecommunications infrastructure; **(GC) utilise information from services used in the design process of passive telecommunications infrastructure (e.g., Geoportal);** prepare a bill of quantities for a passive telecommunications infrastructure project; prepare an investor's cost estimate for a passive telecommunications infrastructure project; prepare a Health Protection and Safety Plan (H&S Plan) for constructing telecommunications structures; draw up the Technical Specification for the Execution and Acceptance of Construction Work for passive telecommunications infrastructure	apply legal provisions in designing passive telecommunications infrastructure; apply contractual requirements, including those contained in the tender specifications regarding the parameters of passive telecommunications infrastructure; organise design processes for passive telecommunications infrastructure; follow procedures, in particular administrative ones, relating to obtaining opinions, permits, approvals, and decisions at the design stage of passive telecommunications infrastructure; coordinate and supervise the work of subcontractors involved in designing passive telecommunications infrastructure; **(GC) coordinate multi-disciplinary projects for passive telecommunications infrastructure;** **(GC) draw up a functional and utility programme for the construction of passive telecommunications infrastructure, taking into account ESG requirements and energy-efficient solutions**	plan and supervise the work of the design team to ensure the completeness and quality of passive telecommunications infrastructure design; optimise design processes for passive telecommunications infrastructure; **(GC) optimise design solutions for passive telecommunications infrastructure;** **(GC) analyse the impact of legislation on possible design solutions for passive telecommunications infrastructure**	

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
II. Passive infrastructure	knows and understands...	**Constructing the physical elements of a telecommunications network**	the health and safety regulations applicable to the construction of the physical elements of telecommunications infrastructure; **(GC) the principles of installing and assembling fibre-optic and copper cables arising from standards and good construction practices, including those ensuring maximum durability and the reduction of cable waste;** **(GC) the principles of constructing telecommunications structures, including cable ducts and telecommunications pole substructures, in accordance with standards and good construction practices, including those ensuring maximum durability and the reduction of construction waste**	the regulations governing the construction of passive telecommunications infrastructure; the legal provisions on the occupation of land for the construction of telecommunications structures; the legal provisions on traffic management and preparing traffic management plans during the construction of telecommunications structures; the requirements for using materials and tools employed in the construction of telecommunications structures, including the requirements for placing products in the market; the technical specifications of the materials and technical instructions for telecommunications equipment and apparatus; the technical conditions for the construction and installation of passive telecommunications infrastructure; the principles of preparing and updating the Health Protection and Safety Plan during the construction of telecommunications structures; the principles of measuring and testing passive telecommunications infrastructure arising from standards and good construction practices	the rights and obligations of participants in the construction process, including the site manager and the client's supervision inspector during the construction of telecommunications structures; **(GC) the parameters of the materials, equipment, and tools used in constructing telecommunications infrastructure elements;** the regulations and best practices on preparing as-built documentation for telecommunications structures; the principles of structured cabling certification	**(GC) the principles of organising telecommunications infrastructure construction sites in accordance with legal regulations, including health and safety regulations, and taking into account sustainable supply chain management, waste segregation, and ESG requirements;** the regulations governing the selection of contractors for telecommunications construction projects		

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
II. Passive infrastructure	is able to...	**Constructing the physical elements of a telecommunications network**	apply health and safety measures used in constructing the physical components of telecommunications infrastructure; apply safety measures during the construction of telecommunications network components; identify the materials used in constructing physical telecommunications network components based on how they are marked by the manufacturer; **(GC) perform installation and construction work in building passive telecommunications infrastructure, including in a manner that ensures maximum durability and the reduction of construction waste;** **(GC) operate equipment and tools used in the construction of passive telecommunications infrastructure, taking into account energy efficiency, noise abatement, and waste reduction;** test passive telecommunications infrastructure; mark components of passive telecommunications infrastructure in accordance with technical documentation	use design documentation when constructing a telecommunications network; verify the compliance of the construction design for telecommunications network components with site conditions; verify the validity of agreements and permits during the construction of telecommunications structures; draw up a traffic management plan for the roadway of a public road during the construction of telecommunications structures; obtain a decision authorising the occupation of a road right-of-way for the duration of work during the construction of a telecommunications network; **(GC) plan the individual stages of construction and installation work for constructing a telecommunications network, taking into account supply chain management, optimisation of machine operating times, and the segregation of construction waste;** **(GC) select materials, equipment and tools in accordance with the design documentation when constructing the elements of a telecommunications network, taking into account durability and energy efficiency;**	**(GC) select technologies for the construction of passive telecommunications infrastructure appropriate to the type of facility and site conditions;** prepare measurement documentation for passive telecommunications infrastructure components; use software for preparing as-built documentation for passive telecommunications infrastructure	analyse the legal and regulatory aspects necessary for the construction of telecommunications network elements; prepare and update the Health Protection and Safety Plan for the construction of telecommunications structures; **(GC) organise the construction site for passive telecommunications infrastructure in accordance with legal regulations, including health protection, safety and fire prevention, taking into account sustainable supply chain management, waste segregation, and ESG requirements;** manage the work of employee and subcontractor teams during the construction of passive telecommunications infrastructure; prepare and coordinate delivery schedules for passive telecommunications infrastructure components; **(GC) coordinate work with other trades, ensuring the consistency and safety of the construction of passive telecommunications infrastructure;** maintain documentation for the telecommunications construction project, including the site log;	**(GC) optimise the processes taking place at the construction site of passive telecommunications infrastructure;** optimise the costs of constructing passive telecommunications infrastructure	

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
II. Passive infrastructure		**Constructing the physical elements of a telecommunications network (continued)**		plan the work of employees and subcontractors and select technical resources while constructing telecommunications network components; verify work progress and ensure that the construction and installation of telecommunications network components is executed correctly; perform measurements of passive telecommunications infrastructure; prepare measurement data of telecommunications infrastructure components for the purpose of compiling as-built documentation		verify the compliance of the completed structure with the design, standards, as well as the technical and contractual requirements; analyse the results of measurements and inspections of passive telecommunications infrastructure; prepare as-built documentation for telecommunications structures; settle accounts for the construction of passive telecommunications infrastructure		

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
II. Passive infrastructure	knows and understands...	**Maintaining and managing passive infrastructure, including telecommunications structures**	the health and safety regulations and fire prevention rules in the maintenance of telecommunications structures; the terminology relating to telecommunications structures in the maintenance and management of passive infrastructure; the symbols used in the documentation for the maintenance of passive telecommunications infrastructure **(GC) environmental monitoring systems in the maintenance of telecommunications structures;** the principles of connecting elements of passive telecommunications infrastructure, including patch cords and splitters; the procedures for gaining physical access to telecommunications structures	**(GC) the legislation, standards, and best practices relating to the maintenance and management of telecommunications structures;** **(GC) the technologies, equipment, and materials used in the maintenance of telecommunications structures;** the principles of using telecommunications infrastructure records; **(GC) the principles of connecting and operating equipment relating to the maintenance of telecommunications structures, taking into account energy efficiency and emissions reduction;** the principles of ensuring the continuity of infrastructure operation as presented in the maintenance instructions for telecommunications structures; the tools used for diagnosing faults in telecommunications structures	**(GC) alternative solutions for the maintenance of telecommunications structures;** the principles of preparing records of the telecommunications infrastructure	the principles of developing maintenance procedures for telecommunications structures, including the performance of periodic inspections		

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
II. Passive infrastructure	is able to...	**Maintaining and managing passive infrastructure, including telecommunications structures**	determine the layout of infrastructure components in telecommunications facilities from documentation; determine the location of telecommunications structures from plans and maps; identify telecommunications infrastructure components; test cabling during the maintenance of telecommunications structures	**(GC) replace physical telecommunications infrastructure components, taking into account waste reduction and segregation;** use measuring and diagnostic equipment in the maintenance of telecommunications structures; interpret data from the systems monitoring telecommunications structures; update documentation relating to the maintenance of telecommunications infrastructure; use and update network records as part of the maintenance of the telecommunications infrastructure	use technical documentation relating to the maintenance and management of telecommunications structures; use record-keeping systems in the maintenance of telecommunications structures; use infrastructure measurement results to identify the location of faults; **(GC) install and configure active infrastructure equipment used for the maintenance of telecommunications structures, taking into account energy efficiency and emissions reduction;** cooperate with the maintenance team for telecommunications infrastructure; draw up a schedule and supervise planned maintenance work on passive telecommunications infrastructure; maintain a register of telecommunications structures	**(GC) manage the maintenance of telecommunications structures;** harmonise the documentation for planned utility networks in the vicinity of existing telecommunications infrastructure; deploy and manage access control and monitoring systems for telecommunications structures; prepare reports in accordance with the requirements of applicable law and the requirements of the telecommunications market regulator	manage the maintenance of passive telecommunications infrastructure at the level of the enterprise or institution; **(GC) optimise the procedures for operating telecommunications structures**	

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
III. Active infrastructure	knows and understands...	**Designing active infrastructure**	the terminology of active telecommunications infrastructure components; the topology of active telecommunications infrastructure; the types of equipment used in active telecommunications infrastructure; the technical terminology in English relating to active telecommunications infrastructure	the terminology used in the design process of active telecommunications infrastructure; **(GC) the transmission technologies used in the design of active telecommunications infrastructure;** the basic configurations of equipment used in active telecommunications infrastructure; **(GC) the standards for the installation of active equipment;** **(GC) the regulations on the marketing authorisation and use of equipment in active telecommunications infrastructure;** the structure and components of an active telecommunications infrastructure design; equipment manufacturers' certification pathways for designers of active telecommunications infrastructure	**(GC) the methods of designing active telecommunications infrastructure;** the principles of performing transmission link balancing, including radio links; the classes and functionalities of active equipment used in active telecommunications infrastructure; the functionalities and applications of network protocols for active telecommunications infrastructure equipment, including routing mechanisms; the functionalities and application possibilities of active telecommunications infrastructure management systems; the technical and operational documentation for active telecommunications infrastructure equipment	the communication protocols used in telecommunications networks and systems; the technical requirements for the co-location of active telecommunications equipment; network service requirements for active telecommunications infrastructure projects; advanced routing and access control mechanisms used in active telecommunications infrastructure; **(GC) the principles of designing active telecommunications infrastructure based on technical specifications, scope of services, client requirements, and good design practices;** the measurement systems used in active telecommunications infrastructure		

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
III. Active infrastructure	is able to...	**Designing active infrastructure**		apply the standards of installing active equipment, **(GC) select equipment appropriate to environmental conditions when designing active telecommunications infrastructure**	use available technical documentation to design active telecommunications infrastructure; **(GC) define technical requirements for other systems (including air conditioning and power supply) when designing active telecommunications infrastructure;** identify the parameters of active telecommunications infrastructure components for the purposes of service design; use the tools employed in preparing the designs for active telecommunications infrastructure; **(GC) prepare designs for active telecommunications infrastructure installations;** determine the configuration parameters of active telecommunications equipment; **(GC) select network equipment and protocols for the telecommunications services provided;** analyse the transmission link balance, including for radio links	**(GC) define the assumptions and parameters of the planned active telecommunications infrastructure, taking into account redundancy;** define requirements for other sectors affecting the operation of the planned active telecommunications infrastructure; **(GC) scale telecommunications systems by selecting active equipment that takes future services into account;** prepare functional and configuration designs for active telecommunications infrastructure; **(GC) select alternative solutions for the active telecommunications equipment used;** draw up detailed technical specifications for active telecommunications infrastructure; reach agreement on the design of active telecommunications infrastructure with the client and other stakeholders, including the acceptance scenarios developed; coordinate cross-disciplinary projects for active telecommunications infrastructure;	design measurement systems for use in active telecommunications infrastructure in accordance with the client's requirements	

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
III. Active infrastructure	is able to...	**Designing active infrastructure (continued)**				configure management systems for active telecommunications infrastructure; **(GC) draw up a functional and utility programme for active telecommunications infrastructure, taking into account ESG requirements and energy-efficient solutions**		

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
III. Active infrastructure	knows and understands...	**Installing, configuring, and commissioning active telecommunications infrastructure**	**(GC) the components used in the construction of active telecommunications infrastructure and their purpose;** the types of cabling and connectors used to connect components of active telecommunications infrastructure; the health and safety regulations applicable when working on the construction, commissioning, and configuration of active telecommunications infrastructure components; **(GC) the principles of installation and power supply for the equipment used in active telecommunications infrastructure, as presented in standards and best practices;** the principles of performing electrical installation tests necessary for the commissioning of active telecommunications infrastructure equipment; the principles of performing commissioning measurements of active telecommunications infrastructure	the principles of measuring the parameters of the transmission layer of active infrastructure (including SNR, power budget, attenuation); the methods and standards of the initial configuration of active telecommunications infrastructure equipment; the rules for connecting active telecommunications infrastructure equipment; the structure and addressing principles of active telecommunications infrastructure equipment; **(GC) the types of active telecommunications infrastructure equipment and their intended use;** the differences between design and as-built documentation relating to active telecommunications infrastructure	**(GC) the differences in the technologies used in active telecommunications infrastructure equipment, broken down into local area networks (LAN) and wide area networks (WAN), taking into account their energy efficiency and environmental impact;** the principles of configuring end-user services on active telecommunications infrastructure equipment within an operator's access network; the tools for collecting and processing diagnostic data from the active devices being deployed; the methods for updating the firmware of active infrastructure components; the methods of making and archiving backups of active telecommunications infrastructure components; the principles of maintaining an event log for active telecommunications infrastructure, which includes configuration and software changes; the methods and tools for analysing the traffic in active telecommunications infrastructure; the principles of conducting acceptance tests of active telecommunications infrastructure	the principles and limitations of interoperability in the integration process of active telecommunications equipment; the impact of transmission parameters on the overall performance of a constructed and commissioned active telecommunications infrastructure, as well as on the quality of services provided using that infrastructure; the methods of advanced diagnostics for the commissioning and configuration of active telecommunications infrastructure components	**(GC) the processes relating to the planning, construction and configuration of active telecommunications infrastructure components;** **(GC) the principles of planning the scalability of active telecommunications infrastructure components**	

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
III. Active infrastructure	is able to...	**Installing, configuring, and commissioning active telecommunications infrastructure**	**(GC) operate the equipment and tools used in the installation and commissioning of active telecommunications infrastructure, taking into account energy efficiency, noise abatement, and waste reduction;** identify the components of active telecommunications infrastructure; perform the power supply tests necessary to commission telecommunications equipment; **(GC) perform installation work on active telecommunications infrastructure, including cabling, in a manner that ensures maximum durability and waste reduction;** use installation documentation when assembling active telecommunications infrastructure; perform assembly and connection tests on components of the active telecommunications infrastructure system, including on the basis of instructions or a checklist	configure equipment for the installation of active telecommunications infrastructure; commission telecommunications equipment in accordance with the documentation; perform tests on the configuration and parameters of active telecommunications infrastructure and compile the results; use network diagnostic tools to verify that the commissioning process of active telecommunications infrastructure is executed correctly; make backups of the configuration of active telecommunications infrastructure	analyse the collected diagnostic data to optimise the operation of active telecommunications infrastructure; update the software of active telecommunications infrastructure equipment	design the addressing and configure active devices forming part of telecommunications networks; configure, integrate, and commission active telecommunications network equipment, taking interoperability into account; perform testing, acceptance, and commissioning procedures for the constructed active telecommunications infrastructure; optimise the deployed configurations based on the results of commissioning and acceptance tests of active telecommunications infrastructure; **(GC) select equipment intended for active telecommunications infrastructure under construction;** analyse occupational safety risks in telecommunications systems	**(GC) manage the construction and commissioning of active telecommunications infrastructure;** **(GC) deploy advanced active telecommunications infrastructure systems;** manage the quality of work performed during the installation, configuration, and commissioning of active telecommunications infrastructure	analyse and synthesise research findings for the purpose of future solutions in the field of active telecommunications infrastructure

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
III. Active infrastructure	knows and understands...	**Maintaining active telecommunications infrastructure**	the health and safety regulations applicable when performing maintenance work on active telecommunications infrastructure components; the principles of protecting telecommunications equipment against electrostatic and electromagnetic interference; the principles of granting physical access to telecommunications facilities	the principles of the diagnostics and configuration of active telecommunications infrastructure; the significance and types of alarms occurring in active telecommunications infrastructure monitoring systems; the principles of reporting the unavailability of active telecommunications infrastructure; the methods of ensuring the physical security of active telecommunications infrastructure	the principles of operating active telecommunications infrastructure management systems; the principles of event analysis and their correlation with alarms in the maintenance of active telecommunications infrastructure; the protection and redundancy mechanisms used in the maintenance of active telecommunications infrastructure; **(GC) the standards, norms, and best practices applied in the industry for the maintenance of active telecommunications infrastructure;** the procedures of performing periodic inspections of active telecommunications infrastructure	the structure of wide-area telecommunications systems; **(GC) the principles of planning the maintenance of active telecommunications infrastructure, including the creation of material reserves;** the methodology for managing critical incidents occurring in active telecommunications infrastructure; the safety standards applied during the maintenance of active telecommunications infrastructure; the principles of integrating telecommunications systems and critical infrastructure, and their impact on the maintenance of active telecommunications infrastructure	**(GC) the principles of optimising the maintenance of complex telecommunications systems;** the principles of managing active telecommunications infrastructure maintenance teams in accordance with agreed SLA levels; **(GC) the maintenance procedures for active telecommunications infrastructure constituting critical infrastructure;** **(GC) the principles of standardisation and the development of maintenance policies for active telecommunications infrastructure**	

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
III. Active infrastructure	is able to...	**Maintaining active telecommunications infrastructure**	apply health and safety regulations in the maintenance of active telecommunications infrastructure; use safety systems in accordance with their intended purpose during the maintenance of active telecommunications infrastructure; use tools when performing maintenance work on active telecommunications infrastructure; **(GC) perform inspections and operational tasks on active telecommunications infrastructure, including basic measurements of operating parameters;** identify the equipment and its components within active telecommunications infrastructure; use equipment service manuals in the maintenance of active telecommunications infrastructure; identify typical faults in active telecommunications infrastructure at the physical layer; troubleshoot typical faults in active telecommunications infrastructure, as described in publicly available documentation; use IT systems to handle fault reports in the maintenance of active telecommunications infrastructure	use active telecommunications infrastructure management systems at the operational level; perform and interpret advanced measurements of active telecommunications infrastructure using external diagnostic equipment, e.g., attenuation and BER measurements; configure the basic functionalities of active telecommunications infrastructure based on descriptions, procedures, and documentation; perform basic diagnostics, including reading and interpreting logs and alarms from active telecommunications infrastructure; prepare reports on the maintenance work performed on active telecommunications infrastructure and update technical documentation; **(GC) formulate proposals for optimising the maintenance processes of active telecommunications infrastructure**	perform advanced diagnostics of faults and failures involving equipment, networks, telecommunications protocols, and associated infrastructure; **(GC) measure the parameters of radio systems;** **(GC) organise scheduled maintenance work on active telecommunications infrastructure;** perform technical acceptance tests of active telecommunications infrastructure; troubleshoot complex faults and failures in active telecommunications infrastructure; **(GC) develop instructions and procedures for the maintenance of active telecommunications infrastructure;** analyse measurement data and diagnose problems resulting, for example, from interference, insufficient capacity, or the incorrect configuration of antenna systems; prepare analyses and reports on activities relating to the maintenance of active telecommunications infrastructure for the company's needs; provide technical support for the maintenance of active telecommunications infrastructure	**(GC) manage the maintenance of active telecommunications infrastructure at the company or institutional level;** handle major incidents, including those involving critical telecommunications infrastructure; **(GC) analyse the causes of faults and failures in active telecommunications infrastructure in order to minimise the likelihood of their recurrence in the future;** develop business continuity plans for active telecommunications infrastructure based on its maintenance cycle; **(GC) perform technical audits of active telecommunications infrastructure**	prepare a company's budget for the maintenance of active telecommunications infrastructure; **(GC) develop solutions to optimise maintenance procedures for active telecommunications infrastructure**	

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
IV. Telecommunications services	**knows and understands...**	**Selling, providing, and managing retail telecommunications services**	the telecommunications services offered to individual customers; the specific nature of retail telecommunications services intended for business customers; retail tariffs and subscription services in the sale of telecommunications services; retail telecommunications service packages and related or additional features	the decisions, guidelines, and manuals issued by market regulators regarding the provision of retail telecommunications and related services; the legal requirements concerning customer service in retail telecommunications services, including data protection regulations; the offers in the local retail telecommunications services market	the conditions for protecting competition and the consumers of retail telecommunications services	the legal requirements on the sale of retail telecommunications services	**(GC) the trends in retail telecommunications services, methods of their provision, and the equipment used**	

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
IV. Telecommunications services	is able to...	**Selling, providing, and managing retail telecommunications services**	assess the feasibility of providing retail telecommunications services in a given area; present and explain the offer of retail telecommunications services; prepare sales documents for retail telecommunications services; operate IT systems supporting the sale of retail telecommunications services; identify the telecommunications terminal equipment used depending on the retail services provided	organise the work of the retail telecommunications services sales team; communicate with customers during the sale of retail telecommunications services and identify their needs; select and prepare offers for retail telecommunications services based on available price lists; identify retail customers' terminal equipment that can be connected to the telecommunications network; implement marketing strategies for the sale of retail telecommunications services; draw conclusions regarding sales effectiveness and demand for retail telecommunications services from the seller's perspective; modify the retail telecommunications services sales process within the local sales channel	analyse the local market for retail telecommunications services in order to prepare commercial offers; define the terms and conditions for the provision of retail telecommunications services; develop price lists for retail telecommunications services, taking into account current market offers; prepare customised offers for retail telecommunications services, including for business customers; present sales offers for retail telecommunications service to business customers; provide after-sales customer support for the retail telecommunications services provided	**(GC) identify the actions necessary to deploy telecommunications services;** coordinate the work of teams selling telecommunications services across various sales channels; analyse the local market for retail telecommunications services offered to business customers; analyse the technical and quality parameters of the retail telecommunications services provided; analyse the market in terms of infrastructure availability for the sale of retail telecommunications services; analyse customer requirements and needs and prepare telecommunications service proposals for public procurement procedures; **(GC) design customised retail telecommunications services depending on market demand, technical capabilities, and legal constraints;** develop and implement marketing strategies for the sale of retail telecommunications services; draft sales documents, including contracts and the terms and conditions for the provision of retail telecommunications services; prepare guides and handbooks on retail telecommunications services and the regulatory environment;	analyse the competition from the perspective of a business offering retail telecommunications services in the domestic market; forecast trends in the sale of retail telecommunications services in the domestic market; **(GC) optimise retail telecommunications services to align them with current market needs and trends;** **(GC) optimise the sales processes for retail telecommunications services;** analyse the competition from the perspective of a telecommunications market regulator	**(GC) develop strategies to support the availability and competitiveness of retail services in the telecommunications market**

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
IV. Telecommunications services	is able to...	**Selling, providing, and managing retail telecommunications services (continued)**				assess the effectiveness of the sales process of retail telecommunications services; modify the sales process of retail telecommunications services		
	knows and understands...	**Wholesale telecommunications services—sales**	the terminology used for wholesale telecommunications and related services; the distinction between telecommunications services provided directly to the end customer and wholesale telecommunications services; the differences between retail and wholesale price lists for telecommunications services; the process of ordering, modifying, and cancelling wholesale telecommunications services	primary and backup communication mechanisms between operators in the provision of wholesale telecommunications services; the formal requirements relating to customer service for wholesale telecommunications services; the principles of operator liability in the provision of wholesale telecommunications services; the procedures for handling non-standard wholesale telecommunications services; the complaints procedures relating to the provision of wholesale telecommunications services	the formal and legal conditions for the transfer of wholesale telecommunications services between operators; the requirements for the provision of wholesale telecommunications services arising from concluded agreements; the requirements for the provision of non-standard wholesale telecommunications services arising from concluded agreements; the tools for monitoring the wholesale telecommunications services market; the reporting requirements for the sale of wholesale telecommunications services	the formal legal and procedural requirements for drafting contracts for wholesale telecommunications services; the principles governing the functioning of the wholesale telecommunications services market; the principles of calculating wholesale telecommunications service rates; the models of inter-operator cooperation in the provision of wholesale telecommunications services; the principles of organising inter-operator communication in the provision of wholesale telecommunications services	**(GC) the strategies for selecting the optimal model for providing wholesale telecommunications services based on one's own or third-party infrastructure;** **(GC) the market trends in wholesale telecommunications services, methods of their provision, and the equipment used**	**(GC) national and global market strategies for the use of wholesale services by telecommunications operators;** the role of the market regulator in the field of wholesale telecommunications services; **(GC) the regulatory strategies and decisions in the global wholesale telecommunications services market**

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
IV. Telecommunications services	is able to...	**Wholesale telecommunications services—sales**	identify telecommunications equipment belonging to the organisation and to partner operators used to provide wholesale telecommunications services; prepare and present a quotation and explain the installation process for wholesale telecommunications services; prepare sales documents for the end customer relating to the provision of wholesale telecommunications services; prepare and submit orders for wholesale telecommunications services for fulfilment; handle orders for the installation, modification, and cancellation of wholesale telecommunications services	**(GC) prepare customised quotations for wholesale telecommunications services;** prepare reports on the effectiveness of end-customer service in the delivery of wholesale telecommunications services; manage communication processes with partner operators in the sale of wholesale telecommunications services	organise the process of transferring wholesale telecommunications services between operators; analyse the local wholesale telecommunications market in order to select a service delivery model for end customers **(GC) monitor wholesale telecommunications services provided through inter-operator arrangements;** prepare internal reports on the sale of wholesale telecommunications services	analyse and draft the terms of contracts for the provision of wholesale telecommunications services; assess and amend the terms of contracts for the provision of wholesale telecommunications services in line with changing market needs and technical capabilities; design and implement inter-operator communication policies for the provision of wholesale telecommunications services; develop price lists for wholesale telecommunications services; **(GC) analyse the feasibility of providing new or non-standard wholesale telecommunications services;** prepare reports on the sale of wholesale telecommunications services to the extent required by the regulator or other public authorities	analyse data resulting from monitoring the provision of wholesale telecommunications services, taking into account domestic and global market trends; manage the sales process for wholesale telecommunications services, taking into account domestic market trends; analyse the competition and trends in the wholesale telecommunications services market; analyse the impact of retail market trends on wholesale telecommunications services; monitor wholesale telecommunications services from the perspective of the market regulator	analyse trends in the wholesale telecommunications services market with a view to shaping regulatory decisions; develop market strategies and guidelines relating to the development of wholesale telecommunications services; **(GC) draft regulatory decisions concerning the provision of wholesale telecommunications services;** **(GC) draft and consult on legislative proposals regarding the provision of wholesale telecommunications services**

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
IV. Telecommunications services	knows and understands...	**Wholesale telecommunications services—infrastructure**	the distinction between customer, operator, and partner operator equipment used in wholesale telecommunications services; the formal requirements relating to the performance of contracts for the provision of wholesale telecommunications services; the principles of communication with customers relating to the provision of wholesale telecommunications services, as set forth in contracts and best practices	the types and methods of configuring telecommunications equipment and services in a local network (home or small business) in connection with the provision of wholesale telecommunications services; the principles of fault diagnosis and repair in the access network and local network (home or small business) in connection with the provision of wholesale telecommunications services	the principles of configuring equipment used in wholesale telecommunications services at the central and subscriber levels; the principles of fault diagnosis and demarcation of service responsibility in the provision of wholesale telecommunications services; the distinction between individual and mass faults and the procedures for resolving them in the provision of wholesale telecommunications services; the procedures for escalating service problems relating to wholesale telecommunications services	**(GC) the technical requirements for equipment and IT systems used in the provision of wholesale telecommunications services;** the principles of configuring wholesale telecommunications services in the network interface point, aggregation and central devices, and the distribution network; the problems relating to the interoperability and compatibility of equipment from different wholesale telecommunications service providers; **(GC) the principles of infrastructure scalability for the provision of wholesale telecommunications services;** **(GC) the principles of designing and changing the configuration of wholesale telecommunications services and the selection of software versions for the devices;** the management and monitoring systems for wholesale telecommunications services	**(GC) the trends in wholesale telecommunications services, methods of their provision, and the equipment used;** the context of decision-making processes on implementing new management and monitoring systems for wholesale telecommunications services; **(GC) the technical and legal requirements for the provision of wholesale telecommunications services in the global market**	the principles of shaping regulatory policy for wholesale telecommunications services

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
IV. Telecommunications services	is able to...	**Wholesale telecommunications services—infrastructure**	**(GC) install an access network for the recipient of wholesale telecommunications services;** configure the standard equipment installed at the premises of a wholesale telecommunications service recipient; verify the operation and parameters of services activated at the premises of the wholesale telecommunications service recipient to ensure that they are correct; communicate with customers in a manner appropriate to the scope and type of wholesale telecommunications services	identify the possibility of connecting the end-user's equipment to the telecommunications network when providing a wholesale telecommunications service; configure telecommunications services in accordance with the end-user's requirements and the parameters of the wholesale telecommunications service; **(GC) diagnose and rectify faults in the access network at the premises of the recipient of a wholesale telecommunications service;** operate systems for managing requests relating to the provision of wholesale telecommunications services; operate management systems for wholesale telecommunications services	configure the terminal equipment used in wholesale telecommunications services within the aggregation network; use tools and systems for monitoring the network and wholesale telecommunications services; verify the parameters of wholesale telecommunications services to ensure that they are correct; diagnose and resolve mass failures in the provision of wholesale telecommunications services; manage teams servicing the access network in the provision of wholesale telecommunications services	configure wholesale telecommunications services in the network interface and central and aggregation devices; deploy and manage monitoring systems for wholesale telecommunications services; deploy and manage systems for the automatic configuration of equipment and wholesale telecommunications services; plan and perform software updates in the process of providing wholesale telecommunications services; **(GC) test and deploy new equipment and software versions in the process of providing wholesale telecommunications services**	**(GC) analyse the suitability of new technical solutions in the provision of wholesale telecommunications services;** conduct technical discussions with partner operators regarding the coordination of the provision of wholesale telecommunications services; **(GC) forecast and optimise the development of networks and wholesale telecommunications services;** design procedures for the assessment, deployment and verification of the interoperability of new equipment and systems in the provision of wholesale telecommunications services; design systems for the supervision of wholesale telecommunications services; design configuration management systems for wholesale telecommunications services; design and deploy new wholesale telecommunications services	develop interoperability requirements for the provision of wholesale telecommunications services; develop and verify, from a regulatory perspective, model framework agreements for the provision of wholesale telecommunications services

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
V. Applications that support the management of telecommunications networks and services	**knows and understands...**	**Applications used in telecommunications**	the basic functions and purpose of dedicated applications used in the workplace, including billing and ticketing systems, inventory management applications, and telecommunications infrastructure management systems; the principles of data entry into the ICT systems used in telecommunications; basic security procedures, including password management rules and the protection of personal data in telecommunications systems	the consequences of incorrectly entered data for subsequent customer service processes or telecommunications infrastructure; the error and alarm codes generated by telecommunications equipment and systems; the protocols for diagnosing telecommunications equipment, networks and systems; the parameters configured in service management applications and their impact on service operation for the end customer	the principles of granting user permissions in applications, including billing systems and systems for managing telecommunications networks and infrastructure; the interconnections between the systems used in telecommunications	the flow of business processes supported by interconnected systems in telecommunications; the software architecture of telecommunications systems; the methods and tools for automating tasks performed using applications (e.g., generating reports, performing backups, monitoring the operation of telecommunications systems and infrastructure); control and management protocols for telecommunications networks; the specific characteristics of databases used to evaluate the performance of telecommunications networks and systems	the market for providers of applications and related telecommunications solutions, and the licensing models used; the security architecture of telecommunications applications in cloud and hybrid environments; the use of artificial intelligence in telecommunications applications	**(GC) the mechanisms for establishing global standards for telecommunications systems;** **(GC) the latest methods and trends in the automation, optimisation, and management of wide-area telecommunications networks**

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
V. Applications that support the management of telecommunications networks and services	**is able to...**	**Applications used in telecommunications**	deploy dedicated telecommunications applications; navigate the main menu and use the functions necessary to perform routine tasks relating to customer service, configuration of telecommunications equipment, and reading alarms; enter alphanumeric data into defined forms in telecommunications applications (e.g., customer data, parameter readings from measuring devices, order fulfilment statuses); perform procedures (sequences of actions) based on instructions and wizards built into telecommunications applications; read error messages and operational statuses in telecommunications applications	manage customer accounts and their permissions in the process of providing telecommunications services; operate telecommunications systems, including network management and billing systems, performing complete processes for requests or orders; operate the user interfaces of telecommunications systems; use dedicated applications to prepare and deploy telecommunications services, as well as to monitor their quality; verify data consistency between different telecommunications systems; monitor applications, identify operational and performance problems with systems, and report findings to technical support departments	manage user accounts in telecommunications systems; operate telecommunications system interfaces; operate related systems in telecommunications; apply security policies for the operation of telecommunications systems; use query builders to generate custom reports for telecommunications systems	analyse and assign permission levels to users of telecommunications applications; establish security policies for the operation of telecommunications systems; analyse complex incidents involving events in coexisting telecommunications systems to identify the causes of unusual problems; develop and maintain dedicated scripts to automate repetitive tasks in telecommunications systems, and use application programming interfaces (APIs) for data exchange and network management; configure and diagnose the operation of interfaces between management systems and the telecommunications network elements they support; analyse the performance of telecommunications systems and networks, recommending modifications to device configurations	design comprehensive application architectures for network and process management in telecommunications, taking into account business, technical, and financial requirements; design telecommunications application solutions that are resilient to failures and attacks; lead the process of selecting technologies and suppliers for telecommunications applications	**(GC) develop innovations in the field of network and service management, including the optimisation of telecommunications networks**

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
VI. Communication and collaboration	is ready to...	**Communicating and collaborating within the organisation**	report on the progress of work and raise problems and difficulties in performing assigned tasks	instruct colleagues and share one's own professional experience in the telecommunications sector	coordinate the work of a small team, including task allocation, work schedule organisation and conflict resolution	lead a team in the design and construction of telecommunications infrastructure; organise cooperation between the technical and sales/commercial teams in the provision of telecommunications services; mentor and guide employees' career paths in the telecommunications sector	**(GC) devise strategies for the development of the organisation's telecommunications operations**	**(GC) initiate and organise research and identify new directions and areas for the development of telecommunications operations**
	is ready to...	**Communicating and collaborating outside the organisation**	provide the customer/ external stakeholder with basic technical and commercial information	educate/instruct customers and other stakeholders on the operation of telecommunications terminal equipment; **(GC) educate/instruct customers and other stakeholders on the operation of telecommunications infrastructure**	**(GC) negotiate with government agencies and facility managers to construct telecommunications infrastructure;** **(GC) negotiate with contractors performing installation work on telecommunications infrastructure;** **(GC) conduct cross-industry negotiations in the construction and maintenance of telecommunications infrastructure**	present concepts/designs and develop technical solutions with investors or telecommunications service users; present and discuss technical concepts in the field of telecommunications with representatives of telecommunications solution providers	conduct inter-operator discussions; maintain contacts with public authorities, including the telecommunications market regulator; represent the organisation in relations with external stakeholders; represent the organisation in relations with supervisory bodies, including building inspection and technical regulatory authorities; represent the organisation in relations with research bodies	represent the telecommunications sector in international standardisation bodies; **(GC) conduct public debates to raise awareness of the importance of telecommunications for social and economic development**
VII. Responsibility	is ready to...	**Taking responsibility for tasks and development**	perform tasks in the telecommunications sector reliably, in accordance with instructions and procedures	**(GC) autonomously study the field of telecommunications solutions in order to develop skills relating to the tasks performed;** develop one's own social skills; **(GC) perform tasks in the telecommunications sector in accordance with the principles of sustainable development**	take the initiative in performing tasks in the telecommunications sector	**(GC) manage the life cycle of telecommunications systems;** manage the quality of processes relating to the implementation of telecommunications projects	**(GC) set the direction for the development of the competencies of teams involved in the design, construction, sale, and maintenance of telecommunications infrastructure and services**	

SECTORAL DETERMINANT		COMPETENCE SERIES	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
VII. Responsibility	is ready to...	**Taking responsibility for safety**	comply with health and safety regulations; comply with property protection rules	comply with data protection rules for the data processed in telecommunications systems; comply with privacy protection rules, including the GDPR, trade secrets, and the confidentiality of critical information	**(GC) monitor risks within one's area of responsibility;** take responsibility for the continuity of telecommunications infrastructure and services; promote and develop rules for the safe use of telecommunications terminal equipment	**(GC) design processes to ensure the security of telecommunications infrastructure;** design processes to ensure the security of telecommunications services	raise awareness of the importance of critical telecommunications infrastructure for national security	
VIII. Autonomy and working standards	is ready to...	**Organising work**	perform tasks in accordance with the schedule	**(GC) independently plan and conduct assigned installation, commissioning, and configuration work on telecommunications infrastructure;** take responsibility for effective teamwork	**(GC) plan, coordinate, and optimise team activities**	**(GC) plan and deploy complex technical and organisational solutions in the field of telecommunications infrastructure;** organise the process of deploying new telecommunications services; **(GC) organise the work of teams involved in the design, construction, and maintenance of telecommunications infrastructure;** organise the work of sales teams	**(GC) manage a complex telecommunications infrastructure construction project**	**(GC) initiate and deploy innovative projects in the telecommunications sector**
	is ready to...	**Decision-making**	resolve typical problems regarding the installation of telecommunications equipment and infrastructure components	make decisions on the diagnostics of telecommunications infrastructure	make decisions on complex technical solutions and the configuration of telecommunications network equipment	**(GC) make key decisions on the design and construction of telecommunications networks;** make autonomous decisions in the event of telecommunications network failures	make high-risk decisions on the deployment of new telecommunications technologies and services; **(GC) make key decisions on the development of telecommunications services, taking into account technological, market, and environmental conditions;** make decisions on the optimisation of management processes	

5. Glossary of terms used in the Sectoral Qualifications Framework for Telecommunications (SQF TC)

Term	Definition	Reference
Access network	The part of the telecommunications infrastructure that provides a direct connection between the end user and the operator's network node. The current Electronic Communications Act defines the term 'access network' as 'telecommunications infrastructure in the section between the network termination point and the distribution point, comprising in particular subscriber lines, equipment for concentrating subscriber lines, or equipment for managing the access network'.	Article 2(56) of the Act of 12 July 2024—Electronic Communications Law (Journal of Laws of 2024, item 1221).

Active infrastructure	Technical equipment and systems used for electronic communications which perform the functions of actively generating, processing, amplifying, switching, routing, or managing signals, enabling the operation of the electronic communications network and the provision of electronic communications services. The distinction between passive and active infrastructure is functional in nature. Passive infrastructure comprises elements that do not perform the active generation, processing, or amplification of signals, but constitute the physical environment for their transmission and distribution. Active infrastructure comprises equipment and systems that perform these functions and are essential for the operation of the network and the provision of electronic communications services. Both categories are complementary and together constitute the telecommunications infrastructure used in electronic communications.	Article 2(12) of the Act of 12 July 2024—Electronic Communications Law; Journal of Laws of 2024, item 1221.
Active infrastructure network configuration design	Detailed documentation specifying the configuration parameters of network devices forming part of the active network infrastructure, enabling the practical deployment of the functions and operating mechanisms of the telecommunications network in accordance with its functional design.	

Aggregation network	A part of the telecommunications infrastructure constituting an intermediate layer between the access and distribution network and the backbone network, whose function is to collect (aggregate) telecommunications traffic from multiple access nodes and forward it to the core network in order to ensure adequate bandwidth, redundancy, and traffic management mechanisms.	
Architectural (system) redundancy	This is a feature of system architecture whereby it is designed with a number of resources, components, or functions exceeding the minimum necessary for operation. In telecommunications, it is a technical measure involving the use of backup infrastructure components, such as additional links and equipment (but also data), to ensure the continuity of system operation in order to increase reliability and minimise the risk of downtime in the event of a failure. This is a quantitative and structural concept describing the state or property of the system, which does not, however, guarantee its functionality in the event of a failure. This means that should a main component fail, its function can be taken over by a backup element. Consequently, redundancy is divided into functional redundancy and passive redundancy (without functional takeover).	Indirectly linked to regulations concerning critical infrastructure. It also features in technical standards and documents relating to ICT security.

As-built documentation	A collection of documents comprising: the building permit with the attached construction design, the construction log, partial and final acceptance reports, and, where necessary, descriptions and drawings for the construction of the facility (e.g., telecommunications infrastructure), which together form the so-called construction documentation, incorporating changes made during the course of the work, as well as surveying reports and as-built surveying measurements.
Attenuation measurement	A process for verifying network quality by determining the power loss of a signal (optical in fibre-optic cables or electrical in copper cables) transmitted through the medium. In the case of fibre-optic attenuation measurement, this involves determining the optical signal power loss (in dB) along the entire length of the path or at its components (splices, connectors) using the following methods: transmission (power meter + light source) for total attenuation, and reflectometry (OTDR) for detailed analysis of connectors and faults. In the case of measuring the attenuation of radio links, this involves determining the difference between the transmitted signal power and the received signal power (in dB).

Authorisation for the marketing and use of equipment	A legal and technical process which confirms that a given product (e.g., a telecommunications manhole) meets the essential requirements for safety, health, and environmental protection set forth in relevant European Union legislation and Polish regulations. A key element of this process is usually the CE marking and the EC or EU declaration of conformity.	Act of 13 April 2016 on conformity assessment systems and market surveillance (Journal of Laws of 2025, item 568).
Bill of quantities	This is a list of the basic work to be performed in the order of its execution, together with a detailed description thereof or an indication of the basis for determining the detailed description, as well as an indication of the relevant technical specifications for the execution and acceptance of the construction work, as well as a calculation and presentation of the number of measurement units for the basic work.	Section 6(1) of the Regulation of the Minister of Development and Technology of 20 December 2021 on the detailed scope and form of design documentation, technical specifications for the execution and acceptance of construction work, and the functional and utility programme (Journal of Laws of 2025, item 220).
Billing system	A set of interconnected components used to record, process, and bill for telecommunications services provided to customers.	

Bit error rate (BER)	A measurement determining the quality of digital data transmission in a telecommunications network, used to determine the bit error rate in the transmitted digital data stream. BER expresses the ratio of the number of erroneous bits to the total number of bits transmitted within a specified time or within a defined transmission volume. It is one of the fundamental parameters of the quality and reliability of digital transmission in telecommunications networks and, as such, forms part of the quality indicators in SLA contracts.
Broadband service	A telecommunications service offered via a broadband network, used to provide broadband access to ICT system resources, such as the Internet. The bandwidth of a broadband service is not a limiting factor in the ability to run solutions or applications on the ICT systems to which it provides access.
Capital expenditure (CAPEX)	Expenditures on the acquisition, modernisation, or upgrading of fixed assets (e.g., telecommunications equipment, server room, and colocation buildings, software, licences) intended to serve telecommunications operators for a long period, exceeding one financial year.

Central equipment	In telecommunications, these are fixed telecommunications devices of a nodal nature, whose function is the aggregation, switching, control, management, and routing of telecommunications traffic (voice and data) between the operator's service users and the operator's network, and the network of other operators and their end users. Examples of central equipment include: telephone exchanges (TDM, softswitch), aggregation and backbone routers and switches, BNG/BRAS devices, OLTs in GPON networks, network controllers, and traffic control systems.	
Colocation of active telecommunications equipment	The provision of physical space by one entity (usually in a room or telecommunications equipment) for the installation and operation of another entity's active telecommunications equipment (e.g., routers, switches, servers, base stations). The owner of the active telecommunications equipment maintains separate ownership and operational control of it. Colocation is based on an agreement setting forth such parameters as: the space provided, power supply and cooling conditions, any connections to other equipment, additional services, and price. The terms of colocation may also stem from obligations imposed by a regulator. In regulatory practice (UKE, Body of European Regulators for Electronic Communications—BEREC), it is accepted that colocation may concern both active and passive equipment (e.g., patch panels, cable reserves, cabinets, etc.).	Article 2(18), Article 180 and Article 212(3.6) of the Act of 12 July 2024—Electronic Communications Law (Journal of Laws of 2024, item 1221, as amended). Article 12(1)(f) and point B of Annex II to Directive 2002/19/EC of the European Parliament and of the Council of 7 March 2002 on access to, and interconnection of, electronic communications networks and associated facilities (Access Directive) (OJ EU L 108, 24.04.2002, p. 7, as amended).

Construction design	A formal document presenting the anticipated design solutions for the planned investment (including telecommunications), serving as the basis for obtaining opinions, agreements, consents, and permits, including a building permit.	Section 32(1) of the Act of 7 July 1994—Construction Law (Journal of Laws of 2025, item 418).
Coverage and capacity planning	The process of selecting the location, technical parameters, and configuration of base stations in order to ensure the availability of a radio signal of the required quality in a given area (coverage) and to handle the anticipated telecommunications traffic generated by users (capacity).	
Critical infrastructure	Systems and the functionally interlinked facilities comprising them, including buildings, equipment, installations, and services that are key to the security of the state and its citizens and serve to ensure the smooth functioning of public administration bodies, as well as institutions and businesses. The critical infrastructure includes the following systems: ▪ energy supply, energy resources and fuels, ▪ communications, ▪ telecommunications network, ▪ financial systems, ▪ food supply, ▪ water supply, ▪ healthcare, ▪ transport, ▪ rescue services, ▪ ensuring the continuity of public administration, ▪ production, storage, handling, and use of chemical and radioactive substances, including pipelines for hazardous substances.	Article 3(2) of the Act of 26 April 2007 on crisis management (Journal of Laws of 2023, item 122, as amended).

Decision on obtaining a right-of-way on a road lane for the duration of performing work	An administrative permit issued by the road authority (e.g., GDDKiA, county or municipal council) to conduct work within the road right-of-way (e.g., trenches for telecommunications ducts, installation of telecommunications cabinets and poles). This is usually preceded by having a road right-of-way issued by the road administrator that determines where the equipment is to be located.	Section 40 of the Act of 21 March 1985 on Public Roads (Journal of Laws of 2025, item 889).
Demarcation of service responsibility	A precise definition of the boundary where the operational, maintenance, and service responsibility of one operator ends and that of another operator begins, in relation to the infrastructure, configuration, and technical parameters connected at the network interface point. The demarcation covers, in particular, responsibility for passive elements (cables, optical fibres, patch panels, connectors), active elements (ports, modules, devices), logical configuration (VLAN, routing, addressing), and quality parameters (availability, latency, errors, software compatibility).	Indirectly and for selected tasks, see, among others, Article 52 et seq. of the Act of 12 July 2024—Electronic Communications Law (Journal of Laws of 2024, item 1221).
Detailed design	A key component of what is known as the design documentation, providing detailed specifications of the solutions set forth in the construction design. The scope of detailed designs is defined in the regulations only in relation to projects funded from public funds.	
Distribution network	That part of the telecommunications infrastructure used to distribute the signal from the node to access points.	

Electrostatic and electromagnetic interference	Electrostatic interference refers to sudden, short-lived discharges of electrical charge between objects with different electrical potentials. Electromagnetic interference refers to the undesirable effect of an electromagnetic field on the operation of equipment.
Equipment	Products, devices, or technical assemblies, including their components, used for electronic communications, intended to perform specific technical functions in an electronic communications network or equipment, regardless of whether they constitute part of the active or passive infrastructure. The term 'equipment' is general and categorising in nature. It covers both devices and technical assemblies forming part of active or passive infrastructure, as well as ancillary equipment used in the installation, maintenance, measurement, or operation of electronic communications networks, and equipment. The term has no legal definition in current legislation.
Escalation procedure	The procedure defines the escalation of service problems relating to wholesale telecommunications services provided between operators. This procedure is strictly defined in inter-operator Service Level Agreements (SLAs), and describes the guarantee, level and standards of service availability, as well as the rules for inter-operator cooperation, including the method of resolving potential problems.

Event log in active telecommunications infrastructure	A systematic, chronological record of information on all events occurring during the operation of equipment, used by technical staff to monitor the operation of equipment, diagnose problems, and ensure the safety and continuity of the operation of active infrastructure components. Each log entry consists of a timestamp, information on the severity level of the event, an event identifier, a description, and the identifier of the equipment to which it relates.	
Fibre optic patch cord	A short, flexible fibre-optics cable of standardised length, terminated at both ends with connectors (e.g., SC, LC, ST, FC, E2000). It is used for the quick and lossless connection of active devices (routers, switches) to passive network infrastructure (distribution frames, sockets), ensuring data transmission via light.	
Frequency allocation plan	A document specifying the allocation of frequency bands in Poland, established by the President of UKE. It includes, amongst other things, technical conditions and methods of spectrum use. It ensures the effective management of radio communications.	Section 63 of the Act of 12 July 2024—Electronic Communications Law (Journal of Laws of 2024, item 1221, as amended).
Frequency spectrum (radio waves)	Electromagnetic waves with frequencies lower than 3000 GHz, radiating through space without the aid of an artificial conductor.	Article 2(10) of the Act of 12 July 2024—Electronic Communications Law (Journal of Laws of 2024, item 1221).

Functional and utility programme (FUP)	The FUP is the primary document used by a prospective contractor to prepare a cost estimate in the absence of technical and detailed design drawings. It enables costs to be planned for the construction of a building and for the missing designs. The contracting authority is responsible for preparing the FUP. The FUP defines the objectives, functional and utility requirements, as well as the technical and quality parameters of the planned telecommunications investment. It specifies the scope, purpose, and expected performance of telecommunications systems, networks, and facilities, and forms the basis for the preparation of design documentation.	Regulation of the Minister of Development and Technology of 20 December 2021 on the detailed scope and form of design documentation, technical specifications for the execution and acceptance of construction work, and the functional and utility programme (Journal of Laws of 2021, item 2454, Chapter 4—Scope and form of the functional and utility programme).
Functional design/ logical layers of active telecommunications infrastructure	Design documentation describing the principles of interaction between the active elements of telecommunications infrastructure. It defines the logical structure of the network, the functions of individual active devices, the principles of their addressing schemes, and the communication and traffic management mechanisms employed.	

Functional (operational) redundancy	The telecommunications industry uses the term 'redundancy' in referring to the deliberate use of backup (duplicated) links and systems. It is one form of extra repetition in telecommunications infrastructure, functionally aimed at ensuring the continuous availability of telecommunications systems and services (resilience to failure) in the event of a failure of one of the components. Hardware redundancy involves installing and maintaining additional servers, active network devices, as well as power supplies and power systems. These usually automatically take over the functions of a main device that has failed. Network redundancy involves providing alternative data transmission routes in the event of a failure of the primary route. In this case, switching to the backup route occurs automatically.	Indirectly linked to regulations concerning critical infrastructure, high-availability systems and essential services, which in practice require redundancy.
Geoportal	A public spatial information system operated by the Central Office of Geodesy and Cartography, available at www.geoportal.gov.pl. It provides free access to maps and spatial data of the territory of the Republic of Poland.	

Good construction practices	Recognised and widely applied principles of the execution (implementation) of construction, assembly, installation, and infrastructure work relating to the construction of telecommunications infrastructure. These practices include ensuring the durability and reliability of the infrastructure, the safety of the structure and its users, compliance with design documentation and formal requirements, as well as technical and environmental conditions. They also concern a set of principles that improve cooperation with other parties (including the client, subcontractors, land and road right-of-way managers, and owners providing access to sewerage systems, sub-structures for poles and masts, and building infrastructure) during infrastructure construction, with a view to ensuring the efficient implementation of the project and avoiding disputes.	
Health and safety (H&S) information	A document drawn up by the designer as part of the construction project, identifying risks and preventive measures prior to the commencement of work. It forms the basis for the detailed Health Protection and Safety Plan, which is drawn up by the site manager.	Section 2 of the Regulation of the Minister of Infrastructure of 23 June 2003 on information concerning health and safety and the health protection and safety plan (Journal of Laws of 2003, No. 120, item 1126).

Health Protection and Safety Plan (BIOZ)	The Health Protection and Safety Plan (BIOZ) aims to prevent risks to health and life on a construction site, ensure safe working practices, and comply with health and safety regulations. It contains the basic procedures and rules of conduct applicable on the site in question. All participants in the construction process are obliged to comply with it. The BIOZ consists of two parts: a descriptive section and a diagrammatic section. The detailed scope of work for which a Health Protection and Safety Plan must be drawn up is described in §6 of the Regulation of the Minister of Infrastructure of 23 June 2003 on information concerning health and safety and the Health Protection and Safety Plans.	Act of 7 July 1994—Construction Law (Journal of Laws of 2018, item 1202; amended: Journal of Laws of 2018, items 352, 1276, 1496 and 1669; Journal of Laws of 2019, item 51). Regulation of the Minister of Infrastructure of 23 June 2003 on information concerning health and safety and health protection and safety plans (Journal of Laws of 2003, No. 120, item 1126).

Incident	A single unplanned event or a series of related events that have a negative impact on the availability of telecommunications services (disruptions or outages), or threaten the quality or security of network and IT systems. An incident includes both an actual failure and a potential event that may lead to service degradation (e.g., exceeding warning thresholds, network alarms, security anomalies). Categories of incidents in telecommunications networks and services, applicable in the operator sector and consistent with regulatory, operational and management framework (including ITIL, ETSI, NIS2, UKE) are as follows: ▪ critical incidents—result in total or significant unavailability of services for a large number of users, essential public services (e.g., unavailability of emergency numbers), or corporate services (e.g., relating to the banking sector); these incidents require an immediate response and remedial actions that are performed 24 hours a day, 7 days a week; ▪ serious incidents—involve a significant deterioration in service quality or partial unavailability for certain customers (by region, specific segment, etc.); they require rapid handling, but usually not at a critical level;

Incident (continued)	▪ medium incidents—have a limited scope, affecting individual, non-critical services or small groups of customers; they usually involve a reduction in service quality, but without a complete loss of functionality; they require maintenance actions without escalation and in accordance with SLAs; ▪ minor incidents and individual failures—affect individual users or ancillary services; these are handled as part of standard maintenance; ▪ informational/potential incidents—usually generated by monitoring systems upon exceeding the precautionary thresholds defined therein, most often relating to a reduction in optical or radio signal parameters, link overload, or an increase in BER; these include non-critical hardware failures (e.g., relating to the failure of a single fan, a single power supply, a single array drive, etc.), which do not affect the continuity of service provision. From the perspective of telecommunications operators and the practice of network management and SLAs, incidents can also be classified by their area and scale of occurrence, distinguished by: ▪ global incidents—these involve key elements of national or international infrastructure and affect multiple telecommunications operators, resulting in total or significant service unavailability; they require an

Incident (continued)	immediate emergency response and are often subject to reporting obligations to regulators; ▪ mass incidents—these involve disruptions to service provision across a significant area or within a clearly defined user segment; they require rapid handling with increased priority; ▪ individual incidents—concern a single customer or service; these are handled through standard service procedures. Incident management focuses on identifying and restoring normal service operations as quickly as possible, as well as recording and reporting incidents for internal analysis and in accordance with regulatory requirements and applicable SLAs. The categorisation of incidents depends to some extent on the size of the telecommunications operator (local, national, global) and the type of services affected by the incident. The indicated incident categories have been developed in the context of the situations described in SQF TC. The concept of an incident in telecommunications networks and IT services can be defined much more broadly and in many different ways depending on the context (e.g., incidents requiring reporting to the regulator, incidents relating to planned work, incidents in the context of the NIS2 classification, etc.).

Individual failure	In telecommunications, this refers to a sudden technical or operational incident causing unavailability, interruption, or a significant deterioration in the quality of telecommunications services, affecting a single end user or a small, specific group of users, while the rest of the operator's network functions correctly (it is local in nature). It most often results from damage to network equipment at the customer's premises, the telecommunications connection, the port of an active device, or an error in its logical configuration.	
Interoperability	The ability of networks, systems, and system components (services, applications, devices) to interact with one another through the exchange of data and information. The data and information transmitted must be interpreted in the same way by all parties. Interoperability of services is the ability of telecommunications networks, television signal receivers, and digital radio receivers, as well as applications, to cooperate effectively in order to ensure the mutual access of users to the services they provide.	Article 2(16) of the Act of 12 July 2024—Electronic Communications Law (Journal of Laws of 2024, item 1221).

Inter-operator cooperation	A set of technical, legal, and business agreements between telecommunications operators ensuring network interconnection, data transfer, and the provision of end-user services. This includes: ▪ wholesale access, enabling smaller operators to use the infrastructure of larger ones; ▪ interconnection (connecting networks)—the physical connection of networks at points of interconnection for the purpose of exchanging traffic (voice calls, data); ▪ infrastructure sharing—the joint use of masts, telecommunications poles, or cable ducts; ▪ domestic roaming—cooperation that enables users of one operator to use another operator's network; ▪ process automation, for example, the use of API standards for the rapid exchange of information and order processing between operators.

Maintenance of telecommunications structures	A process regulated primarily by the Act of 7 July 1994—Construction Law, covering mandatory technical inspections, repairs, and ensuring the safe operation of infrastructure such as: towers, masts, telecommunications cabinets, and cable networks. This process must also comply with the regulations setting forth the technical conditions to be met by telecommunications structures (including the Regulation of the Minister of Digital Affairs of 26 May 2023 on the technical conditions to be met by telecommunications structures and their location).	Articles 61 and 62 of the Act of 7 July 1994—Construction Law (Journal of Laws of 2025, item 418). Regulation of the Minister of Digital Affairs of 26 May 2023 on the technical conditions to be met by telecommunications structures and their location (Journal of Laws of 2023, item 1040).

Maintenance manual for telecommunications structures	A technical document regulating the rules for the operation, inspection, and maintenance of infrastructure such as: masts, towers, telecommunications cabinets, cable lines, and pole foundations. It should comply with the Construction Law and regulations specifying the technical conditions for telecommunications structures.	Act of 7 July 1994—Construction Law (Journal of Laws of 2025, item 418, as amended). Regulation of the Minister of Infrastructure of 12 April 2002 on the technical requirements to be met by buildings and their siting (Journal of Laws of 2022, item 1425, as amended). Regulation of the Minister of Infrastructure of 26 October 2005 on the technical conditions to be met by telecommunications structures and their location (Journal of Laws of 2023, item 1823).

Mass failure	In telecommunications, this refers to a sudden, unplanned, and widespread technical or operational incident causing simultaneous unavailability, interruption, or significant deterioration in the quality of telecommunications services, affecting a significant number of end users, resulting from damage to or unavailability of shared elements of the operator's network infrastructure (it is area-wide in nature). Depending on the classification system adopted by the telecommunications operator, it covers a housing estate, a district, a region, or the whole country. It most often results from damage to network nodes—central, aggregation or backbone equipment—as well as passive infrastructure and power supply systems.	
National Frequency Allocation Table	A key document regulating the allocation of radio spectrum in Poland, specifying the purposes (e.g., telecommunications, national defence) for which individual frequency bands may be used.	Regulation of the Council of Ministers of 27 December 2013 on the National Frequency Allocation Table (Journal of Laws of 2023, item 2518).
Numbering Allocation Tables	Documents published by the Office of Electronic Communications containing detailed lists of allocated telephone number ranges (landline, mobile, special services) to operators in Poland.	

Operating expense (OPEX)	Ongoing operating costs associated with the day-to-day activities of telecommunications companies, incurred on a regular basis and necessary to maintain the continuity of telecommunications services (e.g., energy costs, staff salaries, telecommunications infrastructure maintenance and servicing, and the purchase of consumables).	
Operator	Article 2(40) of the Act of 12 July 2024—Electronic Communications Law (ECL) defines a telecommunications operator as an entrepreneur or other entity (authorised to conduct business activities under separate regulations), which conducts business activities consisting of providing electronic communications services, the provision of a public telecommunications network, providing related services, or providing publicly available telecommunications services. Pursuant to Articles 5 and 6 of the ECL, all telecommunications activities in the Republic of Poland must be entered into the Register of Telecommunications Operators (RTO) by the President of the Office of Electronic Communications upon application by the relevant entity. This entry is constitutive; in other words, it is required for an entity to be recognised as a telecommunications operator. However, the terms 'entrepreneur' and 'telecommunications operator' are not interchangeable or equivalent. The ECL restricts the term 'operator' to providers of public telecommunications networks and related services, distinguishing this category from 'telecommunications service providers' who provide publicly available telecommunications services. In this context, the term 'telecommunications operator' is linked to infrastructure in the	Article 2(40) and Section I, Chapter 2, Division 1 (Articles 5 et seq.) of the Act of 12 July 2024—Electronic Communications Law (Journal of Laws, item 1221, as amended).

Operator (continued)	market, both an access network operator (which owns the infrastructure) and a user operator (which, in some models, may be a virtual service provider with no infrastructure of its own) operate. Similar examples can be found in the mobile telephony market, for instance. According to the ECL, a telecommunications operator is defined as an entrepreneur (or other entity) conducting business activities consisting of providing a public electronic communications network and related services. This entity must be entered in the Register of Telecommunications Operators, which is maintained by the President of the Office of Electronic Communications.
Partner operator	Each of the parties to a contract for the provision of wholesale telecommunications services concluded between access network operators and user operators. A term developed for the purposes of SQF TC.

Passive infrastructure	Elements of technical and building infrastructure used for the purposes of electronic communications which do not perform the functions of the active processing, amplification, or generation of signals, but serve to route, distribute, protect, or install electronic communications networks and equipment, in particular including cables and optical fibres, cable ducts, installations, buildings, and supporting structures. The distinction between passive and active infrastructure is functional in nature. Passive infrastructure comprises elements that do not perform active signal generation, processing or amplification, but constitute the physical environment for their routing and distribution. Active infrastructure comprises equipment and systems that perform these functions and are essential for the operation of networks and the provision of electronic communications services. Both categories are complementary and together constitute the telecommunications infrastructure	(Article 2(12) of the Act of 12 July 2024—Electronic Communications Law; Journal of Laws of 2024, item 1221) used in electronic communications.

Principles of technical knowledge	A set of proven scientific, technical, and engineering rules for the design, construction, and maintenance of telecommunications infrastructure, derived from standards, the current state of science and technology, engineering principles, and operational practice. They cover the design, operation, and testing of infrastructure in accordance with its relevant parameters, standards, and quality requirements, as well as internal procedures and interoperability requirements.
Propagation models	Mathematical and empirical algorithms used to predict the propagation characteristics of radio waves in a specific environment.
Radio network planning	The process of designing and optimising wireless infrastructure (e.g., WLAN, LTE/5G) in order to ensure stable coverage and high throughput, while minimising interference.
Regulatory decision	A binding administrative act issued by regulatory authorities (e.g., Office of Electronic Communications—UKE, Energy Regulatory Office—URE), imposing specific obligations (e.g., regarding pricing, access, regulatory accounting) on undertakings with significant market power, which are intended to protect competition, ensure fair market conditions, and safeguard consumer interests.

Related services	Services relating to a telecommunications network or electronic communications services which enable or support the provision of services via that network or those services, or which may be used for that purpose. Related services include number translation systems or systems with equivalent functions, conditional access systems and electronic programme guides, as well as other services, in particular identification, location, and presence signalling services.	Article 2(37) of the Act of 12 July 2024—Electronic Communications Law (Journal of Laws of 2024, item 1221).
Resilience	In the telecommunications industry, resilience refers to the set of technical mechanisms and procedures aimed at ensuring the continuity of telecommunications services or mitigating the effects of adverse events in the event of a failure or degradation of telecommunications infrastructure components (e.g., fibre optic cable damage, line card failure). Resilience may, but doesn't have to, utilise redundancy. Resilience is a key element of traffic engineering ensuring the reliability of a modern network. It includes, among other things, the protection of transmission and telecommunications service integrity and parameters, rate-limiting mechanisms, forward error correction (FEC), access control (to facilities, devices, and systems), power supply protection (including surge protection), etc. In legal terminology, the word 'resilience' is sometimes replaced by terms such as: safeguarding, security, or protective measures.	

Retail services	Telecommunications services (in particular internet access services, voice services, and data transmission services) provided by a telecommunications operator directly to an end user (consumer, business, or institution) for their own use. Retail telecommunications services may be provided using the telecommunications operator's own infrastructure or in cooperation with a wholesale service provider.	
Right to dispose of real estate for construction purposes	A legal title arising from ownership, perpetual usufruct, administration, a limited real right, or a contractual relationship that confers the right to perform construction work (including the construction of telecommunications structures).	Article 3(11) of the Act of 7 July 1994—Construction Law (Journal of Laws of 2025, item 418).
Sales channels for telecommunications services	A set of channels through which orders are placed and telecommunications services are delivered to the customer. In practice, a distinction is made between direct channels (e.g., own retail outlets, telephone sales) and indirect channels (local distributors, partner outlets).	
Scalability	The ability of a network to gradually and effectively increase or decrease the scope or functionality of the services provided, bandwidth, the number of users served, and geographical coverage in response to changing market and operational requirements, while maintaining quality of service (QoS) parameters and without the need for significant restructuring of the network architecture.	

Shared use of buildings	A concept involving the shared use of buildings, equipment, and technical networks (e.g., telecommunications and energy networks) by different entities or for different purposes, with the aim of optimising costs, maximising spatial efficiency, and reducing negative impact on the environment.
SLA (Service Level Agreement)	A formal, optional, and separately priced contract concluded between a telecommunications service provider and its customer (forming part of the agreement or a separate annex thereto), which precisely defines the guaranteed quality and availability parameters of the service, such as, for example, quality of service (QoS), bit error rate (BER), annual service availability (RDU), or the method of measuring these parameters, as well as the business and financial consequences in the event of non-compliance (contractual penalties). Due to the additional costs involved, SLA contracts are typically part of professional business contracts.
Spatial development plan	A resolution of a city or municipal council regulating the use of land within the territory of that city or municipality, including by indicating the possible location of telecommunications infrastructure (e.g., masts with mobile phone base stations).

Splitter	A passive component in a fibre-optic network (an optical splitter that requires no electrical power supply and contains no active electronic components), which splits the optical signal power from a single fibre into 2, 4, 8, 16, 32 or 64 (up to 256) output channels.
Structured cabling certification	A measurement process confirming the compliance of the installed cabling (copper or fibre optic) with the transmission parameters specified in standards (e.g., EN 50173 or ISO/IEC 11801). It is used to verify connection quality, ensure compliance with standards (Classes D, E, F, Categories 5e–7A), as well as to obtain a long-term system warranty for the cabling and a site certificate issued by the system manufacturer.
Survey documentation of passive telecommunications infrastructure elements	This documentation is an integral part of the as-built documentation. It confirms the compliance of the constructed telecommunications network with the technical design, regulations, and quality standards.

Technical and operational documentation	Technical and operational documentation drawn up by the manufacturer, supplier or user of a piece of equipment or technical system, which sets out the rules for the installation, commissioning, operation, handling, servicing (maintenance, diagnostics, repairs) and decommissioning of the equipment or system in question. The technical and operational documentation (DTR) includes, in particular: a technical description of the equipment or system, technical and limit parameters, diagrams (electrical, logic, block), instructions (for assembly and commissioning, operation and handling, maintenance and inspections), health and safety rules, procedures for addressing breakdowns, and a list of spare parts and consumables.	§ 1(2), § 2 et seq. of the Regulation of the Minister of Economy of 30 October 2002 on the minimum requirements concerning occupational health and safety in relation to the use of machinery by workers during work (Journal of Laws of 2002, No. 191, item 1596, as amended).
Technical infrastructure	Any element of infrastructure or a network which may be used to house elements of a telecommunications network or telecommunications infrastructure within or on it, without itself becoming an active element of that telecommunications network (pipelines, sewers, masts, ducts, chambers, manholes, cabinets, buildings and building entrances, antenna installations, antenna support structures, towers and masts), excluding: ▪ cables, including optical fibres, ▪ network elements used for the supply of water intended for human consumption, ▪ service ducts.	Article 2(1)(6) of the Act of 7 May 2010 on supporting the development of telecommunications services and networks (Journal of Laws of 2025, item 311).

Technical Specification for the Execution and Acceptance of Construction Work (TSEACW; PL: (STWiORB)	A document that specifies the conditions, standards, materials, quality requirements, as well as the scope and method of execution and acceptance of construction and installation work relating to the construction, reconstruction, extension, or maintenance of telecommunications infrastructure. As a contractual document supplementing the design documentation, (but required, among others, in the case of public procurement), it constitutes the primary quality control document for contractors, the client, and the supervising inspector, ensuring uniform quality standards during the execution and acceptance of projects involving telecommunications infrastructure.	Act of 11 September 2019—Public Procurement Law (Journal of Laws of 2019, item 2019). Regulation of the Minister of Development and Technology of 20 December 2021 on the detailed scope and form of design documentation, technical specifications for the execution and acceptance of construction work, and the functional and utility programme (Journal of Laws of 2021, item 2454).
Telecommunications	The sending, receiving, or transmission of information, regardless of its type, by means of wires, radio waves, or optical fibres, or by other means utilising electromagnetic energy.	Article 2(70) of the Act of 12 July 2024—Electronic Communications Law (Journal of Laws of 2024, item 1221).
Telecommunications construction logbook	Mandatory technical documentation used to record inspections, surveys, and repairs that ensure the safe use of a construction.	Section 64(1) of the Act of 7 July 1994—Construction Law (Journal of Laws of 2025, item 418).

Telecommunications equipment	Components used for the construction, installation, and maintenance of telecommunications networks, including: cable joints and connectors, distribution frames, telecommunications cabinets and boxes, cables, and telecommunications poles.	
Telecommunications infrastructure	Physical elements of a telecommunications network used to provide telecommunications, in particular telecommunications equipment, cable lines, and associated assets, with the exception of associated services, buildings, and building entrances.	Article 2(12) of the Act of 12 July 2024—Electronic Communications Law (Journal of Laws of 2024, item 1221).
Telecommunications infrastructure register	A dataset of the equipment and network used to provide telecommunications services.	
Telecommunications network	Transmission systems, as well as telecommunications equipment, excluding telecommunications terminal equipment, and other resources, including inactive network elements, which enable the transmission of signals by means of wires, radio waves, optical fibres or other means utilising electromagnetic energy, regardless of the type of information transmitted.	Article 2(58) of the Act of 12 July 2024—Electronic Communications Law (Journal of Laws of 2024, item 1221).
Telecommunications network architecture	The logical and physical structure connecting telecommunications network nodes and terminal equipment, ensuring the transmission of data and services. It consists of layers (physical, transmission, service) and networks (backbone, distribution, and access, e.g., FTTH), utilising fibre-optic, radio, and copper topologies.	

Telecommunications operator	An entrepreneur or other entity, authorised to conduct business activity under separate regulations, which conducts business activity consisting in the provision of a public telecommunications network, the provision of related services or the provision of publicly available telecommunications services, whereby a telecommunications operator authorised to: a) provide publicly available telecommunications services is hereinafter referred to as a 'telecommunications service provider', b) provide a public telecommunications network or related services is hereinafter referred to as an 'operator'.	Article 2(40) of the Act of 12 July 2024—Electronic Communications Law (Journal of Laws of 2024, item 1221).

Telecommunications operators' network interconnection point (NIP)	A clearly defined logical location (e.g., VLAN, BGP session), or physical location (e.g., device or switch port, telecommunications socket), where the telecommunications network of at least two operators are directly connected, enabling the exchange of telecommunications traffic or the provision of services, while maintaining each operator's infrastructural and organisational separation and operational responsibility.	Article 2(36) and (69), Articles 43–48, and Article 170 et seq. of the Act of 12 July 2024—Electronic Communications Law (Journal of Laws of 2024, item 1221). In telecommunications practice, the concept of a network interconnection point is broader in scope than indicated in the above-mentioned provision. In particular, the purpose of a network interconnection need not be the provision of services to telecommunications operators' customers. It may serve, for example, monitoring, redundancy, or resilience.

Telecommunications regulator	A specialised state body whose tasks include: resource management (radio frequency bands, telephone numbering), regulation of the telecommunications and postal markets (including the analysis of telecommunications markets, the designation of operators with significant market power, and the imposition of regulatory obligations on them), consumer protection, and the promotion of competition. In Poland, these functions are performed by the President of the Office of Electronic Communications (UKE), which is the regulatory authority for the telecommunications and postal services market.

Telecommunications services	Telecommunications services are part of the group of electronic communications services. They include services provided through a telecommunications network, usually for remuneration, excluding services relating to the provision or exercise of control over content transmitted using telecommunications networks or electronic communications services. These include: ▪ Internet access services within the meaning of the second subparagraph of Article 2(2) of Regulation (EU) 2015/2120 of the European Parliament and of the Council (EU) 2015/2120 of 25 November 2015 laying down measures concerning open internet access and retail charges for regulated intra-EU communications and amending Directive 2002/22/EC and Regulation (EU) No 531/2012 (OJ EU L 310, 26.11.2015, p. 1, as amended); ▪ a service consisting wholly or mainly of the transmission of signals, in particular a transmission service used for the provision of machine-to-machine (M2M) communication services and for broadcasting; ▪ a person-to-person communications service enabling direct, person-to-person and interactive exchange of information via a telecommunications network between a finite number of persons, where the persons initiating or participating in the connection determine its recipient or recipients, excluding services in which person-to-person and interactive communication is merely a secondary	Article 2(80) in conjunction with points 69, 70, 76(a) and (c) and point 78(a) of the Act of 12 July 2024—Electronic Communications Law (Journal of Laws, item 1221) Article 2(2), second subparagraph, of Regulation (EU) 2015/2120 of the European Parliament and of the Council (EU) 2015/2120 of 25 November 2015 laying down measures concerning open internet access and retail charges for regulated intra-EU communications and amending Directive 2002/22/EC and Regulation (EU) No 531/2012 on roaming on public mobile communications networks within the Union (OJ EU L 310, 26.11.2015, p. 1, as amended)

Telecommunications services (continued)	function of another core service, including a service that enables calls to be made to numbers from the national numbering plan or international numbering plans (a personal communications service using numbers).	
Telecommunications structures	Telecommunications cable lines, cable ducts, antenna towers, telecommunications containers, pole foundations for telecommunications cable lines, telecommunications cabinets and poles.	§ 2(17) of the Regulation of the Minister for Digital Affairs of 26 May 2023 on the technical conditions to be met by telecommunications structures and their location (Journal of Laws of 2023, item 1040).
Telecommunications system	A telecommunications system is an integrated set of equipment, networks, and software that enables the transmission, reception, processing, and routing of telecommunications signals between users or within an operator's infrastructure. It performs communication and service functions in accordance with quality, security, and reliability requirements.	
Terminal equipment	A telecommunications device (an electrical or electronic device used to facilitate telecommunications) intended to be connected either directly or indirectly to a network termination point.	Article 2(71) in conjunction with Article 74 of the Act of 12 July 2024—Electronic Communications Law (Journal of Laws of 2024, item 1221).

Ticket system	Specialised software used to record, track, prioritise, and resolve enquiries, complaints, and technical problems reported by subscribers. It is key to managing a large volume of interactions, automating the work of support departments, and maintaining high-quality customer service.	
Topologies of active telecommunications infrastructure	The organisational and technical arrangement of active elements of a telecommunications network, that is, devices requiring power to process signals. The topology describes, among other things, their arrangement within the infrastructure and the logical and physical connections required for data transmission.	
Traffic organisation design	Documentation prepared for the purpose of obtaining approval for a permanent, variable, or temporary traffic management plan from the relevant traffic management authority or the relevant internal road management body (e.g., during the construction of telecommunications infrastructure within the right-of-way of a public road).	Section 1(2)(2) of the Regulation of the Minister of Infrastructure of 23 September 2003 on detailed conditions for traffic management on roads and the supervision of such management (Journal of Laws of 2017, item 784).
Transmission link budget	A detailed summary of all signal power gains and losses in the transmission path from the transmitter to the receiver.	

Utility network	All types of overhead, ground-level, and underground cables and installations: water supply, sewerage, gas, heating, telecommunications, electricity, and other, excluding specific drainage installations, as well as underground structures, which are not classified as buildings within the meaning of the regulations on official statistics.	Article 2(1)(11) of the Act of 17 May 1989 on Geodetic and Cartographic Law (Journal of Laws of 2024, item 1151).
Wholesale services	The provision of telecommunications access, including the use of network elements and associated resources, on a wholesale basis for the purpose of resale by another operator. The telecommunications service of an Access Network Operator (ANO) based on ensuring access to the end user (using its own passive infrastructure, data transmission services, or voice call termination services), provided to a User Operator (UO). From the UO's perspective, the wholesale service is a cost and operational component of a product resold to third parties (most often retail) and enables the provision of services in new markets or under a more efficient business model.	Section 212(1) and (3)(4) of the Act of 12 July 2024—Electronic Communications Law (Journal of Laws of 2024, item 1221).