

**«...Institute of  
Telecommunication Systems  
of the National Technical  
University of Ukraine  
"Igor Sikorsky Kyiv  
Polytechnic Institute"  
was established  
in 2002 ...»**



**INFORMATION  
PACKAGE**

**EDUCATIONAL AND  
RESEARCH INSTITUTE  
OF TELECOMMUNICATION  
SYSTEMS**

**Kyiv, 2022**

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**\*\*\* Information is current as for the 2022/2023 academic year. In the next academic year, there may be minor changes in the list of training specialties and educational programs/specializations.**



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## 1. COMMON DESCRIPTION OF INSTITUTE

**Educational and Research Institute of Telecommunication Systems (ITS)** of the National Technical University of Ukraine "Kyiv Polytechnic Institute" was established in 2002



based on the Telecommunication Department, which was established in 1993, and the Telecommunication Research Institute, which began to operate in 1990 as the Research Institute of Wireless Electronic Technologies "TOR".

The Institute trains professionals in a branch of knowledge "Electronics and Telecommunications" on a specialty "Telecommunications and Radio Engineering".

Educational and scientific work is conducted in collaboration with colleagues from research companies in the US, UK, France, Germany, China, and Poland. A scholarship fund was created at the **ITS** with support from the companies "Ukrtelecom" and "ATLAS"; the best students get financial incentives in the form of monthly stipends. Training activities related, in particular, to the use of the technological infrastructure of companies "Ukrtelecom", "Kyivstar", Kapsch Telecom, Bankomsvyaz, DataGroup, Alcatel, Security Service of Ukraine, AMPAK (USA), HUAWEI (China), LifeCell, Nokia, MTS, and others.

Intel Competence Center operates at the **ITS**, where everyone can practically study networking technologies and take a part in the scientific work on a competitive and contractual basis.

## 2. LEVELS OF HIGHER EDUCATION

Students are trained in **ITS** at three levels of higher education.

In the first (Bachelor's course, I-IV academic years) students acquire knowledge in physics, mathematics, mechanics, computing, informatics, and special disciplines. During the IV year, they prepare and defend a bachelor's thesis work and obtain a qualification degree Bachelor.

At the second level, (Master's course, I-II academic years) training is carried out according to the Master's program. Students are trained and acquire relevant skills including laboratory practice.

Third, educational and scientific level (graduate school, I-IV courses). Applicants prepare and defend dissertations, they are awarded the educational qualification of Doctor of Philosophy (PhD).

**Terms of training:** Bachelor (B) – 4 years; Master (educational-professional program) – 1.5 academic years, Master (educational-scientific program) – 2 academic years, PhD – 4 academic years.



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### 3. STRUCTURE

Institute of Telecommunication Systems consists of:

1. Department of Information and Communication Technologies and Systems;

2. Department of Telecommunications, as well as

- Educational and Research Center for Advanced Training in Telecommunications and Information Systems;
- Research Center for Digital Communications;
- Educational and Research Laboratory of the Internet of Things (IoT);

1. Department of Information and Communication Technologies and Systems provides training under the following Educational Programs (EP):

Specialty	Name of the EP	Levels of higher education		
		First	Second	Third
172 Telecommunications and Radio Engineering	Engineering of Innovative Information and Telecommunication Technologies and Systems	–	Master ESP	–
	Information and Communication Technologies	Bachelor EPP	Master EPP	–
			Master ESP	
	Telecommunication Systems and Networks	Bachelor EPP	–	–
	Electronic Communication Systems and Networks	–	Master EPP	
			Master ESP	
Systems of Electronic Communications and the Internet of Things	Bachelor EPP	Master EPP		
Telecommunications and Radio Engineering	–	–	PhD	

Comment: EPP – Educational-Professional Program  
ESP – Educational-Scientific Program



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The department trains specialists in the field of creating and supporting services provided to users in the digital global environment. Graduates have the knowledge, skills, and abilities that allow them to analyze and implement information and communication technologies, develop software for access and exchange of information, access to cloud resources, monitor, conduct modeling, systems analysis, operations research, and information protection in information and communication environment.



Students obtain fundamental theoretical and applied practical training directed at

- mastery of graduates' specialized knowledge in the design of heterogeneous hardware and software platforms, which provide the modern Internet services at any time and in any place;
- design "cloud" (software-defined) data centers combined with modern 3G, 4G, and 5G communication networks;
- creation and use of new technologies IoT (Internet of Things), as well as the construction of information and communication systems based on them;
- design of hardware and software platforms, data processing units, and intellectual means of their interaction;
- creation of energy-efficient intelligent protocols and means of parallel, collective processing of large amounts of information in the nodes of data centers, and the use of "cloud resources and services."

Over the years, the department has trained hundreds of young general engineers who today work as IT specialists in leading companies in the world and Ukraine (Microsoft, Epam Systems, Ericsson, Lifecell, Vodafone, Incom, etc.).



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**2. Department of Telecommunications** provides training under the following Educational Programs:

Specialty	Educational Program	Levels of higher education		
		First	Second	Third
<b>172</b> Telecommunications and Radio Engineering	Engineering and Programming Infocommunications	Bachelor EPP	Master EPP	-
			Master ESP	
	Engineering of Innovative Information and Telecommunication Technologies and Systems	-	Master ESP	-
	Telecommunications and Radio Engineering	-	-	PhD

Comment: EPP – Educational-Professional Program  
ESP – Educational-Scientific Program

The department occupies the highest positions in the ranking of the university, in particular, according to the ratings of scientific and pedagogical workers, scientific and innovative activities, the index of creative achievements of students, and the activity of international relations.



Graduates of the department acquire skills in building next-generation networks (multiservice networks) that deliver a complete set of modern and advanced services with the flexibility of their management, the creation of a universal multi-protocol transport network with distributed switching based on Soft Switch, and access networks providing connection of terminal user devices and integration with traditional networks.

Graduates acquire skills in the design of various devices: multichannel transceivers simultaneously operating in an environment with many services and technologies; software-specific means of telecommunications; development of software for the electronic communications device following modern requirements to use navigation, the synthesis/analysis of specific signals, special methods of data processing; software development for embedded systems of telecommunications; the development of "smart pervasive networks" hardware and software.



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Collaboration with leading companies-developers of specialized software, such as Microsoft, Ericsson, EPAM, Huawei, and Nokia Corporation, as well as telecom operators and Internet service providers will prepare the graduates for future work.

**ITS graduates are capable** of designing a network for transferring huge information flows at high speed, solving the routing of these flows, ensuring high-quality data transfer, controlling and synchronizing the communications network as a whole and each of its links, in particular, using the digital systems and intelligent computer technologies.

Within the framework of the European Master's Program in Distributed Systems Engineering, the Institute of Telecommunication Systems of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" and the Faculty of Informatics of the Technical University of Dresden (TUD) offer a united international program "Distributed Systems Engineering".



Students of Igor Sikorsky KPI have the opportunity to study for master's programs at Igor Sikorsky KPI joined with the master's program of TUD "Distributed Systems Engineering" for a second higher education. Formation and preparation of groups of students begin in the second year of their studies at Igor Sikorsky KPI based on the results of the first year of study.

**The Educational and Research Center for Advanced Training in Telecommunications and Information Systems** performs the following tasks:

- training, retraining, and advanced training of specialists in the field of telecommunications;
- providing the educational services under the programs of the second (next) higher telecommunication education;
- implementation of modern technologies in the process of design, construction, development, and organization of telecommunication networks and systems based on domestic and foreign experience.

**The Research Center for Digital Communications** performs the following tasks:

- ensuring the research and educational process under the education and science standards for students to obtain higher education that meets the current level of science and technology;
- providing practical training for applicants for higher education who study at ITS, through their training and internships at the Center;
- conducting research in the field of telecommunications.



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**The Educational and Research Laboratory of the Internet of Things (IoT)** provides training for higher education students and ensures their access to special Internet of Things (IoT) equipment.

The activities of the Laboratory include the use of samples of modern equipment to create and test their applications and sensors using IoT.

The Laboratory contributes to the training of specialists, advanced training of teachers of the institute, and introduces the latest equipment in the field of the Internet of Things in the training process.

## 4. TRAINING AND LABORATORY BASE

The following specialized laboratories operate in the **Department of Telecommunications**:

- LIFECCELL mobile network operator's lab, supported by ERICSSON;
- Laboratory of relay and satellite systems
- Laboratory for satellite and telecommunications technologies;
- Laboratory of computer telecommunication systems;
- Laboratory of microwave devices of telecommunication systems;
- Laboratory of telecommunication radio systems;
- Network technology lab;
- Laboratory for Broadband Wireless Access Equipment.
- Laboratory of television systems and satellite television;
- Laboratory of over-the-horizon communication and systems based on air platforms;
- Laboratory for the propagation of radio waves and antennas.

**To conduct training sessions the departments use common premises of the Igor Sikorsky KPI, as well as classrooms and laboratories of the ITS**

**The Department of Information and Communication Technologies and Systems** has the following specialized laboratories:

- Laboratory of Telecommunication Software;
- Laboratory of Information and Telecommunication Networks;
- Laboratory for Studies of Parameters and Characteristics of Electronic Devices and Components;
- Laboratory of Microcellular Communication.



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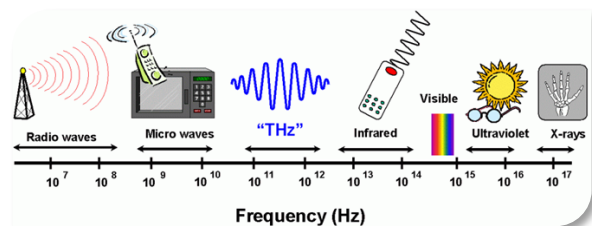
## 5. RESEARCH ACTIVITY

### *Main directions of scientific activity of the Institute:*

- Telecommunication support the most important national programs for development of information system, science, education, and the economy of Ukraine;
- Development and justification of proposals and recommendations on the selection of the most promising for Ukraine conditions of telecommunication complexes, systems, and technologies, and their implementation to address the information society objectives, including information processes management tools, terminal equipment to work with heterogeneous information flow in terms of integration of different services: multimedia, Internet, etc.;
- Development of critical and cost-effective telecommunication technologies capable of ensuring the competitiveness of domestic equipment in the domestic and foreign markets, including the development of a scientific and technical basis for the creation of new high-speed broadband wireless microwave systems and distributive radio systems based on them;
- Creation of scientific fundamentals of building a new class of solid-state devices, resonators, and filters, as well as monolithic integrated planar frequency-selective structures;
- Creation of conditions for the introduction of progressive forms of education and training, including distance-learning techniques.

### Department of Telecommunications

- Advanced communications systems;
- Modeling and optimization of systems and networks;
- Advanced telecommunication systems and technologies;
- Methods, mathematical models, algorithms of analysis and synthesis, structural and parametric adaptation;
- The building of advanced transport networks and their management;
- Space-time radio signal processing for radio telecommunication networks and systems of digital television;
- Exploration and use of the terahertz frequency range in the field of telecommunications;
- Sand distribution of precise time;



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- Harmonization and development of telecommunication standards and laws;
- Research on wireless information transfer technologies for building Internet of Things systems
- IEEE 802.11 wireless technology research for information transfer;
- Research of information capabilities of telecommunications channels in the promising wireless technologies;
- Study of multimedia traffic transmission technologies in communication networks of the next generation;
- Research and development of band-pass filters and antennas based on dielectric resonators.

### *Department of Information and Communication Technologies and Systems*

- Development of an interdisciplinary complex of distributed computing on the base of web services;
- The multi-agent system of information resources integration and processing in a distributed information and telecommunications environment;
- Management of resources and services in a heterogeneous environment of information and telecommunications;
- The adaptive technology of information processing in heterogeneous information and telecommunications environment;
- Software package for creation, integration, and reengineering of information and functional resources in the telecommunication environment;
- Creation of a virtual network of educational institutions based on modern telecommunication and information technologies;
- An information document management system based on a common model of the production environment;
- The building of methodologies, models, and approaches to create school information resources;
- Mathematical support and software for the design of earth station transmitters/ receivers of satellite communications in the millimeter range;
- Optimization of the structure and characteristics of systems and wireless broadband networks.
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## 6. INTERNATIONAL PROJECTS AND COLLABORATION

**ITS** carry out an international collaboration in the framework of partnership agreements, cooperation, and scientific exchange with:

- Technical University of Dresden (Germany);
- West Pomeranian University of Technology (Poland);
- Leipzig Institute of Telecommunications (Germany);
- Technical University of Chemnitz (Germany).

In previous years the **ITS** took part in the following projects:

- Project "Breeze" jointly with the 8th Research Institute of China (Shenzhen Shenyuan Compay LTD.) on the creation of fiber-optic gyroscopes.
- A project of SE Ukrkosmos jointly with the Canadian company MDA on the building of Ukrainian national satellite network "Lybid".

**ITS** established scientific contacts with the American company AMPAC. Scientists of the Research Institute of Telecommunications and company AMPAC carry out projects on the creation of the complex for the formation of hyperspectral images based on high-speed optoelectronics and advanced mathematical methods of digital signal processing.

## 7. CONTACT INFORMATION

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