

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



## INFORMATION PACKAGE

## INSTITUTE OF TELECOMMUNICATION SYSTEMS

**Kyiv, 2020**

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## CONTENT

1. COMMON DESCRIPTION AND THE STRUCTURE OF INSTITUTE.....	3
2. EDUCATIONAL PROGRAMS .....	5
3. TRAINING AND LABORATORY BASE .....	6
4. RESEARCH ACTIVITY .....	7
5. INTERNATIONAL PROJECTS AND COLLABORATION .....	9
6. CONTACT INFORMATION.....	10

**\*\*\* Information is current as for the 2020/2021 academic year. In the next academic year, there may be minor changes in the list of training specialties and educational programs/specializations.**



Foreign Economic Activity Office  
+380 44 204 83 81  
[forea@kpi.ua](mailto:forea@kpi.ua)  
<http://forea.kpi.ua/>

Institute of Telecommunication Systems  
+380 204 81 96  
+380 204-84-17  
[its@kpi.ua](mailto:its@kpi.ua)  
[its.kpi.ua](http://its.kpi.ua)



# 1. COMMON DESCRIPTION AND THE STRUCTURE OF INSTITUTE



The **Institute of Telecommunication Systems (ITS)** of the National Technical University of Ukraine "Kyiv Polytechnic Institute" was founded in 2002 on the base of the Telecommunication Department, which was organized 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 Radioengineering".

Educational and scientific work is carried out 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" created; the best students get financial incentives in the form of monthly stipends. Training activities related, in particular, with the use of the technological infrastructure of firms "Ukrtelecom", "Kyivstar", Kapsch Telecom, Bankomsvyaz, DataGroup, Alcatel, Security Service of Ukraine, AMPAK (USA), HUAWEI TECHNOLOGIES (China), LifeCell, Nokia, MTS, and others.

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

The structure of the scientific complex includes the Research Institute of Telecommunications.

## Structure

**The Institute consists of three departments, Centre for Postgraduate Education and Research Institute of Telecommunications**

**1. Department of Telecommunication** trains experts according to educational program "Engineering and programming of infocommunications".

Specialization is focused on mastering the methods of support for mobility in cellular radio systems, broadband systems, heterogeneous distributed telecommunication networks based on various technologies and architectures.



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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.

Fruitful cooperation of the department with the leading manufacturers of telecommunications equipment and developers of specialized software such as Alcatel-Lucent, Nokia Corporation, as well as operators of mobile communication Kyivstar, Life (Astelit), Vodafone (MTS) enables graduates to be fully adapted to the labor market.

**2. Department of Telecommunication Systems** trains professionals according to the educational program "Telecommunication Systems and Networks".



Graduates of 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.

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

**3. Department of Information and Telecommunication Networks** provides training in "Information and Communication Technologies." Specialization provides fundamental theoretical and applied practical training and is aimed at the mastery of graduates specialized knowledge on: 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



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(InternetofThinks), as well as the construction of information and communication systems based on them; the design of hardware and software platforms, data processing units, intellectual means of their interaction; the creation of energy-efficient intelligent protocols and means of parallel, collective processing of large amounts of information in the nodes of data centers, the use of "cloud resources and services."

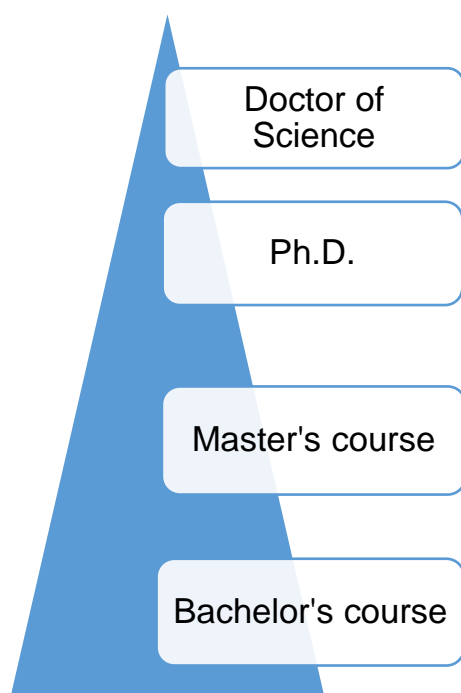
## 2. EDUCATIONAL PROGRAMS

**Levels of higher education.** Training of students at the IASA is carried out at several levels of higher education. The first (Bachelor's course, I-IV academic years) – the students acquire knowledge in physics, mathematics, mechanics, computing, informatics, and special disciplines. During the IV year, they 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. Additionally, students have the opportunity to continue their education in a graduate course, and then in a doctoral candidacy of the University.

**Terms of training:** Bachelor (b) – 4 years; Master (m) – 2 years (standard terms of training in Bachelor's course and Master's course), Graduate course / Doctoral candidacy lasts 3 years (4 years by the correspondence study).

### Specialties and Educational Programs/Specializations:



#### **Telecommunication and Radioengineering**

#### **Telecommunication and Radioengineering**

- Information and Communication Technologies
- Telecommunication Systems and Networks
- Information and Communication Technologies



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**ITS graduates are capable** of designing a network for transferring huge information flows at high speed, to solve the routing of these flows, to ensure high-quality data transfer, control and synchronize communications network as a whole and each of its links, in particular, use the digital systems and intelligent computer technologies.

### 3. TRAINING AND LABORATORY BASE

The following specialized laboratories operate at the **Department of Telecommunication**:

- LIFECCELL mobile network operator's lab, supported by ERICSSON;
- Laboratory of cellular mobile communication systems;
- 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.

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

**Department of Information and Telecommunication Networks** 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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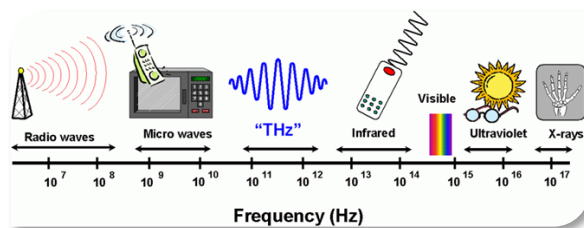
## 4. RESEARCH ACTIVITY

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

- Telecommunication support important national programs of information system development, 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;
- Harmonization and development of telecommunication standards and laws.



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## *Department of Telecommunication Systems*

- 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 Telecommunication Networks:*

- 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, approaches to creating 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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## 5. 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 and Russian JSC Academician M.F. Reshetnev INFORMATION SATELLITE SYSTEMS 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.



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[its@kpi.ua](mailto:its@kpi.ua)  
[its.kpi.ua](http://its.kpi.ua)



## 6. CONTACT INFORMATION

- 1. Scientific Advisor:** Prof., D-r of Tech. Sci., Academician of NASU,  
Mykhailo Yu. Ilchenko

*Phone:* +380 44 204 91 21

*e-mail:* [its@kpi.ua](mailto:its@kpi.ua)

*Official website:* [its.kpi.ua](http://its.kpi.ua)

- 2. Acting Director:** Ph.D., Assoc. Prof., Valery V. Pravilo

*Phone:* +380 44 204 81 96

*e-mail:* [its@kpi.ua](mailto:its@kpi.ua)

*Official website:* [its.kpi.ua](http://its.kpi.ua)

- 3. Department of Telecommunication**

*Acting Head of Department:* D-r of Tech. Sci., Prof., Sergii O. Kravchuk

*Phone:* +380 44 204 81 97

*Official website:* [its.kpi.ua/tk/](http://its.kpi.ua/tk/)

- 4. Department of Telecommunication Systems**

*Head of Department:* D-r of Tech. Sci. Prof., Leonid O. Urivskyi

*Phone:* +380 44 204 98 10

*Official website:* [its.kpi.ua/ts/](http://its.kpi.ua/ts/)

- 5. Department of Information and Telecommunication Networks**

*Head of Department:* D-r of Tech. Sci., Prof., Larisa S. Globa

*Phones:* +380 44 204 98 91, 204 82 99

*Official website:* [its.kpi.ua/itm/](http://its.kpi.ua/itm/)



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[forea@kpi.ua](mailto:forea@kpi.ua)

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