GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	VoIP Technology, PG_00048357						
Field of study	Electronics and Telecommunications						
Date of commencement of studies	February 2026		Academic year of realisation of subject	2026/2027			
Education level	second-cycle studies		Subject group	Optional subject group Specialty subject group Subject group related to scientific research in the field of study			
Mode of study	Full-time studies		Mode of delivery	at the university			
Year of study	1		Language of instruction	Polish			
Semester of study	2		ECTS credits	2.0			
Learning profile	general academic profile		Assessment form	exam			
Conducting unit	Department Of Teleinformation Networks -> Faculty Of Electronics Telecommunications And Informatics -> Wydziały Politechniki Gdańskiej						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Sylwester Kaczmarek					
	Teachers	dr hab. inż. Sylwester Kaczmarek					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours	Self-study		SUM
	Number of study hours	30		4.0	16.0		50
Subject objectives	Transfer of knowledge on solutions used in the implementation of telecommunications services based on the IP protocol and network; discussion of the principles of configuring and installing functional elements of the network implemented in VoIP technology.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U08] while identifying and formulating engineering tasks specifications and solving these tasks, can: - apply analytical, simulation and experimental methods, - notice their systemic and non-technical aspects, - make a preliminary economic assessment of suggested solutions and engineering work	The student has an ability of determining parameters of configuration functional elements of technology and practically is configuring them and is verifying.	[SU1] Assessment of task fulfilment
[K7_U09] can carry out a critical analysis of the functioning of existing technical solutions and assess these solutions, as well as apply experience related to the maintenance of advanced technical systems, devices and facilities typical for the field of studies, gained in the professional engineering environment	The student has an ability of determining the functionality and principles of cooperation of different solutions of elements on the level of the network and services.	[SU1] Assessment of task fulfilment
[K7_W03] knows and understands, to an increased extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum	The student is describing practically applied solutions of architectures of telecommunications systems being based on a technology of the Internet, delivering also a service of the speech.	[SW1] Assessment of factual knowledge
[K7_K02] is ready to provide critical evaluation of received content and to acknowledge the importance of knowledge in solving cognitive and practical problems	The student is able to assess the usefulness of proposed solutions in the development of the information technology.	[SK5] Assessment of ability to solve problems that arise in practice

Subject contents

LECTURE: VoIP technology based on IMS. Model for the IMS/NGN network service layer. Scenarios and handlers. CSD and CDD performance parameters defined by ITU-T. Model of the service system for the control layer. Model of the service system for the transport layer with MPLS technology. A model of the resource management service system. Analysis results. Development of media gateway software with SIP protocol. The logical structure of the software. Construction of the SIPPhone application. SIP-T. Q-SIP architecture. ATK based VoIP terminal with H.323. AAA system. Examples of VoIP system solutions: Asterisk, Kamailio, FreeSWITCH, Yate. Selected solutions for the implementation of services in VoIP systems based on application servers. CSTA standard. Standard Parlay/OSA. Third Party Call Control Services. Concept and implementation of 3PCC. Practical implementation of a media and signalling gate. Network construction and configuration for the DiffServ domain under Debian Linux. Tools in the Linux environment for generation of packet streams and QoS measurements.

LAB: Getting acquainted with one of the practical solutions of the VoIP terminal. Configuring parameters and uploading software to the ATK subscriber gateway. Monitoring the execution of calls. Observation of the exchange of signalling messages between elements of the IP network for various configurations of their cooperation. Getting acquainted with the parameters, configuration and operation of the edge and core routers of the DiffServ domain. Familiarization with the AAA system - authentication, authorization, accounting. Configuration of devices used in the VoIP network with the SIP protocol, such as software terminal, hardware terminal and network elements acting as signalling and media gateways. Getting acquainted with the configuration and operation of the SIP server - OpenSIPS. Familiarization with the exchange of signalling messages between networks with different technologies and protocols and their detailed analysis. Familiarization with the IVR (Interactive Voice Response) service enabling automatic and interactive subscriber service based on the Asterisk server.

Prerequisites and co-requisites

No requirements

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written exam	50.0%	60.0%
Practical exercise	50.0%	40.0%

Recommended reading

Basic literature	Materials prepared by the lecturer available in electronic form in PDF files and in the form of a photocopy (on request).
Supplementary literature	No requirements.
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed

Work placement

Not applicable

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