GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	NGN Systems and Architectures, PG_00048114		
Field of study	Electronics and Telecommunications		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2027/2028
Education level	first-cycle studies	Subject group	Optional 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	3	Language of instruction	Polish
Semester of study	5	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
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	30.0	0.0	0.0	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	2.0	18.0	50

Subject objectives

Obtain knowledge about next-generation network systems and architectures, including next-generation internet in the context of real-time services.

Learning outcomes

Course outcome	Subject outcome	Method of verification

Subject contents

Evolution of services, technologies and networks - integration or convergence. Convergence planes. Broadband networks with guaranteed quality of service. Succession of technologies and architectures: STM, ATM, IP QoS. ATM technology as an attempt to integrate services and networks. Mechanisms used in ATM to guarantee service quality. Advantages and limitations of ATM technology. Changes in the nature of traffic and services and the choice of the target service platform. Traffic source types. Features of IP technology from the point of view of the target service platform. QoS guarantee problem in IP. The use of ATM mechanisms in IP QoS. IntServ and DiffServ architectures for implementing IP QoS. IntServ concept - advantages and disadvantages. RSVP signalling protocol for implementing IntServ. Connection execution process. DiffServ concept - service classes. Functional model of the edge node. Functional model of the core node. Aggregate stream connection requests support. AC and Broadband Broker function. Guarantee of service quality in a multi-domain IP QoS network. The problem of realizing switching functions and traffic engineering. MPLS technology is the answer to these problems. Functional elements in MPLS and creation of LSP paths. Functional models of the input-output node and inside the MPLS domain. GMPLS - generalized MPLS across technologies. Implementation of the "speech" service in the IP QoS network - VoIP. VoIP call control - Softswitch concept. Technology convergence - gateway concept. Protocols and functionality of the MGW media gateway. MGS signalling gateway protocols and functionality. SIP architecture. NGN architecture as a response to the convergence of technologies, services and networks. Functionalities of layers: transfer (media), connection control servers, service control servers, applications. Example of implementation of the NGN system. SDN software defined networks according to ITU-T and IETF. NFV - virtualization of network functions. Directions of next generation network evolution.

Prerequisites and co-requisites

No requirements

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Midterm tests	50.0%	100.0%

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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