



## Subject card

Subject name and code	NGN Systems and Architectures, PG_00048114						
Field of study	Electronics and Telecommunications						
Date of commencement of studies	October 2021		Academic year of realisation of subject		2023/2024		
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						
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		
	[K6_U31] can identify telecommunications network architectures, differentiates their areas and functional elements, evaluates the quality of service delivery, calculates parameters of functional elements		Student determines correct solutions of systems and architectures fulfilling qualitative and service needs formulated by users.		[SU2] Assessment of ability to analyse information		
	[K6_W35] Knows the concepts of the technique of signal transmission, operation of telecommunications networks and multimedia services and the rules for providing them		Student describes conceptions and realizations of architectures for the next generation networks being based on the packet switching and the Internet. Student propose mechanisms and architectures those assure realization of the differentiated qualities of network services.		[SW1] Assessment of factual knowledge		

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 eNaukanie: Systemy i architektury NGN I - 2023 - Moodle ID: 31568 <a href="https://enauczenie.pg.edu.pl/moodle/course/view.php?id=31568">https://enauczenie.pg.edu.pl/moodle/course/view.php?id=31568</a>	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		