

TABLE OF CONTENTS

Chapter 1: Introduction to Edge AI and Next-Generation Wireless Systems	1-35
1.1 Evolution of Wireless Communication Networks	
1.2 Fundamentals of Edge AI	
1.3 Artificial Intelligence in Wireless Communications	
1.4 Edge Intelligence Architecture	
1.5 AI-Native Network Concepts	
1.6 Applications of Edge AI	
Chapter 2: Fundamentals of Artificial Intelligence and Machine Learning	36-71
2.1 Introduction to Artificial Intelligence	
2.2 Machine Learning Fundamentals	
2.3 Deep Learning Architectures	
2.4 Reinforcement Learning	
2.5 Neural Networks for Wireless Systems	
2.6 Model Training and Optimization	
Chapter 3: Fundamentals of Wireless Communication Systems	72-97
3.1 Evolution from 1G to 6G	
3.2 Wireless Communication Architecture	
3.3 Radio Wave Propagation	
3.4 Multiple Access Techniques	
3.5 OFDM and OFDMA Technologies	
3.6 MIMO and Massive MIMO Systems	
Chapter 4: Edge Computing Architecture and Multi-Access Edge Computing (MEC)	98-118
4.1 Fundamentals of Edge Computing	
4.2 Cloud Computing vs. Edge Computing	
4.3 Multi-Access Edge Computing (MEC)	
4.4 Edge Infrastructure Components	
4.5 Virtualization Technologies	
4.6 Containerization and Kubernetes	

Chapter 5: AI-Driven Resource Management in Wireless Networks	119-141
5.1 Radio Resource Management	
5.2 Dynamic Spectrum Allocation	
5.3 Intelligent Scheduling Algorithms	
5.4 Network Slicing Fundamentals	
5.5 Quality of Service (QoS) Optimization	
5.6 Energy-Efficient Wireless Networks	
 Chapter 6: Edge Intelligence for 5G and 6G Networks	 142-174
6.1 5G Network Architecture	
6.2 AI-Enabled Radio Access Networks (AI-RAN)	
6.3 Intelligent Mobility Management	
6.4 AI-Based Handover Optimization	
6.5 Ultra-Reliable Low-Latency Communication (URLLC)	
6.6 Semantic Communications	
 Chapter 7: Distributed Intelligence and Federated Learning	 175-214
7.1 Distributed Machine Learning	
7.2 Fundamentals of Federated Learning	
7.3 Federated Learning Architectures	
7.4 Edge Model Training	
7.5 Privacy-Preserving Machine Learning	
7.6 Model Aggregation Techniques	
 Chapter 8: Internet of Things (IoT) and Edge AI Integration	 215-252
8.1 Fundamentals of IoT	
8.2 Smart Sensors and Edge Devices	
8.3 IoT Communication Protocols	
8.4 Edge Gateways and Data Processing	
8.5 AI-Enabled IoT Systems	
8.6 Industrial Internet of Things (IIoT)	
 Chapter 9: Security, Privacy and Trust in Edge AI Networks	 253-293
9.1 Security Challenges in Edge Networks	
9.2 Wireless Network Security	
9.3 AI-Based Intrusion Detection Systems	
9.4 Authentication and Access Control	
9.5 Privacy-Preserving AI Techniques	
9.6 Blockchain for Edge Networks	

Chapter 10: Intelligent Network Automation and Digital Twin Networks

294-337

- 10.1 Software-Defined Networking (SDN)
- 10.2 Network Function Virtualization (NFV)
- 10.3 Self-Organizing Networks (SON)
- 10.4 Intent-Based Networking
- 10.5 AI-Driven Network Automation
- 10.6 Predictive Maintenance Using AI