1. Record Nr. UNINA9910983359903321

Autore	Afzal Muhammad Khalil
Titolo	Digital Twins for Wireless Networks : Overview, Architecture, and Challenges / / edited by Muhammad Khalil Afzal, Muhammad Naeem, Waleed Ejaz
Pubbl/distr/stampa	Cham : , : Springer Nature Switzerland : , : Imprint : Springer, , 2025
ISBN	9783031736797 3031736796
Edizione	[1st ed. 2025.]
Descrizione fisica	1 online resource (175 pages)
Altri autori (Persone)	NaeemMuhammad EjazWaleed
Disciplina	004.6
Soggetti	Computer networks Wireless communication systems Mobile communication systems Internet of things Computer Communication Networks Wireless and Mobile Communication Internet of Things
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Chapter 1 Overview of Digital Twin, Architecture, and Applications -- Chapter 2 Dielectric and Path Loss Modeling to Support Simple and Fast Digital Twins for Wireless Human Body Area Network -- Chapter 3 ML for Digital Twin over Wireless Networks: Creation, Deployment, and Applications -- Chapter 4 Optimal Offloading in Digital Twin-assisted Multi-Stage Networks -- Chapter 5 Employing Federated Learning for the Implication of Digital Twin -- Chapter 6 Security Attacks in Digital Twin-Enabled Wireless System -- Chapter 7 Metaverse Enabled UAV in Disaster Scenario -- Chapter 8 Digital Twin for UAVs: Architecture, Framework, Challenges and Solutions.
Sommario/riassunto	The sixth-generation (6G) communication systems are anticipated to provide network connectivity for an extensive range of use cases in a variety of emerging vertical industries. Consequently, a new set of

challenging requirements and more stringent key performance indicators have to be considered, a novel architecture has to be designed, and unique enabling technologies shall be developed in order to fulfil the technical, regulatory, and business demands of the communication service customers. 6G networks are expected to offer even faster speeds, lower latency, and greater capacity compared to 5G networks, which will enable new applications and use cases that are currently not possible. Improved quality of life by enabling various applications (emerging Internet of everything applications) such as healthcare, brain-computer interactions, and extended reality is the main focus of future wireless services. Quality of experience, latency, and reliability are the key requirements of these applications. To meet these diverse requirements there is a need to assist wireless systems with unique technologies. Self-sustaining wireless systems (intelligence, seamless and ubiquitous connectivity) and proactive-online-learning-enables systems (Intelligent analytics) are two trends in future wireless systems. The digital twin technology is one of the most promising technologies that can be instrumental in realizing the technical and business objectives of 6G communication systems. A digital twin is a virtual imitation of a physical object or system. In a wireless system, a digital twin can be used to model and analyse the behaviour of the network and its components, such as antennas, transmitters, receivers, sensors, and other devices in wireless networks. One of the key benefits of using a digital twin for a wireless system is that it can help network operators and engineers to optimize the performance of the wireless network by simulating different scenarios and configurations. Other benefits include improve efficiency, cost saving, and enhanced security. In 6G networks, a digital twin could be used to simulate and optimize the performance. This could include simulating different network topologies, testing the performance of different network protocols and algorithms, and optimizing the placement of network infrastructure. To create a digital twin of a wireless network, a detailed model of the network and its components must be developed, based on real-world data and conditions. This model can then be used to simulate the behaviour of the network under different conditions and settings and to visualize the results in real time.