# [5g Core Network Diagram](#)

## 5G Core Network Diagram: A Deep Dive into the Architecture of Next-Generation Connectivity

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Summary: This report provides a comprehensive overview of the 5G core network diagram, detailing its architecture, key components, functionalities, and benefits compared to previous generations. We examine the evolution from 4G EPC (Evolved Packet Core) to the 5G Core, emphasizing the network slicing capabilities, improved security features, and support for diverse use cases. The report analyzes the role of key network functions, including the User Plane Function (UPF), Session Management Function (SMF), Access and Mobility Management Function (AMF), and the impact of network virtualization and cloud-native technologies on the 5G core network diagram's efficiency and scalability. We also delve into the challenges and future trends shaping the 5G core network's evolution.

Keywords: 5G core network diagram, 5G core network architecture, 5G network functions, network slicing, 5G security, cloud-native 5G core, network virtualization, UPF, SMF, AMF, 5G evolution.

## 1. Introduction to the 5G Core Network Diagram

The 5G core network is a significant departure from its predecessors. Unlike the 4G EPC, which was primarily a circuit-switched network, the 5G core is a service-based architecture, designed for flexibility, scalability, and adaptability to diverse use cases. Understanding the 5G core network diagram is crucial for grasping the technological advancements that underpin 5G's capabilities. The diagram illustrates a service-based architecture where network functions are decoupled and interconnected via standardized interfaces. This allows for flexibility in deploying and managing network resources.

## 2. Key Components of the 5G Core Network Diagram

A comprehensive 5G core network diagram showcases several key network functions (NFs):

User Plane Function (UPF): Handles the actual user data, performing functions like Quality of Service (QoS) management and packet forwarding. Its location is crucial for latency optimization.

Session Management Function (SMF): Responsible for managing user sessions, including session establishment, modification, and termination. It plays a crucial role in network slicing and policy control.

Access and Mobility Management Function (AMF): Manages user registration, authentication, and mobility management. This function is critical for seamless handover between different cells and network access technologies.

Network Repository Function (NRF): A central registry that stores information about the availability and location of different network functions. This is vital for dynamic service orchestration.

Authentication Server Function (AUSF): Handles user authentication and security procedures, ensuring secure access to the network.

Policy Control Function (PCF): Defines and enforces policies related to user access, QoS, and security. This is crucial for controlling network resources and ensuring compliance with regulations.

UDM (Unified Data Management): Stores subscriber data and user profiles, essential for personalized services and network security.

These functions, depicted in the 5G core network diagram, work in conjunction to provide seamless connectivity and support a wide range of applications. The relationships between these NFs, as shown in the 5G core network diagram, are crucial for understanding the overall functionality.

## 3. Network Slicing and its Representation in the 5G Core Network Diagram

One of the most significant advantages of the 5G core network is its ability to support network slicing. A 5G core network diagram illustrating network slicing would show multiple virtualized instances of the core network functions, each tailored to a specific application or service. For instance, a slice optimized for autonomous vehicles would prioritize low latency and high reliability, while a slice for IoT devices might prioritize massive connectivity and low power consumption. The 5G core network diagram, therefore, becomes more complex but also more illustrative of its flexibility and efficiency.

Research by Ericsson (2022) indicates that network slicing can improve network efficiency by up to 40% and reduce latency by up to 50% depending on the specific application. This efficiency is clearly illustrated in a detailed 5G core network diagram showing the separation of slices.

# 4. Security in the 5G Core Network Diagram

Security is a paramount concern in 5G, and this is reflected in the architecture depicted by the 5G core network diagram. Several key functions, such as the AUSF and PCF, contribute to a robust security posture. End-to-end encryption, robust authentication protocols, and advanced threat detection mechanisms are incorporated to protect user data and network integrity. Studies by GSMA Intelligence (2023) highlight the importance of integrated security across the entire 5G architecture, which is visually emphasized in a comprehensive 5G core network diagram.

# 5. Cloud-Native Architecture and its Impact on the 5G Core Network Diagram

The 5G core is increasingly adopting a cloud-native architecture, which simplifies deployment, improves scalability, and enhances operational efficiency. The 5G core network diagram for a cloud-native deployment would highlight the virtualization of NFs and their deployment across cloud infrastructure. This approach enables dynamic resource allocation, optimized cost management, and improved resilience. Research by the Open Networking Foundation (ONF, 2023) demonstrates that cloud-native architectures can significantly reduce operational expenses and improve service agility.

# 6. Evolution and Future Trends

The 5G core network is a constantly evolving technology. Future developments will likely focus on further virtualization, automation, and integration with other technologies like edge computing and AI. The 5G core network diagram will continue to evolve, reflecting these advancements and new network functions. A future 5G core network diagram might include functions related to AI-driven network optimization and advanced analytics.

# Conclusion

The 5G core network diagram is a critical tool for understanding the architecture and functionality of the next-generation cellular network. Its service-based architecture, supported by advanced network functions and virtualization, enables a level of flexibility and scalability unmatched by previous generations. While challenges remain, particularly around security and interoperability, the continuous evolution of the 5G core network promises to deliver unprecedented connectivity capabilities and transform various industries. The 5G core network diagram, therefore, serves not only as a visual representation but also as a roadmap for future advancements in telecommunications.

# FAQs

1. What is the difference between the 4G EPC and the 5G Core? The 4G EPC is a circuit-switched architecture, while the 5G core is a service-based architecture, offering greater flexibility and scalability.

2. What is network slicing, and how does it impact the 5G core network diagram? Network slicing allows for the creation of multiple virtualized networks within a single physical infrastructure, each tailored to specific applications. A 5G core network diagram illustrating network slicing shows multiple instances of network functions.

3. What are the key security features of the 5G core network? The 5G core incorporates end-to-end encryption, robust authentication protocols, and advanced threat detection mechanisms.

4. What is the role of the UPF in the 5G core network? The UPF handles user data, performing QoS management and packet forwarding.

5. How does cloud-native architecture impact the 5G core network diagram? Cloud-native architecture virtualizes network functions and deploys them across cloud infrastructure, enabling dynamic resource allocation and improved efficiency.

6. What are the future trends in 5G core network evolution? Future trends include further virtualization, automation, integration with edge computing and AI, and advancements in network slicing techniques.

7. What are the benefits of using a 5G core network diagram? A 5G core network diagram provides a visual understanding of the network architecture, facilitating planning, troubleshooting, and optimization.

8. How does the 5G core network diagram differ from a 4G EPC diagram? The 5G core network diagram showcases a service-based architecture with decoupled network functions, unlike the monolithic structure of the 4G EPC diagram.

9. Where can I find more information on 5G core network diagrams and related topics? You can find additional information from industry publications, research papers, vendor documentation, and online resources like the 3GPP website.

## Related Articles

1. "Understanding the 5G Core Network's Service-Based Architecture": This article delves deep into the architectural principles of the 5G core, explaining the transition from a packet-switched to a service-based approach.

2. "Network Slicing in 5G: A Practical Guide": This article provides a practical overview of network slicing, its implementation, and its impact on various industries.

3. "Securing the 5G Core Network: Addressing Key Vulnerabilities": This article focuses on the security challenges and solutions for the 5G core, covering encryption, authentication, and threat detection.

4. "The Role of Cloud-Native Technologies in the 5G Core Network": This article explores the benefits and challenges of deploying cloud-native technologies in the 5G core.

5. "5G Core Network Performance Optimization: Techniques and Strategies": This article presents various strategies and techniques for optimizing the performance of the 5G core network.

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8. "The Impact of AI and Machine Learning on 5G Core Network Management": This article explores the use of AI and machine learning in optimizing and managing 5G core networks.

9. "Future Trends in 5G Core Network Technology: A Look Ahead": This article examines the future trends and advancements expected in 5G core network technology.

**5g core network diagram: 5G Radio Access Network Architecture** Sasha Sirotkin, 2020-11-25 Discover how the NG-RAN architecture is, and isn't, ready for the challenges introduced by 5G 5G Radio Access Network Architecture: The Dark Side of 5G explores foundational and advanced topics in Radio Access Network (RAN) architecture and why a re-thinking of that architecture is necessary to support new 5G requirements. The distinguished engineer and editor Sasha Sirotkin has included numerous works written by industry insiders with state of the art research at their disposal. The book explains the relevant standards and technologies from an academic perspective, but also explains why particular standards decisions were made and how a variety of NG-RAN architecture options could be deployed in real-life networks. All major standards and technologies associated with the NG-RAN architecture are discussed in this book, including 3GPP, O-RAN, Small Cell Forum, IEEE, and IETF. Readers will learn about how a re-design of the RAN architecture would ensure that 5G networks can deliver their promised throughput and low latency KPIs consistently and sustainably. The book is structured as follows: An overview of the market drivers of the NG-RAN architecture, like spectrum models, 5G-relevant regulatory considerations, and 5G radio interface technical requirements An overview of the 5G System, from the core network, to the RAN, to the radio interface protocols and physical layer, with emphasis on how these are different compared to 4G Release-15 RAN architectures defined in 3GPP, O-RAN, and Small Cell Forum RAN architecture evolution in Release-16 and Release-17 Enabling technologies, like virtualization, open source technologies, multi-access edge (MEC) computing, and operations, administration, and management (OAM) NG-RAN deployment considerations, objectives, and challenges, like costs, spectrum and radio propagation considerations, and coverage Perfect for network designers and operators who require a solid understanding of the NG-RAN architecture, 5G Radio Access Network Architecture also belongs on the bookshelves of network engineers who aim to increase their understanding of the standards and technologies relevant to the NG-RAN architecture.

**5g core network diagram: 5G Core Networks** Stefan Rommer, Peter Hedman, Magnus Olsson, Lars Frid, Shabnam Sultana, Catherine Mulligan, 2019-11-14 5G Core Networks: Powering Digitalization provides an overview of the 5G Core network architecture, as well as giving

descriptions of cloud technologies and the key concepts in the 3GPP rel-15/16 specifications. Written by the authors who are heavily involved in development of the 5G standards and who wrote the successful book on EPC and 4G Packet Networks, this book provides an authoritative reference on the technologies and standards of the 3GPP 5G Core network. Content includes: - An overview of the 5G Core Architecture - The Stand-Alone and Non-Stand-Alone Architectures - Detailed presentation of 5G Core key concepts - An overview of 5G Radio and Cloud technologies Learn - The differences between the 5G Core network and previous core network generations - How the interworking with previous network standards is defined - Why certain functionality has been included and what is beyond the scope of 5G Core - How the specifications relate to state-of-the-art web-scale concepts and virtualization technologies - Details of the protocol and service descriptions - Examples of network deployment options - Provides a clear, concise and comprehensive view of 5GS/5GC - Written by established experts in the 5GS/5GC standardization process, all of whom have extensive experience and understanding of its goals, history and vision - Covers potential service and operator scenarios for each architecture - Explains the Service Based Architecture, Network Slicing and support of Edge Computing, describing the benefits they will bring - Explains what options and parts of the standards will initially be deployed in real networks, along with their migration paths

**5g core network diagram:** *From LTE to LTE-Advanced Pro and 5G* Moe Rahnema, Marcin Dryjanski, 2017 This practical hands-on new resource presents LTE technologies from end-to-end, including network planning and the optimization tradeoff process. This book examines the features of LTE-Advanced and LTE-Advanced Pro and how they integrate into existing LTE networks. Professionals find in-depth coverage of how the air interface is structured at the physical layer and how the related link level protocols are designed and work. This resource highlights potential 5G solutions as considered in releases 14 and beyond, the migration paths, and the challenges involved with the latest updates and standardization process.Moreover, the book covers performance analysis and results, as well as SON specifications and realization. Readers learn about OFDMA, and how DFT is used to implement it. Link budgeting, parameter estimations, and network planning and sizing is explained. Insight into core network architecture is provided, including the protocols and signaling used for both data and voice services. The book also presents a detailed chapter on the end-to-end data transfer optimization mechanisms based on the TCP protocol. This book provides the tools needed for network planning and optimization while addressing the challenges of LTE and LTE-advanced networks.

**5g core network diagram:** *Fundamentals of 5G Mobile Networks* Jonathan Rodriguez, 2015-06-22 Fundamentals of 5G Mobile Networks provides an overview of the key features of the 5th Generation (5G) mobile networks, discussing the motivation for 5G and the main challenges in developing this new technology. This book provides an insight into the key areas of research that will define this new system technology paving the path towards future research and development. The book is multi-disciplinary in nature, and aims to cover a whole host of intertwined subjects that will predominantly influence the 5G landscape, including the future Internet, cloud computing, small cells and self-organizing networks (SONs), cooperative communications, dynamic spectrum management and cognitive radio, Broadcast-Broadband convergence , 5G security challenge, and green RF. This book aims to be the first of its kind towards painting a holistic perspective on 5G Mobile, allowing 5G stakeholders to capture key technology trends on different layering domains and to identify potential inter-disciplinary design aspects that need to be solved in order to deliver a 5G Mobile system that operates seamlessly.

**5g core network diagram:** *An Introduction to 5G* Christopher Cox, 2020-12-14 A comprehensive and approachable introduction to 5G Written by a noted expert on the subject, An Introduction to 5G: The New Radio, 5G Network and Beyond offers an introductory system-level guide to 5G. The material covered includes: The use cases and requirements of the 5G system The architecture of the next generation radio access network and the 5G core The principles of radio transmission, millimetre waves and MIMO antennas The architecture and detailed design of the 5G new radio The implementation of HTTP/2 on the service-based interfaces of the 5G core The

signalling procedures that govern the end-to-end-operation of the system The new features that are introduced in Releases 16 and 17 An Introduction to 5G is written for engineering professionals in mobile telecommunications, for those in non-technical roles such as management, marketing and intellectual property, and for students. It requires no more than a basic understanding of mobile communications, and includes detailed references to the underlying 3GPP specifications for 5G. The book's approach provides a comprehensive, end-to-end overview of the 5G standard, which enables readers to move on with confidence to the more specialized texts and to the specifications themselves.

**5g core network diagram:** *Fundamentals of 5G Communications: Connectivity for Enhanced Mobile Broadband and Beyond* Wanshi Chen, Peter Gaal, Juan Montojo, Haris Zisimopoulos, 2021-07-23 Explore the foundations and applications of 5G technology This comprehensive guide contains practical information from telecommunications experts working at the forefront of 5G innovation. The authors discuss the foundations of 5G technology—not just the new standards, but the reasons and stories behind them. Fundamentals of 5G Communications features coverage of all major vertical domains with a focus on practical, commercial applications. This book serves both as an essential reference for telecom professionals and as a textbook for students learning about 5G. Coverage includes: 5G versus 4G: What's new? Deployment scenarios and architecture options The evolution of 5G architecture Numerology and slot structure Initial access and mobility Downlink control and data operation Uplink control and data operation Coexistence of 4G and 5G 5G in unlicensed and shared spectra Vertical expansion: URLLC, MTC, V2X Vertical expansion: broadcast and multicast Typical 5G commercial deployments A look toward the future of 5G

**5g core network diagram:** *Moving Broadband Mobile Communications Forward* Abdelfatteh Haidine, 2021-08-18 The deployment of 4G/LTE (Long-Term Evolution) mobile networks has solved the major challenge of high capacities to build a real broadband mobile internet. This was possible mainly through a very strong physical layer and flexible network architecture. However, bandwidth-hungry services such as virtual reality (VR) and augmented reality (AR), have been developed in an unprecedented way. Furthermore, mobile networks are facing other new services with extreme demand for greater reliability and almost zero-latency performance, like vehicle communications and the Internet of Vehicles (IoV). Therefore, industries and researchers are investigating new physical layers and softwarization techniques and including more intelligence in 5G and beyond 5G (B5G/6G). This book discusses some of these softwarization techniques, such as fog computing, cloud computing, and artificial intelligence (AI) and machine learning (ML). It also presents use cases showing practical aspects from 5G deployment scenarios, where other communications technologies will co-habit to build the landscape of next-generation mobile networks (NGMNs).

**5g core network diagram:** *5G Radio Access Network Architecture* Sasha Sirotkin, 2020-11-13 Written by an industry insider with state of the art research at their fingertips, this book describes the Radio Access Network (RAN) architecture, starting with currently deployed 4G, followed by the description of 5G requirements and why re-thinking of the RAN architecture is needed to support these. Based on these considerations, it explains how 5G network architecture, which is currently being defined, is likely to evolve. The aim is not merely to cover relevant standards and technologies as a purely academic exercise (although a significant part of the book will be dedicated to these), but to augment these by practical deployment, to illustrate why the RAN architecture is changing and where it is going. With 5G deployments on the horizon, there is a desire within companies to both re-think the RAN architecture and to change the proprietary nature of the RAN. Correspondingly, there is increased interest in academia, standards bodies and commercial entities involved in the area.

**5g core network diagram: 5G Explained** Jyrki T. J. Penttinen, 2019-04-29 Practical Guide Provides Students and Industry Professionals with Latest Information on 5G Mobile Networks Continuing the tradition established in his previous publications, Jyrki Penttinen offers 5G Explained as a thorough yet concise introduction to recent advancements and growing trends in mobile

telecommunications. In this case, Penttinen focuses on the development and employment of 5G mobile networks and, more specifically, the challenges inherent in adjusting to new global standardization requirements and in maintaining a high level of security even as mobile technology expands to new horizons. The text discusses, for example, the Internet of Things (IoT) and how to keep networks reliable and secure when they are constantly accessed by many different devices with varying levels of user involvement and competence. 5G Explained is primarily designed for specialists who need rapid acclimation to the possibilities and concerns presented by 5G adoption. Therefore, it assumes some prior knowledge of mobile communications. However, earlier chapters are structured so that even relative newcomers will gain useful information. Other notable features include: Three modules each consisting of three chapters: Introduction, Technical Network Description and Planning of Security and Deployment Comprehensive coverage of topics such as technical requirements for 5G, network architecture, radio and core networks and services/applications Discussion of specific security techniques in addition to common-sense guidelines for planning, deploying, managing and optimizing 5G networks 5G Explained offers crucial updates for anyone involved in designing, deploying or working with 5G networks. It should prove a valuable guide for operators, equipment manufacturers and other professionals in mobile equipment engineering and security, network planning and optimization, and mobile application development, or anyone looking to break into these fields.

**5g core network diagram:** <u>System Engineering for IMS Networks</u> Arun Handa, 2009-03-12 The IMS is the foundation architecture for the next generation of mobile phones, wireless-enabled PDAs, PCs, and the like. IMS delivers multimedia content (audio, video, text, etc.) over all types of networks. For network engineers/administrators and telecommunications engineers it will be essential to not only understand IMS architecture, but to also be able to apply it at every stage of the network design process. This book will contain pragmatic information on how to engineer IMS networks as well as an applications-oriented approach for the engineering and networking professionals responsible for making IMS function in the real world. - Describes the convergence of wireless IMS (IP Multimedia Subsystem) with other networks, including wireline and cable - Discusses building interfaces for end users and IMS applications servers - Explores network management issues with IMS

**5g core network diagram: 5G for the Connected World** Devaki Chandramouli, Rainer Liebhart, Juho Pirskanen, 2019-04-29 Comprehensive Handbook Demystifies 5G for Technical and Business Professionals in Mobile Telecommunication Fields Much is being said regarding the possibilities and capabilities of the emerging 5G technology, as the evolution towards 5G promises to transform entire industries and many aspects of our society. 5G for the Connected World offers a comprehensive technical overview that telecommunication professionals need to understand and take advantage of these developments. The book offers a wide-ranging coverage of the technical aspects of 5G (with special consideration of the 3GPP Release 15 content), how it enables new services and how it differs from LTE. This includes information on potential use cases, aspects of radio and core networks, spectrum considerations and the services primarily driving 5G development and deployment. The text also looks at 5G in relation to the Internet of Things, machine to machine communication and technical enablers such as LTE-M, NB-IoT and EC-GSM. Additional chapters discuss new business models for telecommunication service providers and vertical industries as a result of introducing 5G and strategies for staying ahead of the curve. Other topics include: Key features of the new 5G radio such as descriptions of new waveforms, massive MIMO and beamforming technologies as well as spectrum considerations for 5G radio regarding all possible bands Drivers, motivations and overview of the new 5G system – especially RAN architecture and technology enablers (e.g. service-based architecture, compute-storage split and network exposure) for native cloud deployments Mobile edge computing, Non-3GPP access, Fixed-Mobile Convergence Detailed overview of mobility management, session management and Quality of Service frameworks 5G security vision and architecture Ultra-low latency and high reliability use cases and enablers, challenges and requirements (e.g. remote control, industrial

automation, public safety and V2X communication) An outline of the requirements and challenges imposed by massive numbers of devices connected to cellular networks While some familiarity with the basics of 3GPP networks is helpful, 5G for the Connected World is intended for a variety of readers. It will prove a useful guide for telecommunication professionals, standardization experts, network operators, application developers and business analysts (or students working in these fields) as well as infrastructure and device vendors looking to develop and integrate 5G into their products, and to deploy 5G radio and core networks.

**5g core network diagram: 5G System Design** Patrick Marsch, Ömer Bulakci, Olav Queseth, Mauro Boldi, 2018-03-28 This book provides a comprehensive overview of the latest research and standardization progress towards the 5th generation (5G) of mobile communications technology and beyond. It covers a wide range of topics from 5G use cases and their requirements, to spectrum, 5G end-to-end (E2E) system architecture including core network (CN), transport network (TN) and radio access network (RAN) architecture, network slicing, security and network management. It further dives into the detailed functional design and the evaluation of different 5G concepts, and provides details on planned trials and pre-commercial deployments across the globe. While the book naturally captures the latest agreements in 3rd Generation Partnership Project (3GPP) New Radio (NR) Release 15, it goes significantly beyond this by describing the likely developments towards the final 5G system that will ultimately utilize a wide range of spectrum bands, address all envisioned 5G use cases, and meet or exceed the International Mobile Telecommunications (IMT) requirements for the year 2020 and beyond (IMT-2020). 5G System Design: Architectural and Functional Considerations and Long Term Research is based on the knowledge and consensus from 158 leading researchers and standardization experts from 54 companies or institutes around the globe, representing key mobile network operators, network vendors, academic institutions and regional bodies for 5G. Different from earlier books on 5G, it does not focus on single 5G technology components, but describes the full 5G system design from E2E architecture to detailed functional design, including details on 5G performance, implementation and roll-out.

**5g core network diagram: 5G: 2020 and Beyond** Ramjee Prasad, 2022-09-01 The future society would be ushered in a new communication era with the emergence of 5G. 5G would be significantly different, especially, in terms of architecture and operation in comparison with the previous communication generations (4G, 3G...). This book discusses the various aspects of the architecture, operation, possible challenges, and mechanisms to overcome them. Further, it supports users? interac- tion through communication devices relying on Human Bond Communication and COmmunication-NAvigation- SENsing- SErvices (CONASENSE).Topics broadly covered in this book are; • Wireless Innovative System for Dynamically Operating Mega Communications (WISDOM)• Millimeter Waves and Spectrum Management• Cyber Security• Device to Device Communication

**5g core network diagram:** 5G and Beyond Xingqin Lin, Namyoon Lee, 2021-03-25 This book provides an accessible and comprehensive tutorial on the key enabling technologies for 5G and beyond, covering both the fundamentals and the state-of-the-art 5G standards. The book begins with a historical overview of the evolution of cellular technologies and addresses the questions on why 5G and what is 5G. Following this, six tutorial chapters describe the fundamental technology components for 5G and beyond. These include modern advancements in channel coding, multiple access, massive multiple-input and multiple-output (MIMO), network densification, unmanned aerial vehicle enabled cellular networks, and 6G wireless systems. The second part of this book consists of five chapters that introduce the basics of 5G New Radio (NR) standards developed by 3GPP. These include 5G architecture, protocols, and physical layer aspects. The third part of this book provides an overview of the key 5G NR evolution directions. These directions include ultra-reliable low-latency communication (URLLC) enhancements, operation in unlicensed spectrum, positioning, integrated access and backhaul, air-to-ground communication, and non-terrestrial networks with satellite communication.

**5g core network diagram:** *5GtoB From Theory to Practice* Liang Song,

**5g core network diagram:** <u>5G Mobile Communications</u> Saad Asif, 2018-07-20 This book will help readers comprehend technical and policy elements of telecommunication particularly in the context of 5G. It first presents an overview of the current research and standardization practices and lays down the global frequency spectrum allocation process. It further lists solutions to accommodate 5G spectrum requirements. The readers will find a considerable amount of information on 4G (LTE-Advanced), LTE-Advance Pro, 5G NR (New Radio); transport network technologies, 5G NGC (Next Generation Core), OSS (Operations Support Systems), network deployment and end-to-end 5G network architecture. Some details on multiple network elements (end products) such as 5G base station/small cells and the role of semiconductors in telecommunication are also provided. Keeping trends in mind, service delivery mechanisms along with state-of-the-art services such as MFS (mobile financial services), mHealth (mobile health) and IoT (Internet-of-Things) are covered at length. At the end, telecom sector's burning challenges and best practices are explained which may be looked into for today's and tomorrow's networks. The book concludes with certain high level suggestions for the growth of telecommunication, particularly on the importance of basic research, departure from ten-year evolution cycle and having a 20–30 year plan. Explains the conceivable six phases of mobile telecommunication's ecosystem that includes R&D, standardization, product/network/device & application development, and burning challenges and best practices Provides an overview of research and standardization on 5G Discusses solutions to address 5G spectrum requirements while describing the global frequency spectrum allocation process Presents various case studies and policies Provides details on multiple network elements and the role of semiconductors in telecommunication Presents service delivery mechanisms with special focus on IoT

**5g core network diagram: 5G Physical Layer** Ali Zaidi, Fredrik Athley, Jonas Medbo, Ulf Gustavsson, Giuseppe Durisi, Xiaoming Chen, 2018-09-22 5G Physical Layer: Principles, Models and Technology Components explains fundamental physical layer design principles, models and components for the 5G new radio access technology – 5G New Radio (NR). The physical layer models include radio wave propagation and hardware impairments for the full range of frequencies considered for the 5G NR (up to 100 GHz). The physical layer technologies include flexible multi-carrier waveforms, advanced multi-antenna solutions, and channel coding schemes for a wide range of services, deployments, and frequencies envisioned for 5G and beyond. A MATLAB-based link level simulator is included to explore various design options. 5G Physical Layer is very suitable for wireless system designers and researchers: basic understanding of communication theory and signal processing is assumed, but familiarity with 4G and 5G standards is not required. With this book the reader will learn: - The fundamentals of the 5G NR physical layer (waveform, modulation, numerology, channel codes, and multi-antenna schemes). - Why certain PHY technologies have been adopted for the 5G NR. - The fundamental physical limitations imposed by radio wave propagation and hardware impairments. - How the fundamental 5G NR physical layer functionalities (e.g., parameters/methods/schemes) should be realized. The content includes: - A global view of 5G development – concept, standardization, spectrum allocation, use cases and requirements, trials, and future commercial deployments. - The fundamentals behind the 5G NR physical layer specification in 3GPP. - Radio wave propagation and channel modeling for 5G and beyond. - Modeling of hardware impairments for future base stations and devices. - Flexible multi-carrier waveforms, multi-antenna solutions, and channel coding schemes for 5G and beyond. - A simulator including hardware impairments, radio propagation, and various waveforms. Ali Zaidi is a strategic product manager at Ericsson, Sweden. Fredrik Athley is a senior researcher at Ericsson, Sweden. Jonas Medbo and Ulf Gustavsson are senior specialists at Ericsson, Sweden. Xiaoming Chen is a professor at Xi'an Jiaotong University, China. Giuseppe Durisi is a professor at Chalmers University of Technology, Sweden, and a guest researcher at Ericsson, Sweden.

**5g core network diagram: The Wiley 5G REF** , 2021-07-26 THE WILEY 5G REF Explore cutting-edge subjects in 5G privacy and security In The Wiley 5G REF: Security, a team of distinguished researchers delivers an insightful collection of articles selected from the online-only

The Wiley 5G Reference. The editors introduce the security landscape of 5G, including the significant security and privacy risks associated with 5G networks. They also discuss different security solutions for various segments of the 5G network, like the radio, edge, access, and core networks. The book explores the security threats associated with key network softwarization technologies, like SDN, NFV, NS, and MEC, as well as those that come with new 5G and IoT services. There is also a detailed discussion on the privacy of 5G networks. The included articles are written by leading international experts in security and privacy for telecommunication networks. They offer learning opportunities for everyone from graduate-level students to seasoned engineering professionals. The book also offers: A thorough introduction to the 5G mobile network security landscape and the major risks associated with it Comprehensive explorations of SDMN security, the complex challenges associated with 5G security, and physical-layer security for 5G and future networks Practical discussions of security for Handover and D2D communication in 5G HetNets, authentication and access control for 5G, and G5-Core network security In-depth examinations of MEC and cloud security, as well as VNF placement and sharing in NFV-based cellular networks Perfect for researchers and practitioners in the fields of 5G security and privacy, The Wiley 5G REF: Security is an indispensable resource for anyone seeking a solid educational foundation in the latest 5G developments.

**5g core network diagram:** Innovative Mobile and Internet Services in Ubiquitous Computing Leonard Barolli, Aneta Poniszewska-Maranda, Hyunhee Park, 2020-06-09 This book presents the latest research findings, methods and development techniques, challenges and solutions concerning UPC from both theoretical and practical perspectives, with an emphasis on innovative, mobile and Internet services. With the proliferation of wireless technologies and electronic devices, there is a rapidly growing interest in Ubiquitous and Pervasive Computing (UPC), which makes it possible to create a human-oriented computing environment in which computer chips are embedded in everyday objects and interact with the physical world. Through UPC, people can go online even while moving around, thus enjoying nearly permanent access to their preferred services. Though it has the potential to revolutionize our lives, UPC also poses a number of new research challenges.

**5g core network diagram:** *Multiple Access Techniques for 5G Wireless Networks and Beyond* Mojtaba Vaezi, Zhiguo Ding, H. Vincent Poor, 2018-08-23 This book presents comprehensive coverage of current and emerging multiple access, random access, and waveform design techniques for 5G wireless networks and beyond. A definitive reference for researchers in these fields, the book describes recent research from academia, industry, and standardization bodies. The book is an all-encompassing treatment of these areas addressing orthogonal multiple access and waveform design, non-orthogonal multiple access (NOMA) via power, code, and other domains, and orthogonal, non-orthogonal, and grant-free random access. The book builds its foundations on state of the art research papers, measurements, and experimental results from a variety of sources.

**5g core network diagram:** Bio-inspired Information and Communications Technologies Yifan Chen, Dezhong Yao, Tadashi Nakano, 2023-10-26 This book constitutes the refereed conference proceedings of the 14th International Conference on Bio-inspired Information and Communications Technologies, held in Okinawa, Japan, during April 11-12, 2023. The 17 full papers were carefully reviewed and selected from 33 submissions. The papers focus on the latest research that leverages the understanding of key principles, processes, and mechanisms in biological systems for development of novel information and communications technologies (bio-inspired ICT). BICT 2023 will also highlight innovative research and technologies being developed for biomedicine that are inspired by ICT (ICT-inspired biomedicine).

**5g core network diagram: The Proceedings of the 17th Annual Conference of China Electrotechnical Society** Qingxin Yang, Jian Li, Kaigui Xie, Jianlin Hu, 2023-03-28 This book gathers outstanding papers presented at the 17th Annual Conference of China Electrotechnical Society, organized by China Electrotechnical Society (CES), held in Beijing, China, from September 17 to 18, 2022. It covers topics such as electrical technology, power systems, electromagnetic emission technology, and electrical equipment. It introduces the innovative solutions that combine

ideas from multiple disciplines. The book is very much helpful and useful for the researchers, engineers, practitioners, research students, and interested readers.

**5g core network diagram:** <u>Proceedings of Innovative Computing 2024, Vol. 4</u> Yan Pei,

**5g core network diagram: Big Data and Security** Yuan Tian, Tinghuai Ma, Muhammad Khurram Khan, 2021-06-21 This book constitutes the refereed proceedings of the Second International Conference on Big Data and Security, ICBDS 2020, held in Singapore, Singapore, in December 2020. The 44 revised full papers and 8 short papers were carefully reviewed and selected out of 153 submissions. The papers included in this book are organized according to the topical sections on cybersecurity and privacy, big data, blockchain and internet of things, and artificial intelligence/ machine learning security.

**5g core network diagram: Cloud Radio Access Networks** Tony Q. S. Quek, Mugen Peng, Osvaldo Simeone, 2017-02-02 The first book on Cloud Radio Access Networks (C-RANs), covering fundamental theory, current techniques, and potential applications.

**5g core network diagram: 5G Verticals** Rath Vannithamby, Anthony Soong, 2020-01-31 A comprehensive text to an understanding the next generation mobile broadband and wireless Internet of Things (IoT) technologies 5G Verticals brings together in one comprehensive volume a group of visionaries and technical experts from academia and industry. The expert authors discuss the applications and technologies that comprise 5G verticals. The earlier network generations (2G to 4G) were designed as on-size-fits-all, general-purpose connectivity platforms with limited differentiation capabilities. 5G networks have the capability to demand customizable mobile networks and create an ecosystem for technical and business innovation involving vertical markets such as automotive, healthcare, manufacturing, energy, food and agriculture, city management, government, public transportation, media and more. 5G will serve a large portfolio of applications with various requirements ranging from high reliability to ultra-low latency going through high bandwidth and mobility. In this book, the authors explore applications and usages of various 5G verticals including a set of key metrics for these uses and their corresponding target requirements. The book also examines the potential network architectures and enabling technologies to meet the requirements of 5G verticals. This important book: Offers a comprehensive resource to the promise of 5G Verticals Provides a set of key metrics for the uses and target requirements Contains illustrative examples of the technology and applications Includes contributions from experts in the field and professionals that developed the 5G standards Provides an analysis of specific vertical industries which have the potential to be among the first industries to use 5G Written for industry practitioners, engineers and researchers, 5G Verticals discusses the technology that enables the 5G system to be flexibly deployed and scaled.

**5g core network diagram: The Core Network for 5G Advanced** Stefan Rommer, Catherine Mulligan, Peter Hedman, Magnus Olsson, Lars Frid, Shabnam Sultana, 2025-02-01 The Core Network for 5G Advanced, Second Edition covers up to the 3GPP release 17 & 18 which includes the core network for 5G Advanced as well as a large number of new features added by 3GPP to expand the initial 5G Core specifications in rel-15/16. This new release includes A complete update to reflect developments in Releases 17 and 18, along with new chapters on Service Exposure, non-3GPP access, 3GPP access for new use cases, Edge computing, Industry and Enterprise features, Regulatory services and Network automation and AI/ML, an overview of the 5G Core Architecture, and much more.Examples of 5G network deployment options for different use cases are also included. Written by authors who are heavily involved in the development of 5G standards, and who have written several successful books on 4G and 5G Core Networks, this book provides an authoritative reference on the technologies and standards of the 3GPP 5G Core network. - Provides a clear, concise, and comprehensive view of the Core Network for 5G Advanced - Explains key concepts and use cases - Covers 3GPP specification content, up to, and including release 18 - Presents examples of new content, including Service Exposure, features for Industry use cases, Automation and AI/ML - Written by established experts in the 5G Core standardization process, all of whom have extensive experience and understanding of its goals, history and vision

**5g core network diagram: Signal and Information Processing, Networking and Computers** Songlin Sun, Tao Hong, Peng Yu, Jiaqi Zou, 2022-10-12 This book collects selected papers from the 9th Conference on Signal and Information Processing, Networking and Computers held online, in December, 2021. The book focuses on the current works of information theory, communication system, computer science, aerospace technologies, big data and other related technologies. Readers from both academia and industry of this field can contribute and find their interests from the book.

**5g core network diagram: 5G Networks** Atahar Khan, Satya Priyo Dhar, Ramakrishnan Shanmugasundaram, Joe Chemparathy, 2024-08-12 This book provides comprehensive coverage of building an end-to-end view on how to architect, design, and orchestrate a 5G capable network that will integrate with 5G RAN, IP transport, datacenters, Telco Cloud, and 5G packet networks. It contains real-world examples with challenges and success strategies for deploying 5G Transport with closed-loop automation. It also focuses on aspects like scale, performance, latency, security, and manageability while building 5G transport for some of the world's largest 5G networks as well as migration approaches from 4G to 5G transport and core network. 5G is an emerging technology that mobile service providers (MNO/MVNO) across the world are embracing. They are willing to invest in enabling their infrastructure for 5G and explore new business opportunities with their enterprise/mobile customers. As per the Gartner survey, the majority of communication service provider (CSP) revenue will come from 5G. 5G is going to open the door to new applications such as wireless virtual reality, low latency machine-to-machine communication, smart city infrastructure, autonomous vehicles, IoT deployment, artificial intelligence-based applications, industrial automation and so much more.

**5g core network diagram:** *5G NR Modelling in MATLAB* Tulsi Pawan Fowdur, Madhavsingh Indoonundon, Dragorad A. Milovanovic, Zoran S. Bojkovic, 2024-06-30 5G is the fifth generation of wireless technology and NR stands for a new radio interface and radio access technology for cellular networks i.e. a physical connection method for radio-based communication. It is a powerful platform that supports a wide range of services that includes enhanced mobile broadband, massive machine-type communication and ultra-reliability, and low latency covering several vertical industries such as e-health, transportation, energy, media and factories automation. This book provides a detailed description of the fundamental aspects of 5G. It gives an in-depth coverage of the network architecture of 5G by considering both the network reference point architecture and the service-based architecture. It also describes all the user and control plane protocols including the standalone and non-standalone architecture options. The radio access technologies such as the waveforms used in 5G, the multi-access and duplexing techniques as well as the resource allocation schemes are treated in details. Additionally, the physical layer signal processing blocks of 5G-NR are covered in depth with elaborate numerical examples to illustrate the functioning of each block in the 5G downlink transmitter and receiver chain. The main originality of this book is the detailed illustration of the 5G NR pre-processing steps as well as Matlab simulation models with explanation on the codes to allow for a seamless understanding of the principles. In general this book is meant for anyone with a basic engineering background who would be interested to acquire a solid foundation in the fundamental concepts of 5G NR.

**5g core network diagram:** Broadband Communications Networks Abdelfatteh Haidine, Abdelhak Aqqal, 2018-09-19 Nowadays, the Internet plays a vital role in our lives. It is currently one of the most effective media that is shifting to reach into all areas in today's society. While we move into the next decade, the future of many emerging technologies (IoT, cloud solutions, automation and AI, big data, 5G and mobile technologies, smart cities, etc.) is highly dependent on Internet connectivity and broadband communications. The demand for mobile and faster Internet connectivity is on the rise as the voice, video, and data continue to converge to speed up business operations and to improve every aspect of human life. As a result, the broadband communication networks that connect everything on the Internet are now considered a complete ecosystem routing all Internet traffic and delivering Internet data faster and more flexibly than ever before. This book

gives an insight into the latest research and practical aspects of the broadband communication networks in support of many emerging paradigms/applications of global Internet from the traditional architecture to the incorporation of smart applications. This book includes a preface and introduction by the editors, followed by 20 chapters written by leading international researchers, arranged in three parts. This book is recommended for researchers and professionals in the field and may be used as a reference book on broadband communication networks as well as on practical uses of wired/wireless broadband communications. It is also a concise guide for students and readers interested in studying Internet connectivity, mobile/optical broadband networks and concepts/applications of telecommunications engineering.

**5g core network diagram:** 5G+ Zhengmao Li, Xiaoyun Wang, Tongxu Zhang, 2020-08-10 This book takes China Mobile's 5G + plan as the mainline, introduces three major scenarios, nine indicators, system architecture and basic principles of 5G, and systematically explains the essence of China Mobile's 5G + for the first time. A lot of industry use cases and solutions are introduced for 5G to bring new changes to life, industries, and social governance. This book can benefit all readers who are interested in 5G. It also can be a reference for vertical industry partners to fully understand the possible applications of 5G. Most of all, it will help to promote all industries with new developments based on 5G's new kinetic energy.

**5g core network diagram: Enabling 5G Communication Systems to Support Vertical Industries** Muhammad Ali Imran, Yusuf Abdulrahman Sambo, Qammer H. Abbasi, 2019-06-19 How 5G technology can support the demands of multiple vertical industries Recent advances in technologyhave created new vertical industries that are highly dependent on the availability and reliability of data between multiple locations. The 5G system, unlike previous generations, will be entirely data driven—addressing latency, resilience, connection density, coverage area, and other vertical industry criteria. Enabling 5G Communication Systems to Support Vertical Industries demonstrates how 5G communication systems can meet the needs unique to vertical industries for efficient, cost-effective delivery of service. Covering both theory and practice, this book explores solutions to problems in specific industrial sectors including smart transportation, smart agriculture, smart grid, environmental monitoring, and disaster management. The 5G communication system will have to provide customized solutions to accommodate each vertical industry's specific requirements. Whether an industry practitioner designingthe next generation of wireless communications or a researcher needing to identify open issues and classify their research, this timely book: Covers the much-discussed topics of supporting multiple vertical industries and new ICT challenges Addresses emerging issues and real-world problems surrounding 5G technology in wireless communication and networking Explores a comprehensive array of essential topics such as connected health, smart transport, smart manufacturing, and more Presents important topics in a clear, concise style suitable for new learners and professionals alike Includes contributions from experts and industry leaders, system diagrams, charts, tables, and examples Enabling 5G Communication Systems to Support Vertical Industries is a valuable resource telecom engineers industry professionals, researchers, professors, doctorate, and postgraduate students requiring up-to-date information on supporting vertical industries with 5G technology systems.

**5g core network diagram:** *AI in Wireless for Beyond 5G Networks* Sukhdeep Singh, Yulei Wu, Mohan Rao GNS, Kaustubh Joshi, Payam Barnaghi, Madhan Raj Kanagarathinam, 2024-02-02 Artificial intelligence (AI) is a game changer in many domains, and wireless communication networks are no exception. With the advent of 5G networks, we have witnessed rapid growth in wireless connectivity, which has led to unprecedented opportunities for innovation and new use cases. However, as we move beyond 5G (B5G), the challenges and opportunities are set to become even more significant, offering new, previously unimaginable services. AI in Wireless for Beyond 5G Networks provides a comprehensive overview of the use of AI in wireless communication for B5G networks. The authors draw on their expertise in the field to explore the latest developments in AI technologies and their applications in B5G wireless communication systems. The book discusses a wide range of topics, including enabling AI technologies, architecture, and applications of AI from

smartphones, radio access networks (RANs), edge and core networks, and application service providers. It also discusses the trends in on-device AI for B5G networks. This book is written in an accessible style, making it an ideal resource for academics, researchers, and industry professionals in wireless communication. It provides valuable insights into the latest field trends and developments and practical possibilities for implementing AI technologies in wireless communication systems. Above all, this book is a testament to the power of collaboration and innovation in wireless communication. The authors' dedication and expertise have produced a valuable resource for anyone interested in the latest AI and wireless communication developments. This book will inspire and inform readers, and we highly recommend it to scholars interested in the future of AI in wireless communication.

**5g core network diagram: Applying Drone Technologies and Robotics for Agricultural Sustainability** Raj, Pethuru, Saini, Kavita, Pacheco, Vinicius, 2023-01-09 Many industries are affected by the growing advancements and stability of the internet of things (IoT) technologies and tools. These include the agricultural fields. With such advancements, decision-enabling agricultural field data gets gathered and transmitted meticulously through numerous IoT sensors and devices deployed in agricultural fields and their surroundings. Further study on these technologies is required to ensure they are utilized appropriately within the field. Applying Drone Technologies and Robotics for Agricultural Sustainability conveys the latest trends and transitions happening in the digital space in order to fulfill the varying needs and sentiments of the agriculture domain. Covering key topics such as deep learning, robots, sustainability, and smart farming, this premier reference source is ideal for industry professionals, farmers, computer scientists, policymakers, researchers, scholars, practitioners, instructors, and students.

**5g core network diagram: 5G Mobile Communications** Saad Asif, 2018-07-20 This book will help readers comprehend technical and policy elements of telecommunication particularly in the context of 5G. It first presents an overview of the current research and standardization practices and lays down the global frequency spectrum allocation process. It further lists solutions to accommodate 5G spectrum requirements. The readers will find a considerable amount of information on 4G (LTE-Advanced), LTE-Advance Pro, 5G NR (New Radio); transport network technologies, 5G NGC (Next Generation Core), OSS (Operations Support Systems), network deployment and end-to-end 5G network architecture. Some details on multiple network elements (end products) such as 5G base station/small cells and the role of semiconductors in telecommunication are also provided. Keeping trends in mind, service delivery mechanisms along with state-of-the-art services such as MFS (mobile financial services), mHealth (mobile health) and IoT (Internet-of-Things) are covered at length. At the end, telecom sector's burning challenges and best practices are explained which may be looked into for today's and tomorrow's networks. The book concludes with certain high level suggestions for the growth of telecommunication, particularly on the importance of basic research, departure from ten-year evolution cycle and having a 20–30 year plan. Explains the conceivable six phases of mobile telecommunication's ecosystem that includes R&D, standardization, product/network/device & application development, and burning challenges and best practices Provides an overview of research and standardization on 5G Discusses solutions to address 5G spectrum requirements while describing the global frequency spectrum allocation process Presents various case studies and policies Provides details on multiple network elements and the role of semiconductors in telecommunication Presents service delivery mechanisms with special focus on IoT

**5g core network diagram: Artificial Intelligence Applications and Innovations. AIAI 2023 IFIP WG 12.5 International Workshops** Ilias Maglogiannis, Lazaros Iliadis, Antonios Papaleonidas, Ioannis Chochliouros, 2023-06-01 This book constitutes the refereed proceedings of four International Workshops, held as parallel events of the 19th IFIP WG 12.5 International Conference on Artificial Intelligence Applications and Innovations, AIAI 2023, held in León, Spain, during June 14–17, 2023: the 12th Workshop on Mining Humanistic Data (MHDW 2023); the 8th Workshop on "5G–Putting Intelligence to the Network Edge (5G-PINE 2023); the second Workshop

on AI in Energy, Buildings and Micro-Grids Workshop (AIBMG 2023); and the First Workshop on Visual Analytics Approaches for Complex Problems in Engineering and Biomedicine (VAA-CP-EB 2023). This event was held in hybrid mode. The 37 regular papers presented at these workshops were carefully reviewed and selected from 86 submissions.

**5g core network diagram:** *5G New Radio in Bullets* Chris Johnson, 2019-07-28 This is the Black and White version of '5G New Radio in Bullets', printed as a paperback with 590 pages and dimensions of 21.6 x 27.9 cm. This book provides a comprehensive description of the 5G New Radio (NR) radio access network. The content is aimed towards anyone wishing to learn the basics, or to develop a more thorough understanding. The content is presented in the form of bullet points to keep it concise and to allow rapid access to the key information. The text includes both introductory and advanced topics and is supported by more than 480 illustrations and 350 tables. The book is based upon the release 15 version of the specifications. Practical Radio Network Planning topics are discussed after presenting the theoretical background. The content is organised as: Fundamentals; Air Interface; Downlink Signals and Channels; Downlink Transmission Schemes; Flow of Downlink Data; System Information; Uplink Signals and Channels; Uplink Transmission Schemes; Beam Management; UE Measurements; Idle Mode Procedures; Physical and MAC Layer Procedures; Voice Services; Signalling Procedures; Radio Network Planning; Dynamic Spectrum Sharing.

**5g core network diagram:** Building the Network of the Future John Donovan, Krish Prabhu, 2017-06-26 From the Foreword: This book lays out much of what we've learned at AT&T about SDN and NFV. Some of the smartest network experts in the industry have drawn a map to help you navigate this journey. Their goal isn't to predict the future but to help you design and build a network that will be ready for whatever that future holds. Because if there's one thing the last decade has taught us, it's that network demand will always exceed expectations. This book will help you get ready. —Randall Stephenson, Chairman, CEO, and President of AT&T Software is changing the world, and networks too. In this in-depth book, AT&T's top networking experts discuss how they're moving software-defined networking from concept to practice, and why it's a business imperative to do this rapidly. —Urs Hölzle, SVP Cloud Infrastructure, Google Telecom operators face a continuous challenge for more agility to serve their customers with a better customer experience and a lower cost. This book is a very inspiring and vivid testimony of the huge transformation this means, not only for the networks but for the entire companies, and how AT&T is leading it. It provides a lot of very deep insights about the technical challenges telecom engineers are facing today. Beyond AT&T, I'm sure this book will be extremely helpful to the whole industry. —Alain Maloberti, Group Chief Network Officer, Orange Labs Networks This new book should be read by any organization faced with a future driven by a shift to software. It is a holistic view of how AT&T has transformed its core infrastructure from hardware based to largely software based to lower costs and speed innovation. To do so, AT&T had to redefine their technology supply chain, retrain their workforce, and move toward open source user-driven innovation; all while managing one of the biggest networks in the world. It is an amazing feat that will put AT&T in a leading position for years to come. —Jim Zemlin, Executive Director, The Linux Foundation This book is based on the lessons learned from AT&T's software transformation journey starting in 2012 when rampant traffic growth necessitated a change in network architecture and design. Using new technologies such as NFV, SDN, Cloud, and Big Data, AT&T's engineers outlined and implemented a radical network transformation program that dramatically reduced capital and operating expenditures. This book describes the transformation in substantial detail. The subject matter is of great interest to telecom professionals worldwide, as well as academic researchers looking to apply the latest techniques in computer science to solving telecom's big problems around scalability, resilience, and survivability.

**5g core network diagram: Cellular Vehicle-to-Everything (C-V2X)** Shanzhi Chen, Jinling Hu, Li Zhao, Rui Zhao, Jiayi Fang, Yan Shi, Hui Xu, 2023-01-01 This book focuses on cellular Vehicle-to-Everything (C-V2X), currently the most promising wireless communication technology for Vehicle-to-Vehicle (V2V), Vehicle-to-Infrastructure (V2I), Vehicle-to-Pedestrian (V2P), Vehicle-to-Network (V2N) and Vehicle-to-Cloud (V2C) communications. Because of its low latency

and high reliability, C-V2X has become an essential enabling technology for Intelligent Transportation Systems (ITSs) and autonomous driving. This book begins by introducing readers to the research background and status quo of global development. Then, after analyzing the performance requirements of various V2X applications, the system architecture and technical standards are presented. The two evolving stages of C-V2X, i.e., LTE-V2X and NR-V2X, are introduced in detail. In addition, related technologies such as mobile edge computing, network slicing and high-precision positioning, C-V2X security, C-V2X spectrum requirements and planning, and industrial development and applications are introduced. In closing, the book discusses future applications of and technical challenges for C-V2X. This book is the first monograph dedicated to C-V2X, offering experts, researchers and engineers from the areas of IT/CT, intelligent transportation, intelligent and connected vehicles (ICVs) an in-depth understanding of C-V2X technology and standards, while also outlining related interdisciplinary research. The book can also be used as a reference resource for both undergraduate and graduate studies.

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