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Sommario/riassunto

Comprehensive reference on O-RAN technology, covering its history, architecture, security, ecosystem, and more, with didactic resources included throughout Discussing both basic and advanced concepts, Fundamentals of O-RAN delivers a comprehensive summary of O-RAN, covering its history, architecture, control loops and microservices (i.e., xApps and rApps), security, ecosystem, R&D initiatives, and challenges and evolution toward 6G. The book not only includes key theoretical principles of O-RAN, but also provides a framework for the reader to carry out guided hands-on exercises through online auxiliary materials. Homework problems and review questions are included in online auxiliary materials to reinforce learning. The book includes instructions on how to create xApps, which are expected to be one of the most promising aspects of O-RAN; for example, by working with an end-to-end O-RAN system using a network slicing functionality where the rApp provides slicing specified policies to the xApp which then allocates the base station's spectrum resources based on the slicing policy to each user (belonging to a certain slice). Readers will also gain an understanding of cellular networks, particularly radio access networks, software virtualization, and software-defined networking concepts, and the knowledge needed to design, build, and test a 5G O-RAN system. Some of the sample topics explored in Fundamentals of O-RAN include: * RAN evolution from black box 4G RAN to software-based and virtualized RAN (vRAN) * Components of the O-RAN architecture including SMO, Non-RT RIC, Near-RT RIC, O-CU-CP, O-CU-UP, O-DU, O-RU, and O-Cloud * xApp design and prototyping from scratch using open cellular software, srsRAN and O-RAN Software Community (OSC) software. * Examination of various security dimensions inherent in the O-RAN architecture. * Testing and integration, covering Open Test and Integration Centers (OTICs), global PlugFests, certification and badging, and end-to-end test specifications * Work Groups (WGs), including WG1 to WG11, and focus groups, with information on how to obtain WG specifications Fundamentals of O-RAN is an essential reference for the workforce of tomorrow's cellular industry, including graduate students, teachers, researchers, faculty members, engineers, and employees involved in the field of wireless networks, especially radio networks.