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Sommario/riassunto	This book systematically explores the synergistic integration of multidimensional modulation and coding technology, extend wavelength division multiplexing, space division multiplexing (SDM) and signal processing techniques to unlock unprecedented transmission capacities. From foundational principles to experimental validations, this book bridges theoretical concepts with practical implementations, offering a holistic view of scalable solutions for next-generation optical networks. Delving into both established and emerging paradigms, this book develops the key technology of improving the capacity of the transmission. It covers hybrid concatenated coding schemes, multi-carrier generation or multi-band transmission in achieving terabit-scale throughputs. This book also examines the role of self-homodyne coherent systems, SDM transmission system and the channel damage compensation

algorithms, illustrates the real-world applicability of these technologies. The concluding chapter synthesizes key advancements and anticipates future challenges, positioning this book as an indispensable resource for researchers, engineers and graduate students seeking to advance the frontiers of high-speed, high-capacity optical communications.

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