

Preface

In the past decade, we have witnessed the huge success and spectacular growth of the Internet, which has led to the explosion of Internet traffic and has therefore imposed a huge bandwidth demand on its underlying telecommunications infrastructure. To meet the unprecedented demand for bandwidth, fiber optics has brought about a bandwidth revolution in telecommunications networks. At the core of this revolution, optical fiber has proved to be an excellent physical transmission medium because of its huge transmission bandwidth (nearly 50 terabits) as well as a number of other advantages over traditional transmission media, such as low signal attenuation (about 0.2 dB/km), low error bit rate (typically 10^{-12}), low signal distortion, low power requirement, low space requirement, and low cost. In this revolution, the emergence of wavelength division multiplexing (WDM) technology is a new milestone. WDM allows multiple optical signals to be transmitted independently and simultaneously in multiple optical channels or wavelengths over a single fiber, each operating at a very high rate of a few gigabits per second (Gbps), and can thus more efficiently exploit the usable bandwidth inherent in optical fibers. With recent advances in enabling technologies, WDM systems capable of supporting up to 160 channels at 10 Gbps are commercially available and products with more optical channels are expected to come into the market soon. Therefore, WDM has been widely considered a technology of choice for meeting the huge bandwidth demand in telecommunications networks. Optical networks using WDM technology have become the most promising network infrastructure for next-generation telecommunications networks, not only for wide-area networks but also for metropolitan area networks and local area networks.

Although WDM technology is currently being deployed by many network providers mostly for point-to-point transmission, a large effort from academia, industry, and standardization organizations has been and is being made to enable the transition of WDM from a point-to-point transmission

