

The Optical Transport Network Revolution

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Abstract: Optical transport networks, which form the backbone of all telecom networks, have undergone a revolution in the last decade. The most well-known aspect of this revolution that virtually annihilated the cost of long-distance communication is Dense-Wavelength Division Multiplexing (DWDM) which enabled multiple, high-speed (10 Gbps+) wavelengths to be optically multiplexed over a single fibre, optically amplified, and transported without regeneration over transoceanic and intercontinental distances. Today, due to advancements in modulation, coding and detection, the per-wavelength bit-rates are increasing to 100 Gbps, further reducing the cost of long-distance communication. At the same time, the increasing dominance of data in the network traffic has led to the development of Packet Transport Network (PTN) architectures based on connection-oriented Ethernet that combine the benefits of statistical multiplexing with SDH/SONET-like traffic engineering, OAM and reliability. Paradoxically, renewed interest in TDM is noticed world-wide as the SDH/SONET hierarchy transitions to the Optical Transport Network (OTN) hierarchy that enables sub-wavelength multiplexing, grooming and bandwidth-management capabilities over DWDM backbone networks. Recent developments in a unified, multi-layer control plane based on ASON/GMPLS technology provide many significant benefits such as rapid and accurate provisioning, dynamic restoration, greater network efficiency in terms of bandwidth sparing and resource utilization, and seamless inter-operability across multiple vendors. In this talk, we will describe these key characteristics of Packet and Optical Transport Networks. All three technologies—DWDM, PTN and OTN—are coming together in a single “Packet Optical Transport Platform” (POTP) that will form the core of tomorrow’s transport networks. We will end the talk with some speculations on the future of transport networks over the next decade.

Speaker’s biography: Kumar N. Sivarajan co-founded Tejas Networks in 2000 where he serves as Chief Technology Officer, responsible for Tejas’ technology and product direction. Prior to Tejas Networks, Sivarajan was an Associate Professor in the ECE Department, at IISc, Bangalore. He has also worked with the IBM T. J. Watson Research Center, Yorktown Heights, New York.

Sivarajan is co-author of the textbook ‘Optical Networks: A Practical Perspective’ first published in February 1998. He is a Fellow of the Indian National Academy of Engineering, an Associate of the Indian Academy of Sciences, and a recipient of the Swarnajayanti Fellowship from the Department of Science and Technology, and the 2004 Global Indus Technovator Award from the India Business Club at the

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Sivarajan holds a Bachelor's Degree in Electrical Engineering from IIT, Madras, and an M.S. and Ph.D. from the California Institute of Technology.