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**Physics Behind Optical Fiber Communications: Technologies that Drive the Internet Capacity Growth**

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Optical fiber communications forms the backbone for global communications, especially as it relates to the Internet. Indeed, the Internet as we know it today would not exist without optical communications. The data transmission capacity through an optical fiber has undergone an exponential growth increase for decades, progressing from Megabits/sec to now Petabits/sec in just the past 40 years. This growth came about due to many physics advances in the field of optical fiber communications, dating back to 1966 when Sir Charles Kao proposed the idea of a communication system based on low-loss optical glass fiber. This presentation will explore the past and present physics-based crucial innovations needed for this continuing story. Specific topics to be highlighted include: (a) ultra-pure fiber that decreased the attenuation losses through glass by many orders of magnitude, (b) single-frequency lasers that defined a specific data channel that could propagate with low signal distortion, (c) Erbium-doped fiber amplifiers that had high gain and low additive noise allowing for amplifier cascades and conquering enormous distances, (d) the simultaneous transmission of multiple wavelength-division-multiplexing data channels down the optical fiber, and (e) the tackling of various dispersive and nonlinear effects that are introduced by the optical fiber itself, cause the data to degrade, and necessitate some form of compensation or management.