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THE CHINESE UNIVERSITY OF HONG KONG
Department of Information Engineering and
Centre for Advanced Research in Photonics
Joint Seminar

Hybrid Coherent & Incoherent DWDM transmission Optical Fiber Networking

by
Mr. Chris Look
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Date : 16 May, 2011 (Mon.)
Time : 10:00am-11:00am
Venue : Room 1009 William M.W. Mong Engineering Buildin
The Chinese University of Hong Kong

Abstract
Until very recently, the vast majority of fiber optic systems were digital modulation usingon-off-keying (OOK) modulation with direct detection. The choice of OOKand direct detection was popular because it was a straightforward, cheap and robust transmission scheme. As line rates rose and signal spectra became broader, chromatic dispersion (CD) compensation has become essential: at 10Gb/s CD penalties become prohibitive for distances more than approximately 50km. To rectify this, ROADM networks periodically add a dispersion compensating module (DCM) to the network to regenerate the original pulse shape.
In contrast, digital coherent detection captures all four dimensions of the received optical field, thus enabling full compensation of all linear transmission impairments and the use of highly spectrally efficient modulation formats.Digital coherent detection has become viable based on capabilities of state-of-the-art CMOS as well as standardization of the optical receiver. Both of these technologies can be expected to decrease in cost over time as volumes increase. As a result, both 40G and 100G systems utilizing coherent approaches are currently being deployed that do not require the use of DCM.
However, the high peak-to-mean power ratios seen in OOK signals cause significant inter-channel nonlinear impairments for modulation formats such as dual-polarization quaternary phase shift keying (DP-QPSK), which use phase and polarization for the modulation space.
A number of approaches have been suggested in the industry to deal with this problem. This talk will investigate the technical viability of a unique alternative approach. We evaluate whether it is possible to remove all dispersion compensation from the network and detect all signals (including OOK) with digital coherent receivers. The advantage of this approach is that the optical network would support an arbitrary mix of coherent and incoherent signals, with design rules relaxed because of the signal recovery robustness offered by the DSP. Such a network would allow the operator to easily migrate their network from OOK to line rates of 40G and above at any pace that their business conditions warrant.

This talk will be based on work done in collaboration with D. Millar, B. Thomsen and S. Savory, at University College London. The Presenter will be Chris Look

Biography
Mr. Chris Look serves as the Chief Technology Officer of Taseon Inc. Equipping with more than 30 years' experience in R&D, product management and technology development with focus on Optical Communications, Broadband Networks and Broadband Services.

Mr. Look started work in optics in 1978 working as a grad student at the research arm of Nortel. His graduate work was in laser device design, fabrication and packaging. He took it to production and that work became the basis for Nortel's first commercial laser.

Mr. Look then went on to work for the research arm of a Telephone Operator developing Broadband Service strategies and prototypes to demonstrate those services. Examples of specific services & prototypes that he was instrumental in would be a 50 video channel fiber-to-the-home system that was successfully trialed in Detroit in the early 90's as well as a high quality MPEG-2 video-over-ATM system that was purchased by IBM. Mr. Look was also a technical director of a Canadian consortium working on advanced optics in the early '90s where he initiated work on polymer waveguides on silicon.

Since 2000, Chris has designed DWDM equipment, first while at Maple Optical Systems and subsequently at Intellambda. He was responsible for the architecture and hardware engineering development of a lab prototype DWDM system, that was effectively the world's first Packet Optical Transport Platform (P-OTP). The optical portion of that design has been productized by Taseon and is now known as the TN320.

Prior to joining Taseon, Mr. Look was Director, Advanced Technology at PMC-Sierra where his responsibilities include providing technology and market direction for a broad range of advanced home, access and metro telecommunication semiconductor products in the CTO office.

Mr. Look obtained his master degree of Engineering Physics from McMaster University, and his B. Sc. degree of Physics from Simon Fraser University in Canada.

**** ALL ARE WELCOME ****

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