

All-optical Multicasting of Wireless Signals in WDM Networks

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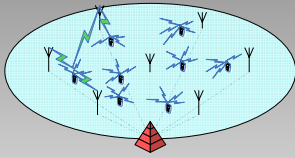
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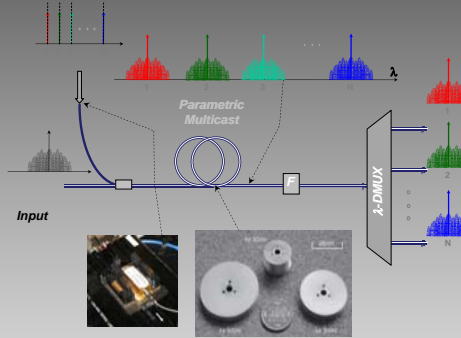
Photonics Systems UCSD

Motivation

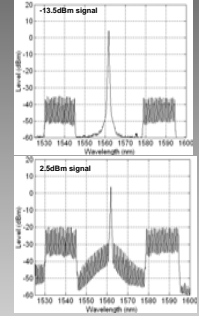
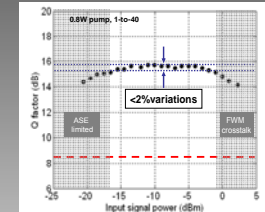
- Mapping of Wireless Traffic to Conventional WDM Layer
- Quadrature-Selective Amplification
- Transparent Phase/Amplitude Manipulation in Optical Access Layer



Primitive Multicast Cell

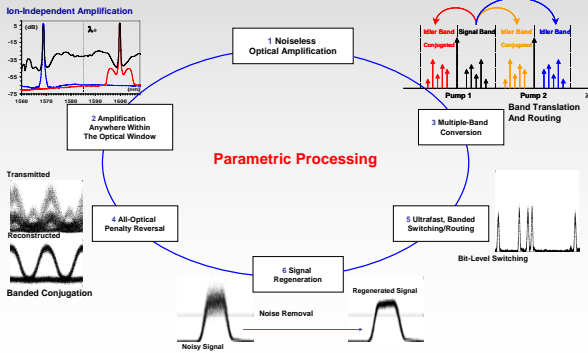


Parametric Multicast

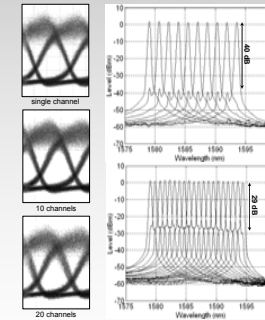
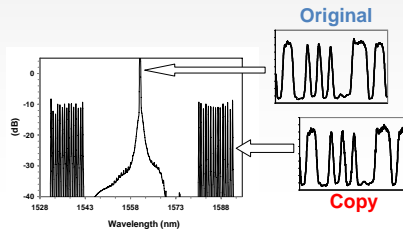
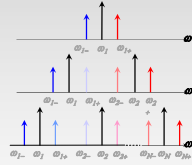


- Deterioration at low input power
 - ASE limited
- Deterioration at high input power
 - Cascading FWM \Rightarrow pump-copy & copy-copy xtalk
- Wide operation region with NO nonlinear xtalk

Basic Technology: Parametric Processing



Parametric Multicast



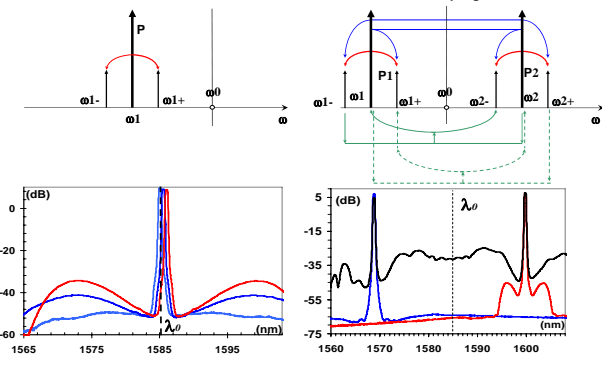
Single channel \Rightarrow 10 channels
 – Rejection between channels in excess of 40dB
 – No penalty

10 channels \Rightarrow 20 channels
 – Slight penalty (Q: 15dB \rightarrow 14.4 dB)
 – Rejection between channels decreased to \sim 29 dB

One vs. Multiple Pumps

Conventional PA

Modulational Coupling PA



UCSD System Insertion



CIAN Multicasting Initiative

- New multicasting architecture using parametric interaction in high confinement waveguide
- Physical modeling of performance and impairments associated with high-bandwidth multicasting, with rates spanning OC-192 to OC-768
- Quantification of impairments of multicast distributed signals and investigation of channel scaling limits
- Demonstration of arbitrary-format signal replication within conventional C- and L-bands and system penalty measurements.

Collaborative Effort:
 F. Kueppers, U of Arizona
 J. Ford, UCSD
 OFS Laboratories, NJ