LIGHTWAVE

Technology Advances for Current and Future FTTH Networks

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LIGHTWAVE

Topics of discussion

- Fiber and cable
- Transceiver technology
- Systems technology
- Final thoughts

First, a quick look at the worldwide market

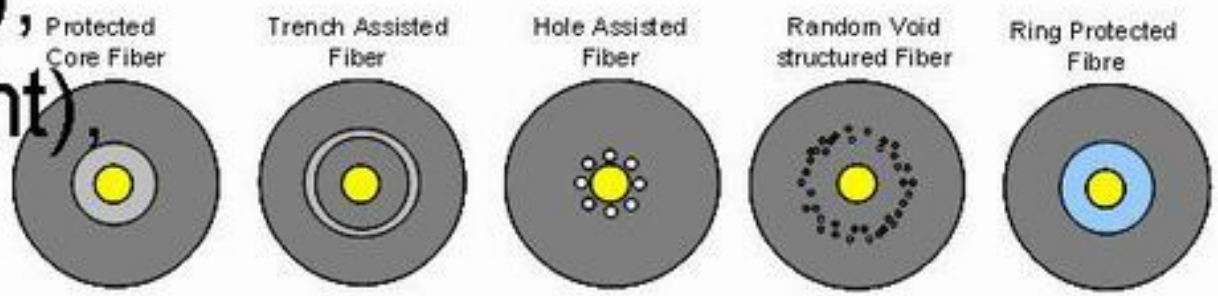
- Despite global economic downturn, FTTH/B deployments continue to grow
  - Dell'Oro: Overall access market (DSL, cable, and PON) down in second quarter of 2009 from same time as 2008, but not PON. PON grows by double-digits!
  - Strong EPON shipments to China and Japan lead growth
  - Infonetics: "The early BPON and EPON rollouts in Japan and South Korea are quickly being eclipsed by China Telecom, China Unicom, and China Mobile's extensive EPON and GPON rollouts for FTTB, FTTH, and mobile backhaul."

Bend-insensitive fibers

- As name implies, fiber designed to tolerate tighter bends
- Targeted at apartments and other in-building applications
- Number of fiber types and suppliers growing

Recent progress

- NTT debuts hole-assisted fiber for indoor applications
- Corning announces ClearCurve in 2007
- OFS (EZ-Bend), Draka (BendBright), and Prysmian (CasaLight) follow



Core - Highest refractive Index, carries the light signal
Ring Structure in solid glass– superior to confine light in the core
Lower refractive index fluorine modified cladding – helps confine light in the core
Lower refractive index bubbles or voids in cladding helps confine light in the core
Lower refractive index holes in cladding – helps confine light in the core
Cladding – low index helps confine light in the core (less effective than above approaches)

New transceiver technology

- Advances in integration promise lower costs
- Application of photonic integrated circuit (PIC) technology

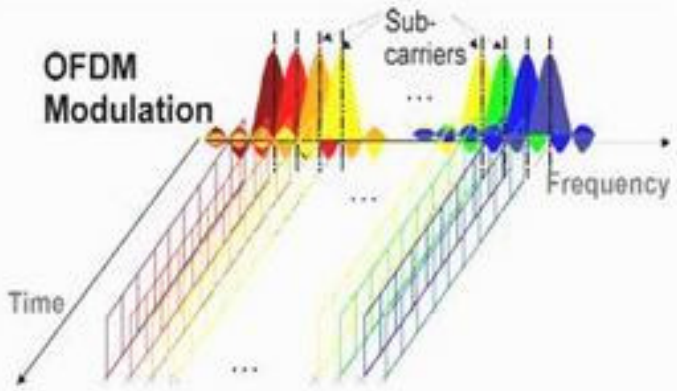
Source: OneChip Photonics

Advances in systems technology

- Move to 10 Gbps
  - Both GEPON and GPON
  - Wavelengths will be similar
  - So will capabilities
- What is the future for WDM-PON?

Looking beyond 10G

- Orthogonal frequency division multiplexing (OFDM)
  - Technique from RF communications
  - Pairing with WDM-PON
  - Downstream speeds faster than 10 Gbps
  - Reach extension to 100 km



New technology for cable operators

- Development of systems that use the same operating system (DOCSIS) as hybrid fiber/coax network
- RF over glass
- DOCSIS PON

Final thoughts

- While PON will be dominant, don't forget about Active Ethernet
- Initial focus for evolution will be 10G PONs first, then WDM-PON
  - 10G GEPON first, then 10G GPON
  - Doubts about WDM-PON economics slows standards development

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Thank you!

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