

# Worldwide trends in FTTH

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LIGHTWAVE

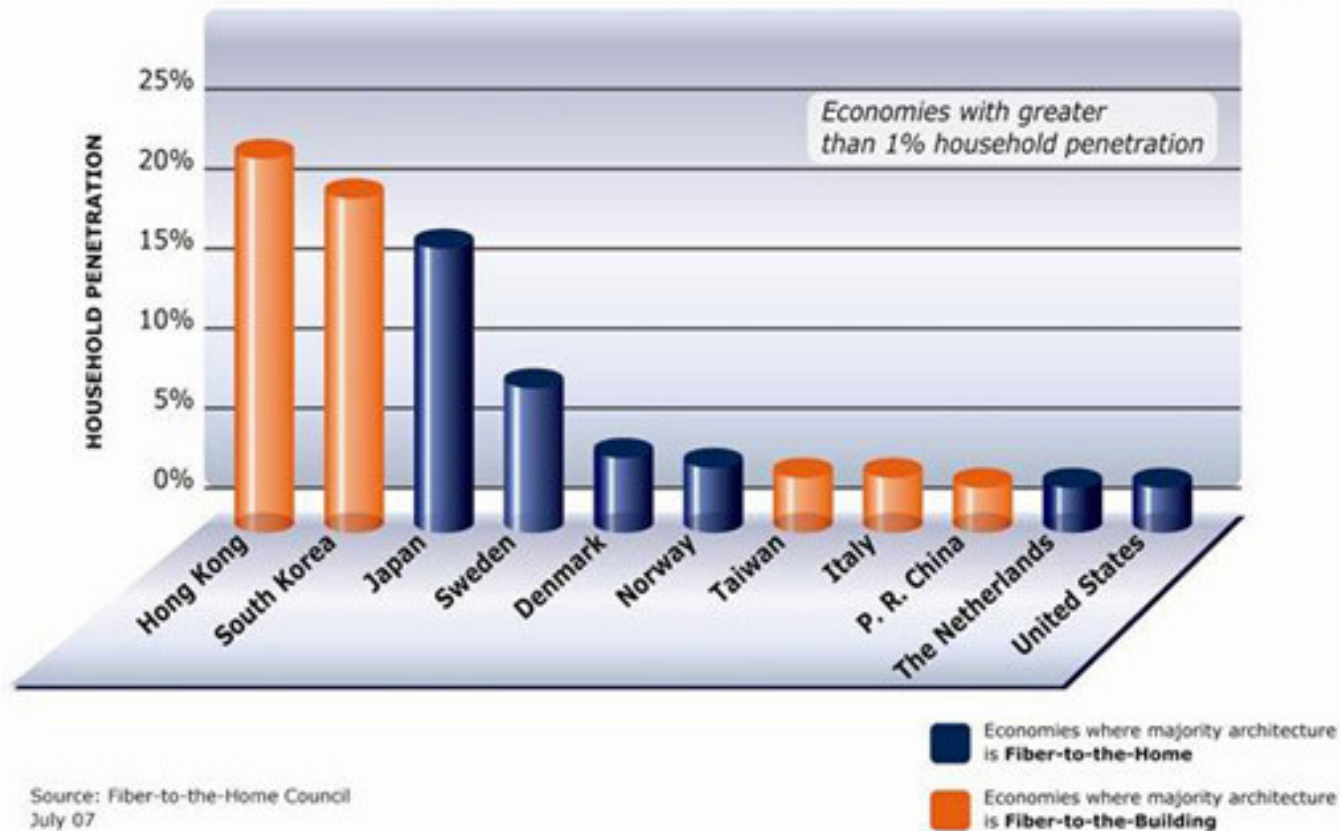


# Agenda

- A global overview
- A quick look at Asia
- What's new in Europe?
- What's (not) new in North America?
- Technology initiatives

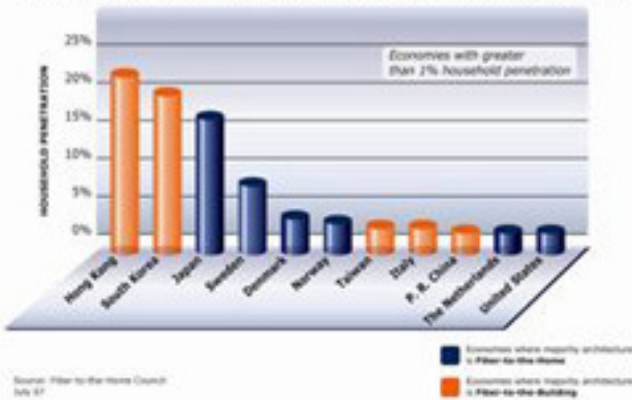
# You've seen this before

Economies with the Highest Penetration of Fiber-to-the-Home / Building



# Here's what it looks like now

Economies with the Highest Penetration of Fiber-to-the-Home / Building

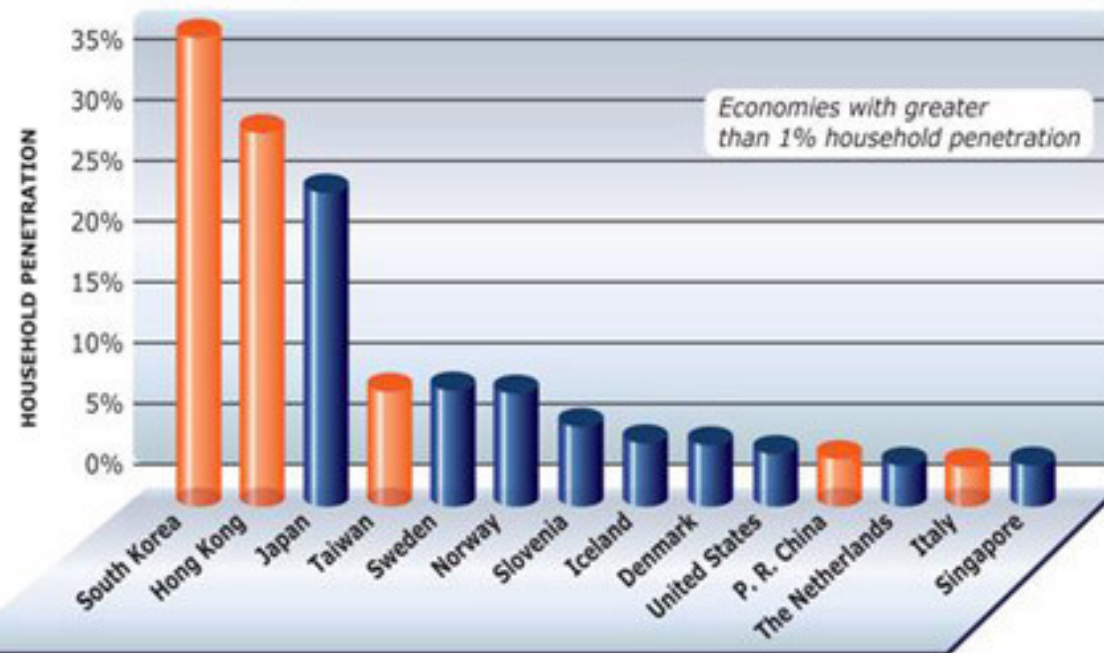


Source: Fiber-to-the-Home Council  
July 07

2007

2008

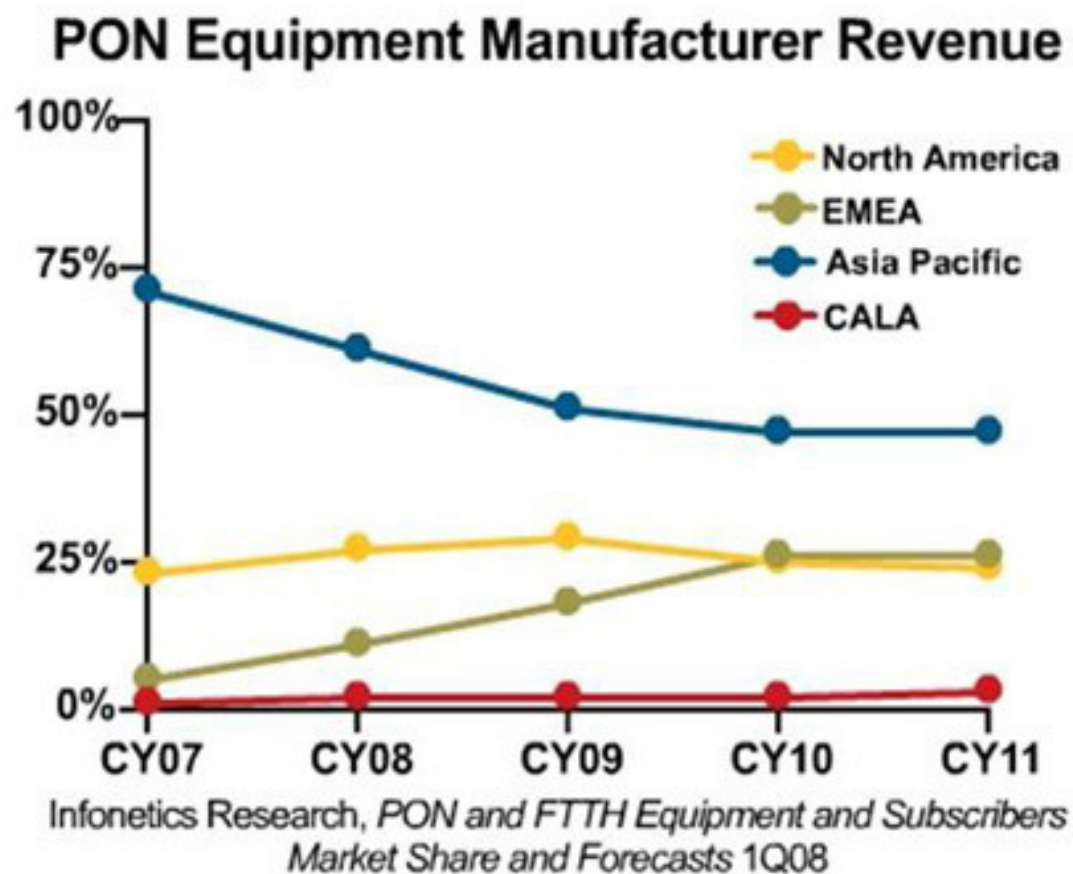
Economies with the Highest Penetration of Fiber-to-the-Home / Building+LAN



Mid-Year 2008 Ranking  
Source: Fiber-to-the-Home Council  
Jul 08

■ Economies where majority architecture is **Fiber-to-the-Home**  
■ Economies where majority architecture is **Fiber-to-the-Building+LAN**

# Asia continues to drive market



# GEPON remains most popular

FTTH Ports Shipped: 2007 Actual & 2008 Forecast

<u>Technology</u>	<b>2007 Actual</b>		<b>2008 Forecast</b>	
	<u>Ports Shipped</u>	<u>Market Share</u>	<u>Ports Shipped</u>	<u>Market Share</u>
GePON	4,510,000	71%	6,325,000	54%
GPON	410,000	7%	4,485,000	38%
Active Ethernet	172,000	19%	575,000	5%
BPON	1,211,000	3%	345,000	3%

Source: Dittberner 2008



# Initial results support worldwide growth forecast

- Dittberner: 1Q08 FTTH shipments up 33% vs. 1Q07
- Infonetics: GPON up 33% in 1Q08 vs. 4Q07.
- Dell'Oro Group: 2Q08 sales \$420.8 million vs. \$246.1 million in 2Q07.
  - 2008: EPON 51.3%, GPON 30.8%, BPON 17.9%
  - 2007: EPON 47.7%, GPON 6.5%, BPON 45.8%
- Point Topic: In 1Q08, more new FTTH subscribers (4.2 million) than new cable subscribers (2.5 million)

# Top companies for 1Q 2008

## ■ Dittberner (PON)

- Mitsubishi
- Sumitomo
- Tellabs
- Alcatel-Lucent
- Nokia Siemens

## ■ Infonetics (PON)

- Mitsubishi
- Tellabs
- Hitachi
  
- In GPON, Alcatel-Lucent leads, followed closely by Huawei



## Don't forget point-to-point Ethernet

- Popular for fiber to the business, apartment buildings, and open access networks
- Infonetics: 1Q08 Ethernet FTTH revenue fell 6% sequentially, but is expected to increase 75% by 1Q09
- Dittberner: Top suppliers include Cisco, Ericsson, PacketFront, and Iskratel

# Asia maintains leadership

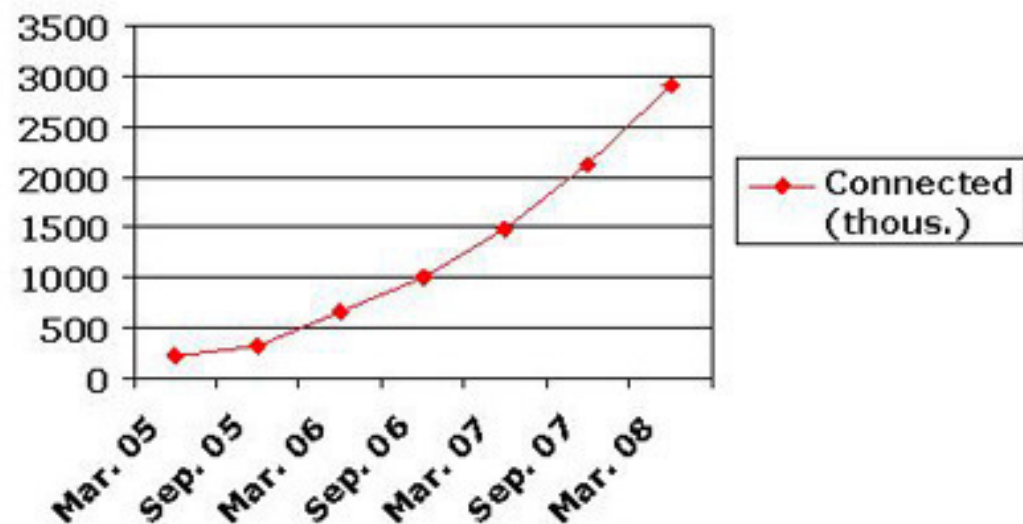
- EPON most popular technology, but GPON beginning to appear
- Japan
  - FTTH adds exceed DSL
  - 7 million homes and 2 million apartments served by fiber (Dittberner)
  - Rapid growth over?
- South Korea
  - KT (EPON) established, Hanaro (GPON) beginning, LG Powercom coming soon?
- China
  - Overtakes U.S. for most broadband subscribers
  - 7.5 million FTTH connections make China #2 in world (FTTH Councils)
  - Many new networks being deployed; others planned
    - China Mobile, PCCW?

# Europe continues to progress

- 1.4 million FTTH connections (FTTH Council Europe)
- Incumbents sign on
  - France Telecom, British Telecom, Telefonica
  - Portugal Telecom soon?
- Mix of technologies
  - Largest market for Active Ethernet
  - Incumbents like GPON
- Infrastructure sharing an issue
  - Demanded by regulators
  - Unevenly enforced
  - New policy coming soon – duct sharing?

# United States maintains past course

- Verizon/AT&T/Qwest  
72.3% of total
- 97% growth March 2007  
to March 2008
- Take rates 28.8%
  - 51.9% for non-Verizon/AT&T/Qwest
- BPON 32%, GPON 30%,  
Active Ethernet 25%,  
EPON 13%



Source: RVA Render & Associates, LLC 2008



# Verizon still leads

- FiOS Internet passed 11 million premises by 2Q08
  - FiOS TV passed 9.6 million by 2Q08
- 2 million FiOS Internet connections (2Q08)
- 1.4 million total FiOS TV customers (2Q08)
- Take rates 23.5% for Internet, 19.7% for TV
- IPTV and RF broadcast combination remains
- Moving to GPON
  - Tellabs drops out, leaving Alcatel-Lucent and Motorola



# Others follow own path

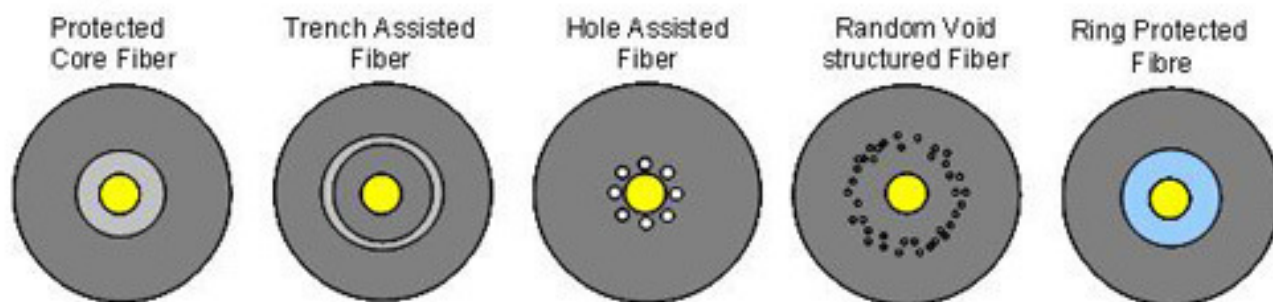
- AT&T still focuses on Fiber-to-the-Node
  - FTTH for new builds only
  - U-Verse offering has 549,000 TV subscribers
    - Expects to exceed 1 million by end of 2008
  - Passed more than 11 million living units (2Q08)
  - Goal is 30 million living units by end of 2010
  - Available in 53 markets in 13 states; 10% penetration
  - Alcatel-Lucent and Ericsson vendors for GPON
- Qwest decides on FTTX
- Interest from cable-TV companies?

# Technology initiatives

- Next-Generation PON
  - Both FSAN (GPON) and IEEE (EPON) working on new 10-Gbit/sec standards
  - EPON chip sets expected end of this year
  - Optical technology issues (cost), particularly for upstream speeds greater than 1 Gbit/sec, will delay deployment of symmetrical or near-symmetrical systems
- A place for WDM-PON?
  - Deployment interest limited to S. Korea presently
    - LG Nortel purchase of Novera Optics keeps this effort alive
  - Recent product announcements will test market interest

# Bend-tolerant fiber

- Began with NTT-developed technology
- Verizon demand for use in apartments spurs Western suppliers
  - Corning, OFS, Draka, Prysmian prominent players
- Very fierce competition



- 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)

(Courtesy OFS)



# Thank you!

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