

# Economics of FTTH

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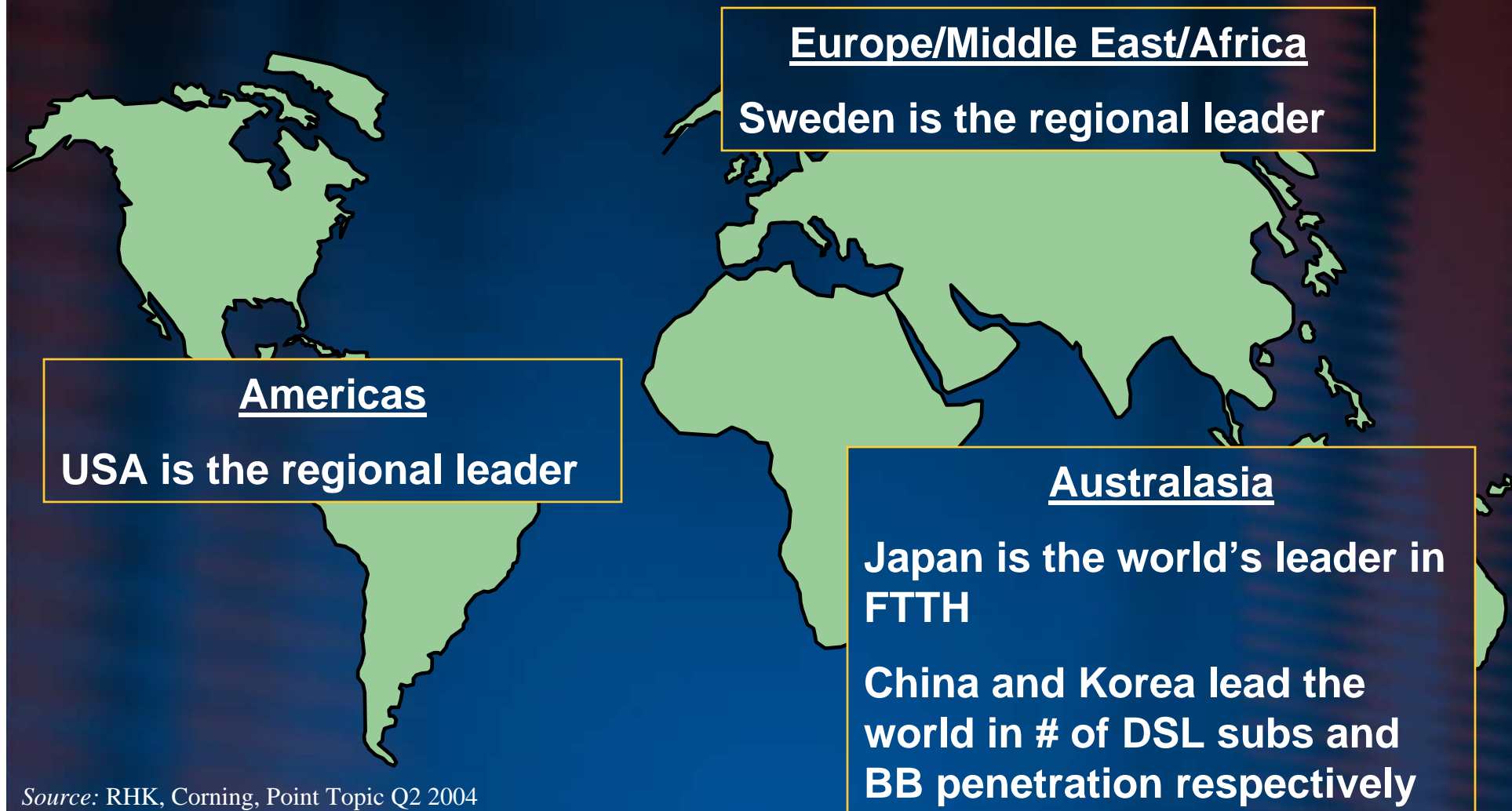
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# Agenda

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- Worldwide FTTH activity
- Economic Model
  - First Installed Costs
  - Financial Model
- Business Case Example
  - Net Income
  - Operational Expense (OPEX)
- Sensitivity Analysis
  - Initial Penetration Rate
  - Homes Passed
  - Percent Aerial Cable Installed
- Conclusions & Summary

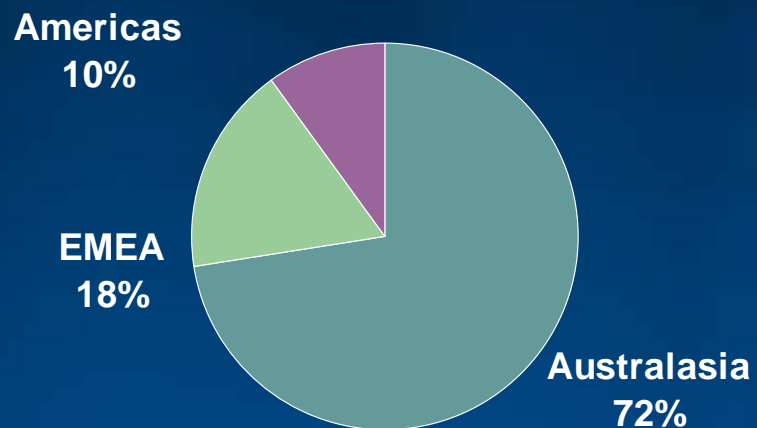
# Global Broadband Leaders



Source: RHK, Corning, Point Topic Q2 2004

# Global Broadband Leaders

**FTTH lines by region**

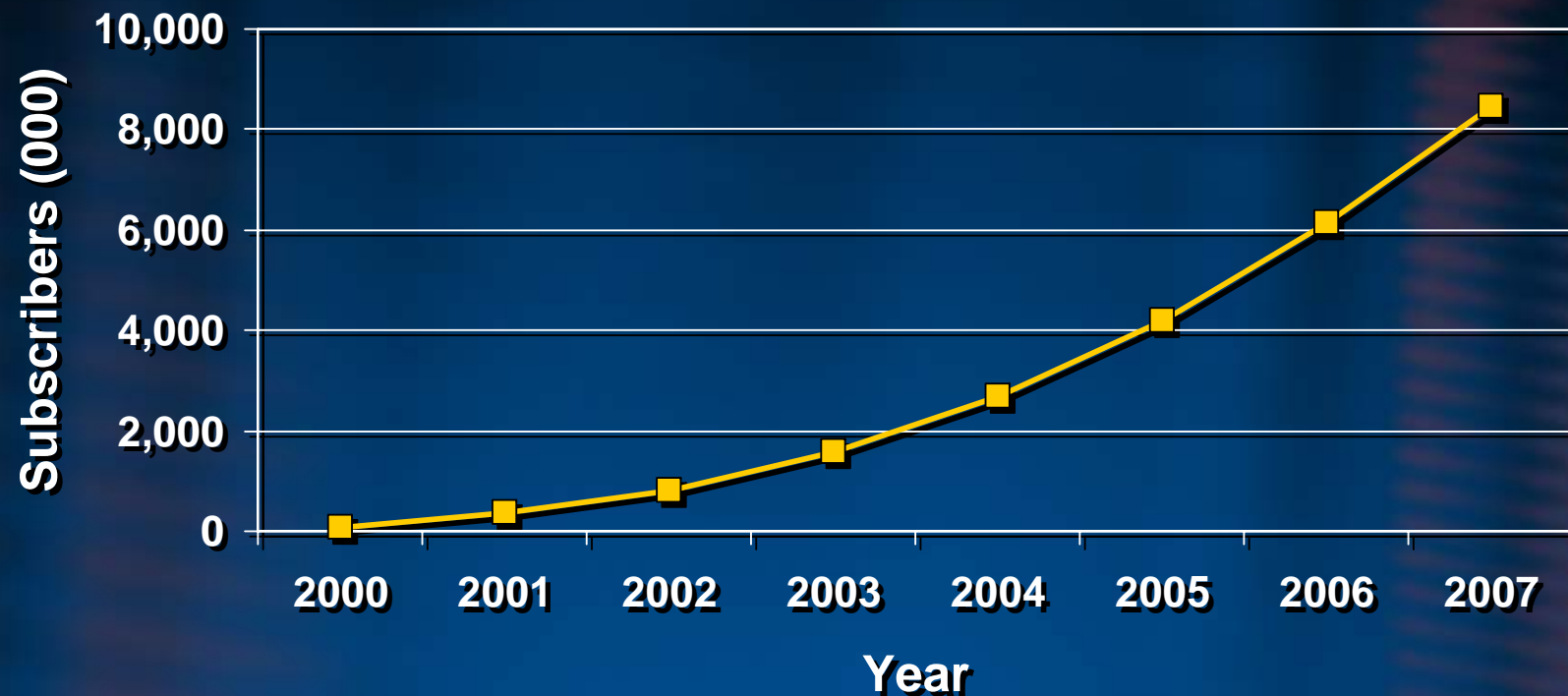


Source: RHK, Corning, Point Topic Q2 2004

# Worldwide FTTH Opportunity

## *Subscribers expected to grow at 220% CAGR*

**Fiber to the Home Broadband Subscribers**



Source: Cahners In-Stat Group, RHK, Corning

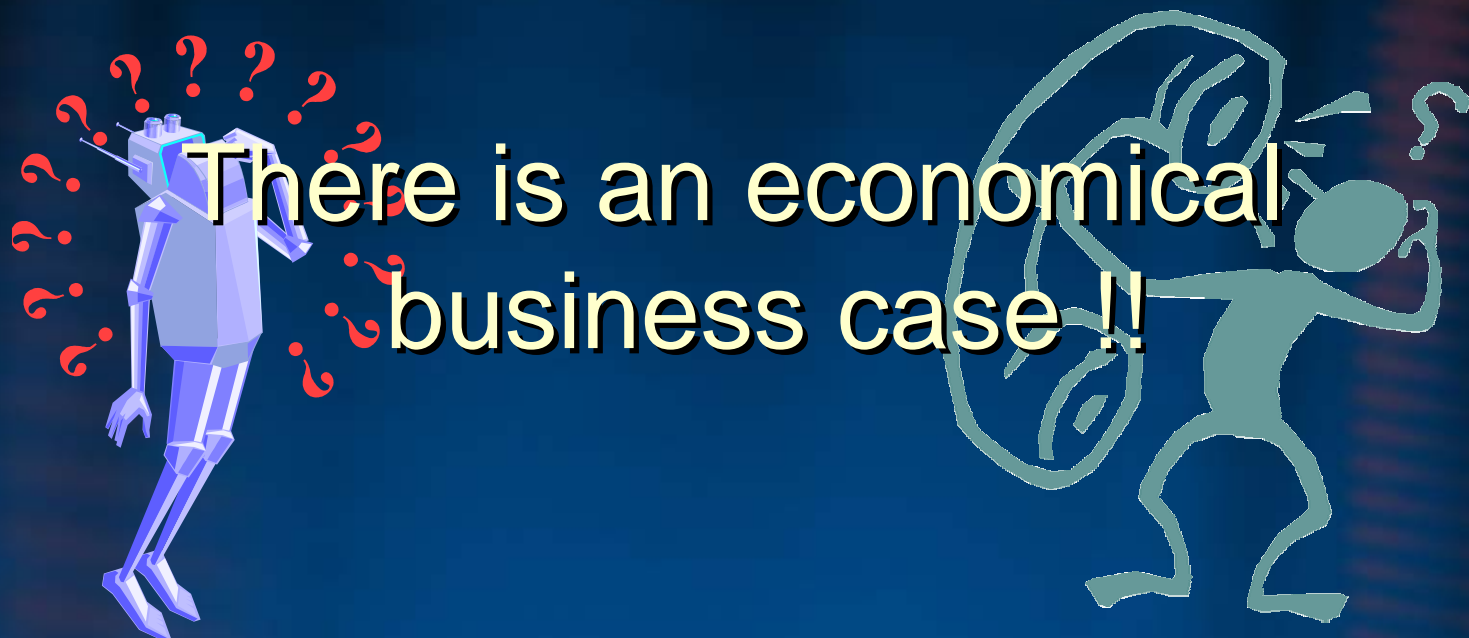


## List of Lit 'US Optical Fiber Communities'\*



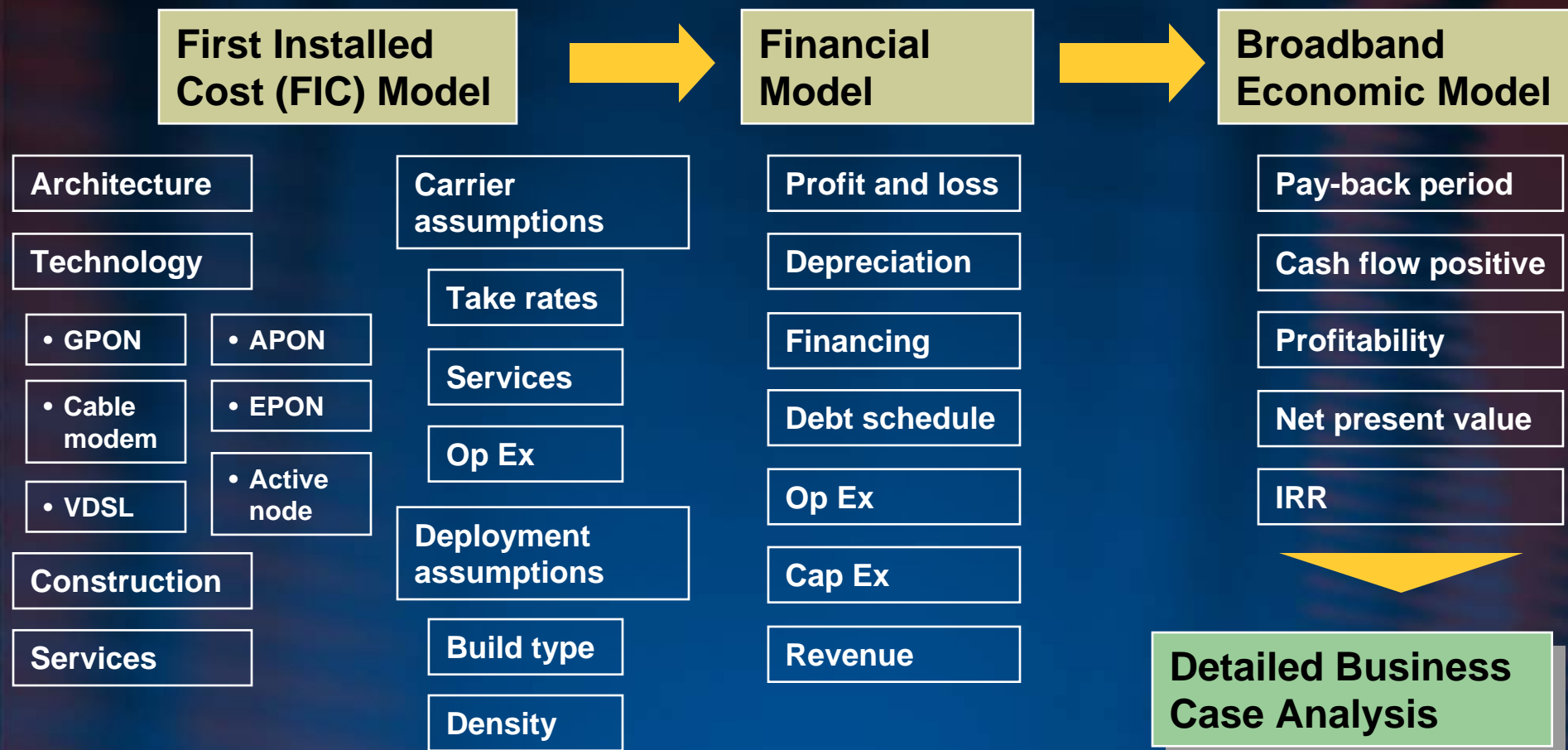
# Why are communities going with FTTH?

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# Broadband Economic Model

## *Conceptual structure*





# FTTH Cost Analysis

## *What to expect...*

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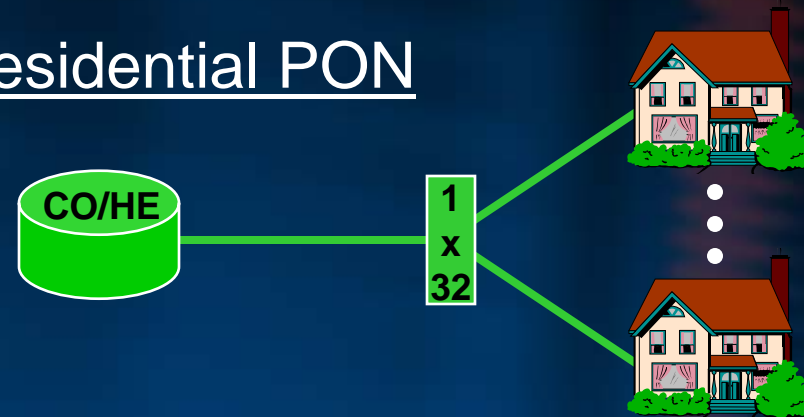
- What this is not...
  - A discussion of individual equipment costs
  - A comparison of active and passive fiber architectures
  - An analysis of the sub-components of FTTH electronics
- What this is...
  - An analysis of generic FTTH networks based on several different modeling techniques
  - An understanding of how some levers impact cost
  - An exploration of life-cycle costs

# FTTH Cost Analysis

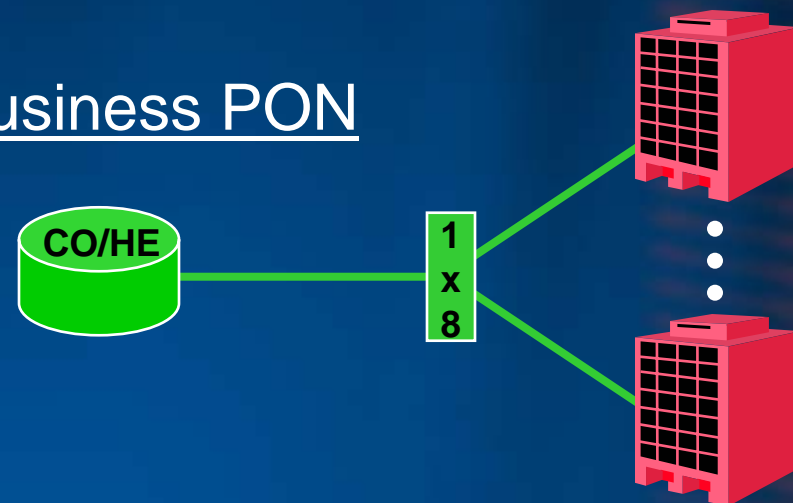
## ***Background and model network architecture***

- Based on prominent FTTH vendor solutions and network adjunct equipment
  - Specifications
  - Pricing
- Only assumptions are the configuration of the subscriber base

### Residential PON



### Business PON



# FTTH Business Case Analysis

## *Inputs to establish the base case*

- 28,555 residential subscribers
- 2,358 business subscribers
- 25% reserve fiber
- 65% aerial cable
- 36.12 square miles
- Overbuild

### Network Input Variables

#### Residential Variables

Penetration Rate	35%
Single Family Dwelling Units Total	28,555
1 Unit Detached	26,531
1 Unit Attached	1,198
Mobile Homes	826
Low Density MDUs Total Units	
2 Units	351
3 to 4 Units	1,228
Medium Density MDUs Total Units	
5 to 9 Units	1,108
10 to 19 Units	980
High Density MDUs	
20 or more Units	3619
Design Bandwidth (Mbps) per Apartment in High Density MDUs	5
High Density MDU Penetration Rate	100%

#### Business Variables

Business Penetration Rate	35%
Business Units Potential	2,358
Business Units by Penetration Rate	825

# FTTH Business Case Analysis

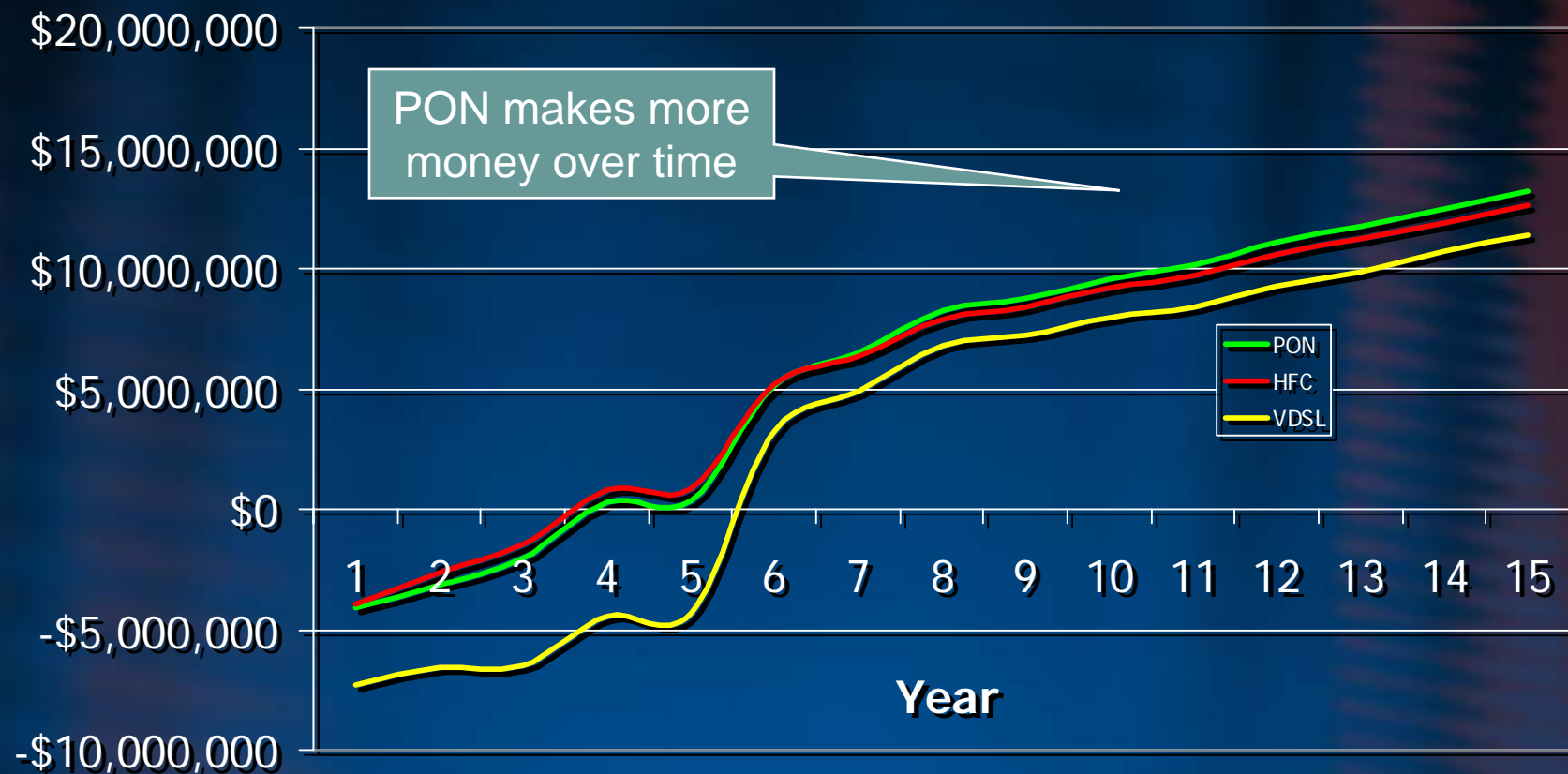
## *Comparison to other technologies*

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- Three architectures studied
  - PON architecture
  - HFC architecture
  - VDSL architecture
- Results analyzed
  - Net Income
  - Operational Expenses

# Architecture Comparison on Net Income

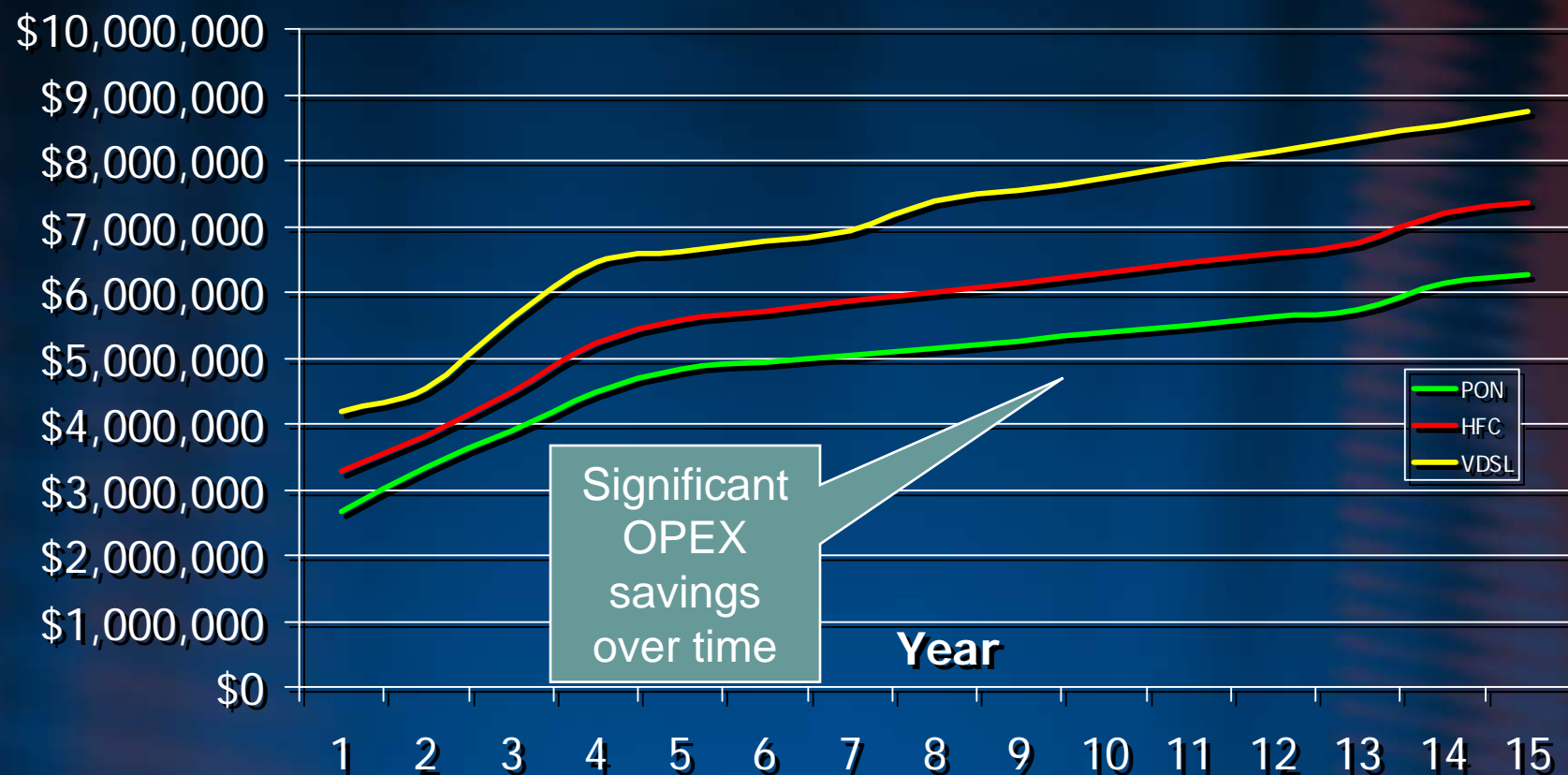
## PON, HFC, VDSL





# Architecture Comparison on OPEX

## PON, HFC, VDSL



# OPEX Savings with FTTH is Significant

- HFC OPEX ( $>1.15X$ ) and VDSL OPEX ( $>1.4X$ ) are larger than PON OPEX
- Drivers
  - Employees required to maintain PON is less than HFC (1.38X) and VDSL (1.54X)
    - Less salary and expenses
    - Less office related expenditures
  - Cost of repair is larger for VDSL and HFC ( $\sim 1.55X$ ) than for PON
    - More truck rolls
    - More tools & vehicles
  - Power consumption of the PON is 20X smaller than HFC or VDSL

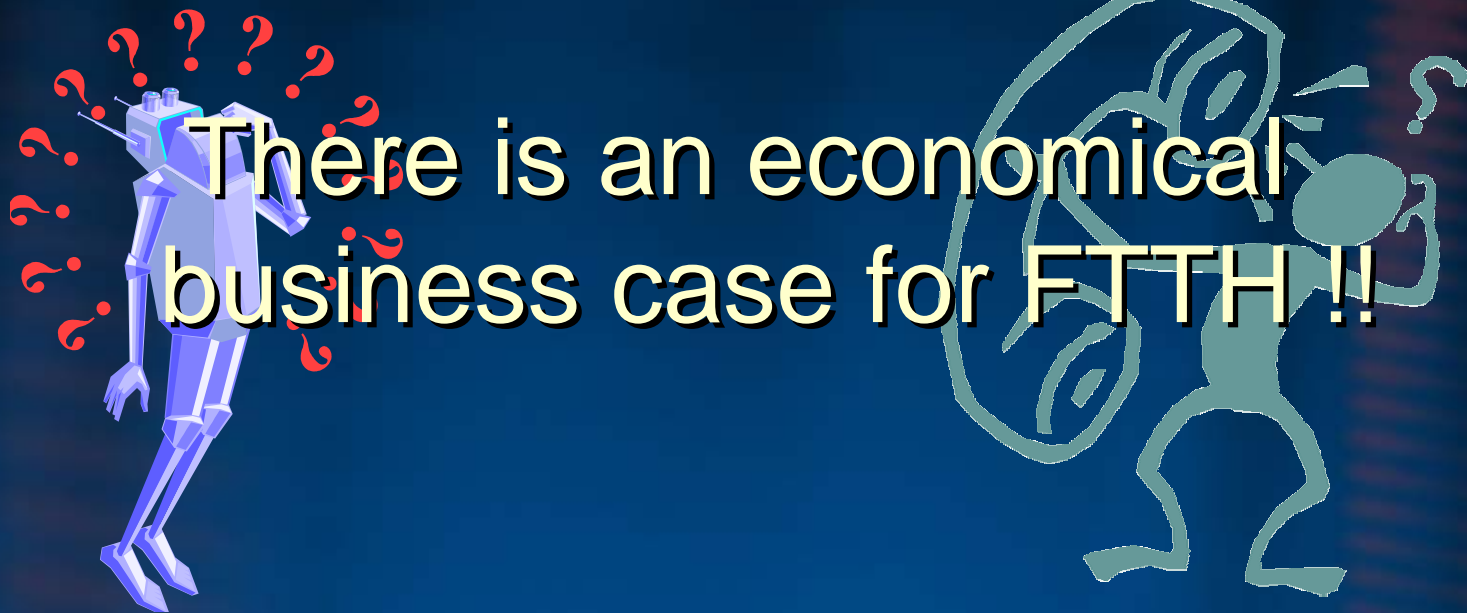
## Other Factors Driving FTTH

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- Competition is driving carriers to become triple play providers
- Loss of access lines by RBOCs creating need for new revenue streams
- Operational expenses for legacy networks are in desperate need of improvement
- Regulations have lowered the risk of investment to RBOCs
- Municipalities business case is viable due to long payback periods
- FTTH electronic costs have been in steep decline
- Other economical considerations
  - new fiber types and pre-connectorized drop cables allow optimal network design and add flexibility

## The Conclusion?

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There is an economical  
business case for FTTH !!

# FTTH Business Case Analysis

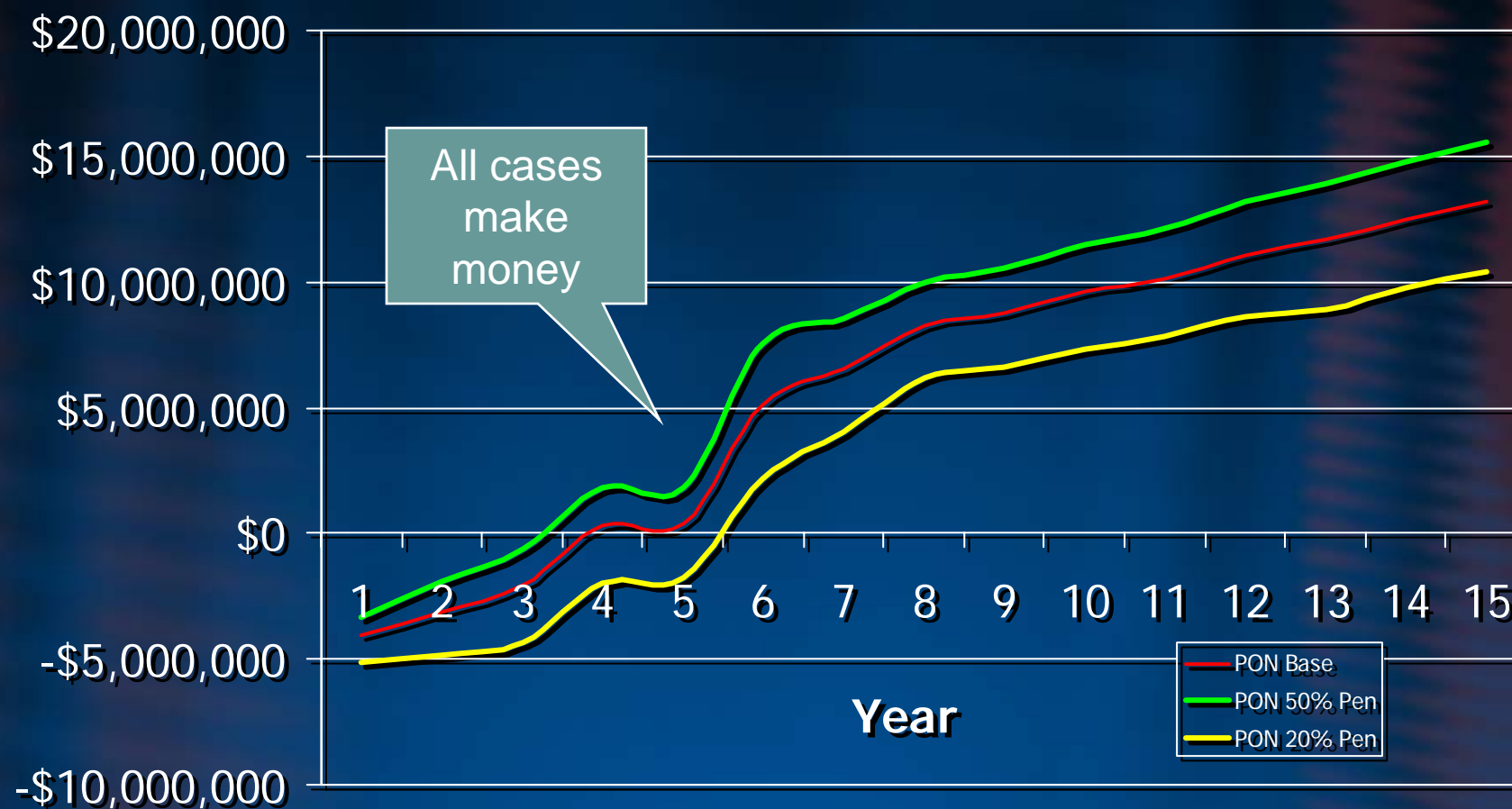
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- Input Variable Studied
  - Initial Penetration Rate
  - Homes Passed
  - % Aerial cable installed
- Output Variable Studied
  - Net Income



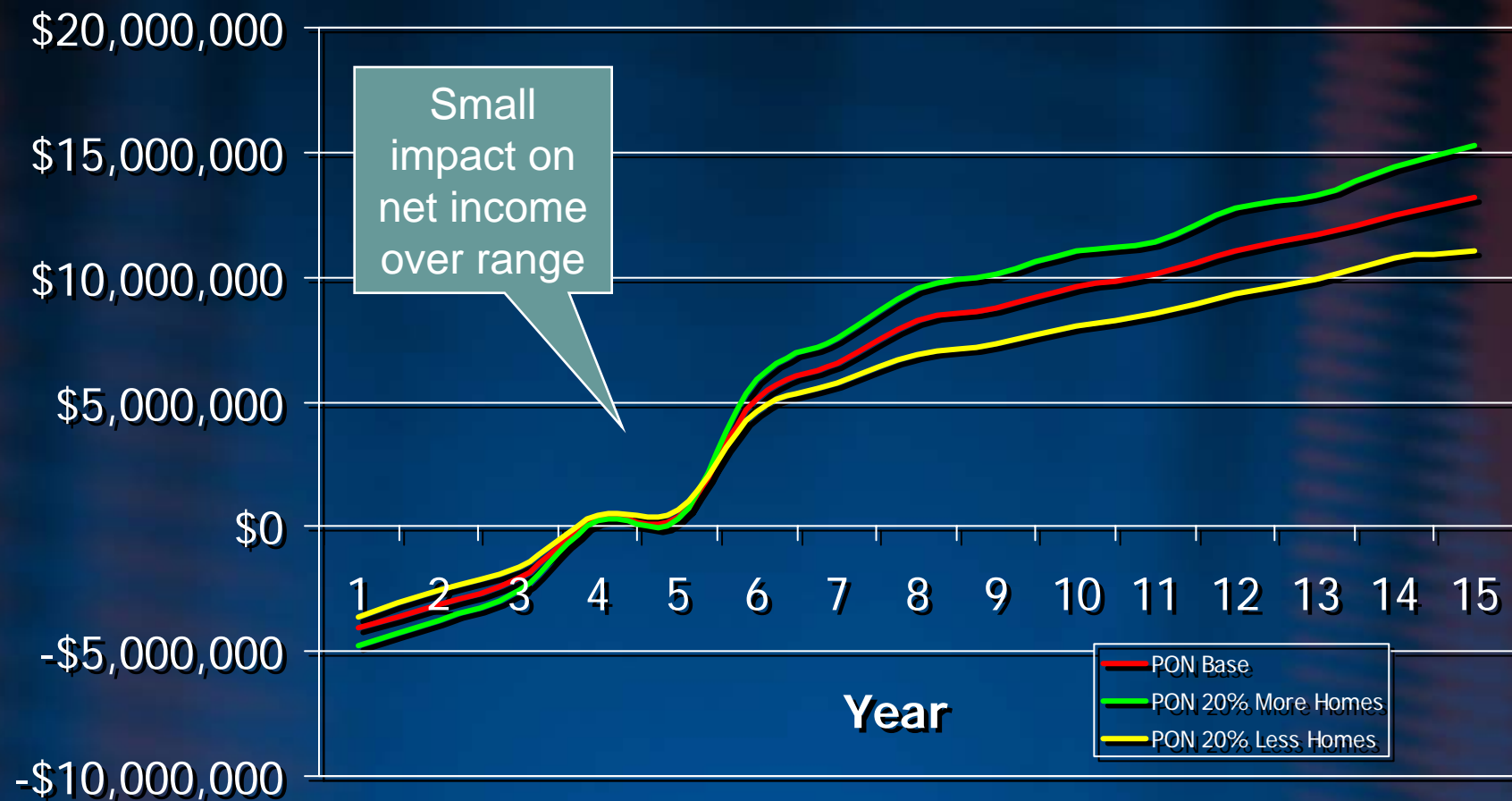
# Effect of Initial Penetration Rate on Net Income

## PON Network



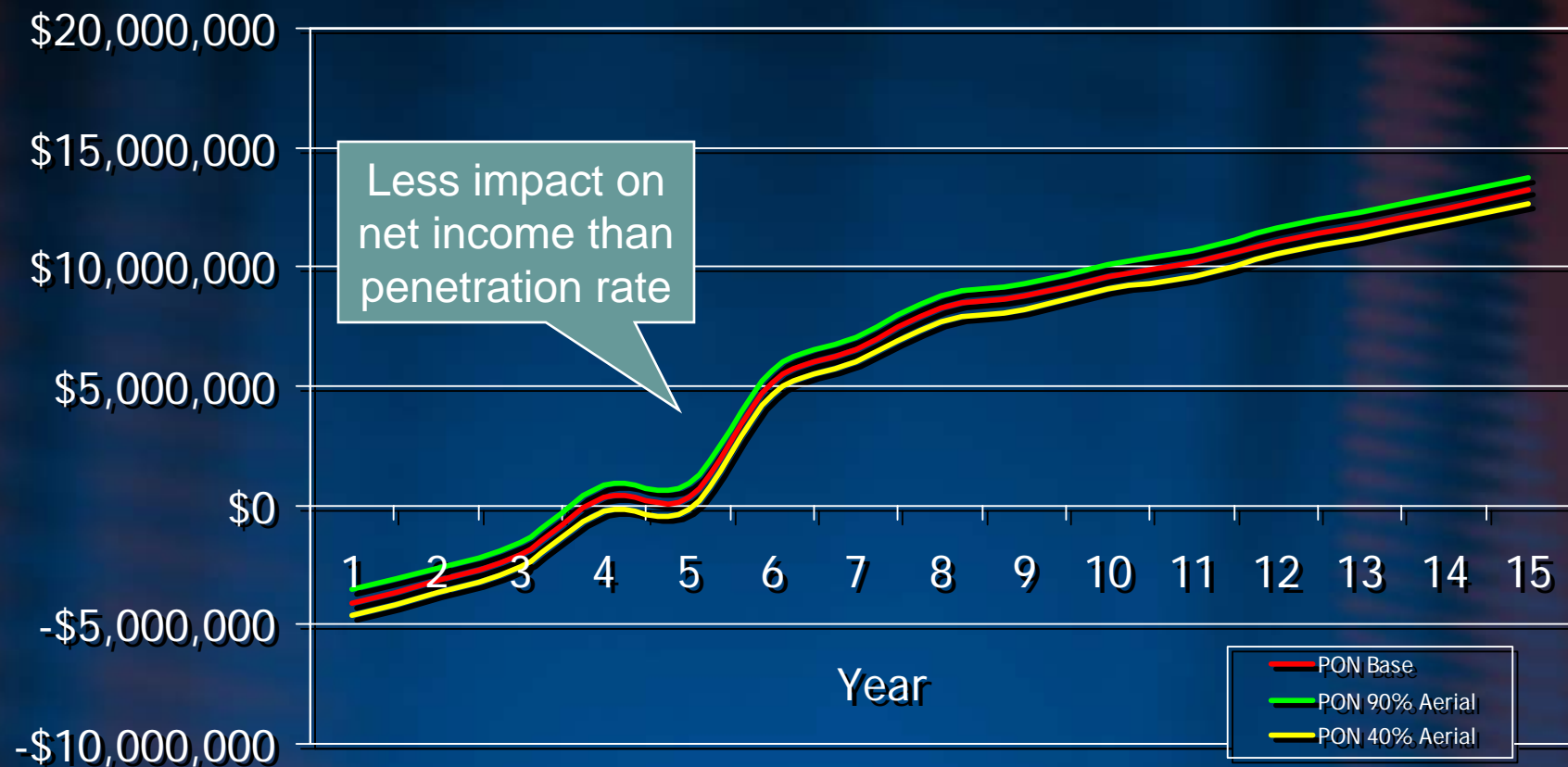
# Effect of Homes Passed on Net Income

## PON Network



# Effect of % Aerial on Net Income

## PON Network



# FTTH Cost Analysis

## *Conclusions and other observations*

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### Basic financial cost levers

- Initial penetration rate has a moderate impact on net income but a wide range of rates make money over time
- Homes passed in a fixed area has a small to moderate impact on net income over time
- % Aerial of the network has a small impact on net income over time

### Other observations of cost levers

- Percentage of aerial installation versus buried installation has a significant impact on initial cost per subscriber

# Questions?



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