Overseas Examples of Open Access FTTP Networks

Communications Alliance
Oct 2009

Global Overview

- Global Overview
- Japan – NTT
- Singapore – NetCo + OpCo
- Netherlands – Amsterdam CityNet
- Sweden – Municipal Networks
- UK – BT OpenReach
- USA – Verizon (not Open Access)
- Appendix A : Japan NTT
- Appendix B: Singapore Next Gen NBN

Global FTTH Penetration (total ~40M)

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

- (blue) Fibre-to-the-Home Subscribers
- (orange) Fibre-to-the-Building + LAN subscribers

Economies with greater than 1% household penetration

Household Penetration
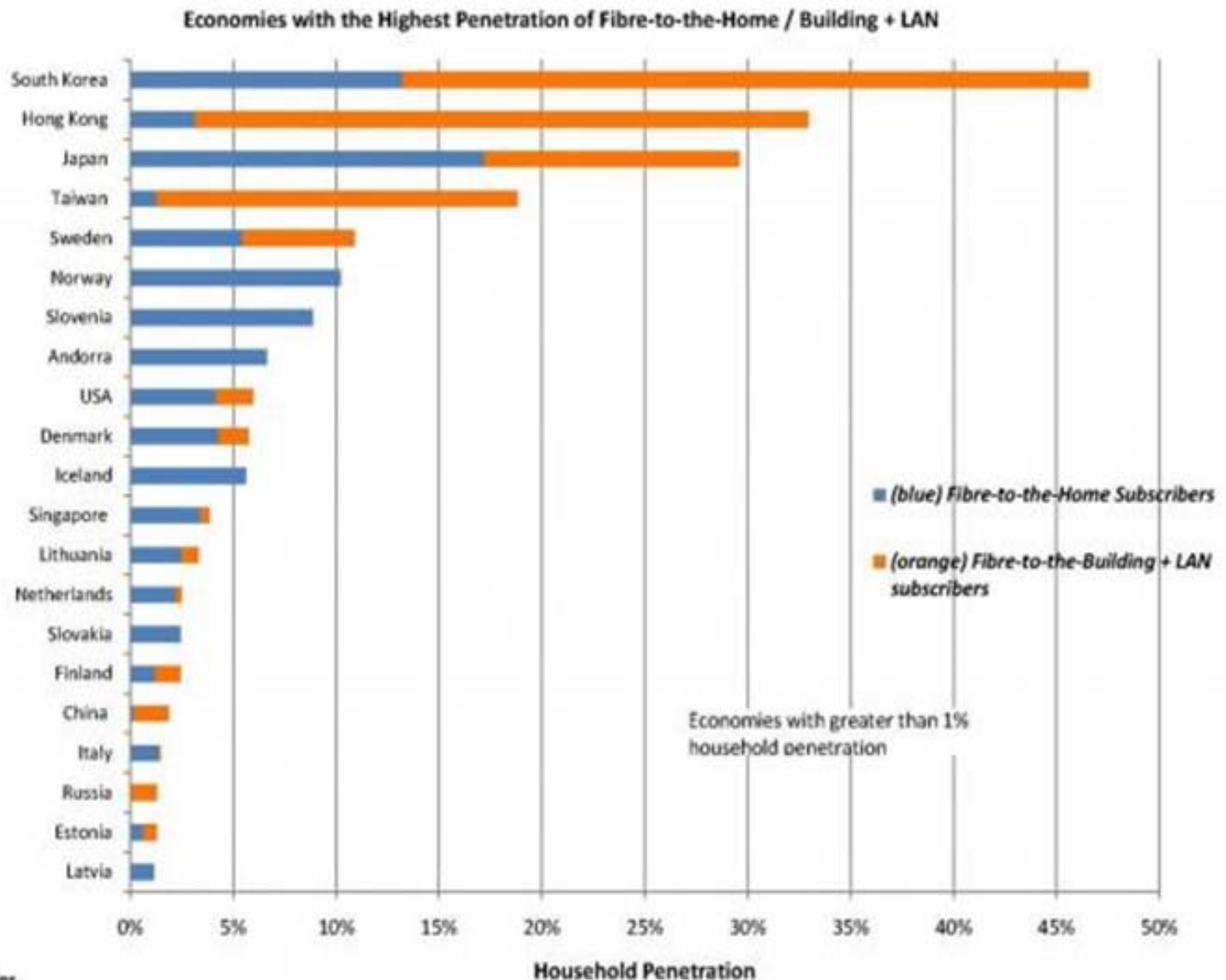
Global Overview

- Global estimate of FTTH/FTTP connected subscribers is ~40M

- Many of the FTTH/FTTP networks are "vertically-integrated" with all retail services (Internet, TV/video, Telephony) being provided by the owner/operator of the FTTH/FTTP network.

- This presentation focuses on those networks known to be primarily "open-access" i.e. provide wholesale access services to other retail operators/service providers.

- The list covered is not exhaustive, but does include some of the largest and most notable networks in the world.

- For comparison, Verizon, a large network which is NOT open-access is also discussed.

Japan NTT (East+West)

- NTT's B-FLET offers both wholesale active access, and wholesale passive ("dark fibre") access to access seekers.

- In 2009 NTT connected aprox. 25M subscribers. From 2005 there has been a net churn of subscribers from DSL to FTTP services, with FTTP overtaking DSL in 2008.

- There are other competing FTTP services in Japan from USEN and KDDI, as well as operators providing network services over NTT dark fibre (e.g. SoftBank BB).

- NTT use an implementation of IEEE EPON (often referred to as GEPON or Gigabit EPON) to stand-alone residences, and either Point-to-Point service to Apartment Buildings with copper in-building distribution (Fibre to the Building) or GEPON with a splitter cabinet in the basement and in-building fibre distribution.

- A substantial portion of the outside cable plant is aerial, as is much electricity distribution in Japan.

Singapore – Next Gen NBN

- Initiated by the Government's Infracomm Development Authority (iDA) to realise the national ICT vision "IN2015"

- Structured with distinct passive (NetCo), wholesale active (OpCo) and retail service provider (RSP) layers, with very strict cross-ownership rules.

- After an extended period of industry comment separate tenders were run for NetCo and OpCo.

- The incumbent PTT SingTel was a participant in the winning NetCo (passives) consortium, and provided for the use of SingTel duct and manhole infrastructure.

- Long term ambition is to provide 1Gbps downlink services to most end-users.

- Target is nation-wide coverage across 1.1m households by 2012, with USO obligations commencing in 2013.

The Netherlands – Amsterdam CityNet

- After Government seed funding several open-access municipal FTTH/FTTP networks were setup in Dutch cities.

- The incumbent KPN has bought into several of these networks.

- Amsterdam's Citynet began construction in 2007, and completed it's first phase passing 40,000 homes in mid-2008. Ultimate objective is 450,000 homes passed by 2013.

- The passive cable plant was 1/3 funded by the City of Amsterdam, 1/3 by several large public housing organisations, and 1/3 ING bank.

- The wholesale active operator was selected by tender. The winner was BBned, a subsidiary of Telecom Italia.

Sweden – Zitius

- Sweden has the highest penetration of FTTH/FTTP in Europe, as a consequence of early government encouragement of municipal open-access builds and a popular rebate program.

- The Swedish Urban Network Association counts 155 urban networks of which 85% are municipal networks. (Often the municipality owns the local electricity company who actually builds and operates the network for the city.)

- Outside of Stockholm the municipal network will build and own both the passive and active infrastructure. In central Stockholm the passive network is built and owned by the city-owned company "Stokab", with different parts of the network assigned to different wholesale active operators.

- "Zitius" is an active operator providing wholesale services across a range of large public housing complexes in Stockholm and Gothenburg.

UK – BT OpenReach

- UK in general is lagging Western Europe in deploying FTTH/FTTP.

- Focus is on FTTC (fibre to the cabinet) in brownfields, with FTTP/FTTH in greenfields.

- FTTC pilots in mid-2009, with substantial builds in 2010.

- FTTP/FTTH deployment in greenfields determined by property market – currently very slow.

USA – Verizon (NOT "open access")

- Began FTTP rollout in 2005, after being granted "protection from unbundling" by the FCC.

- Verizon in Q1 2009 connected over 2.8M subscribers, with most also taking the video service.

- Initial technology choice was BPON, but in 2009 Verizon changed to GPON for new installations. TV/video are currently using RF-video.

- Video service has a strong emphasis by Verizon (and all US FTTP operators) as it is popular in the US market, and helps telco's fight back against the MSO (cable TV) operators who also offer telephony and Internet access.

- Legislation regarding Pay-TV has been changed in several US states to allow Verizon to operate and compete against the cable TV companies who previously enjoyed regional monopolies.
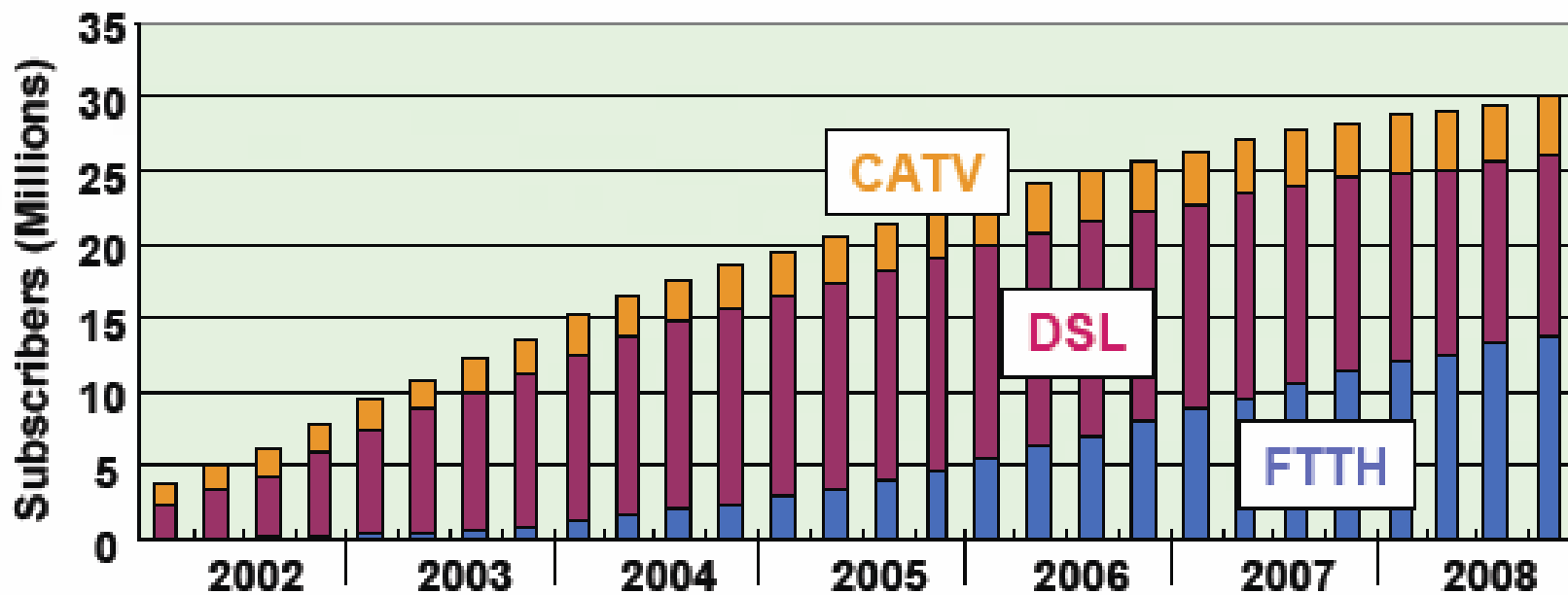
Sources

- "FTTH Review & Five-Year Forecast", Heavy Reading, vol 7, no 7, July 2009

- "CityNet Amsterdam: Fibre-to-the-home is becoming a reality", ING Sector Update

- "Massive FTTH rollout in NTT", Nov 19, 2008, Digiworldsummit 2008. Hiromichi Shinohara, NTT

- "Blazing the Trail : Singapore's Next Generation National Broadband Network", Annual Conference FTTH Council Asia-Pac, Melbourne 2009, iDA Singapore

Appendix A: Japan NTT
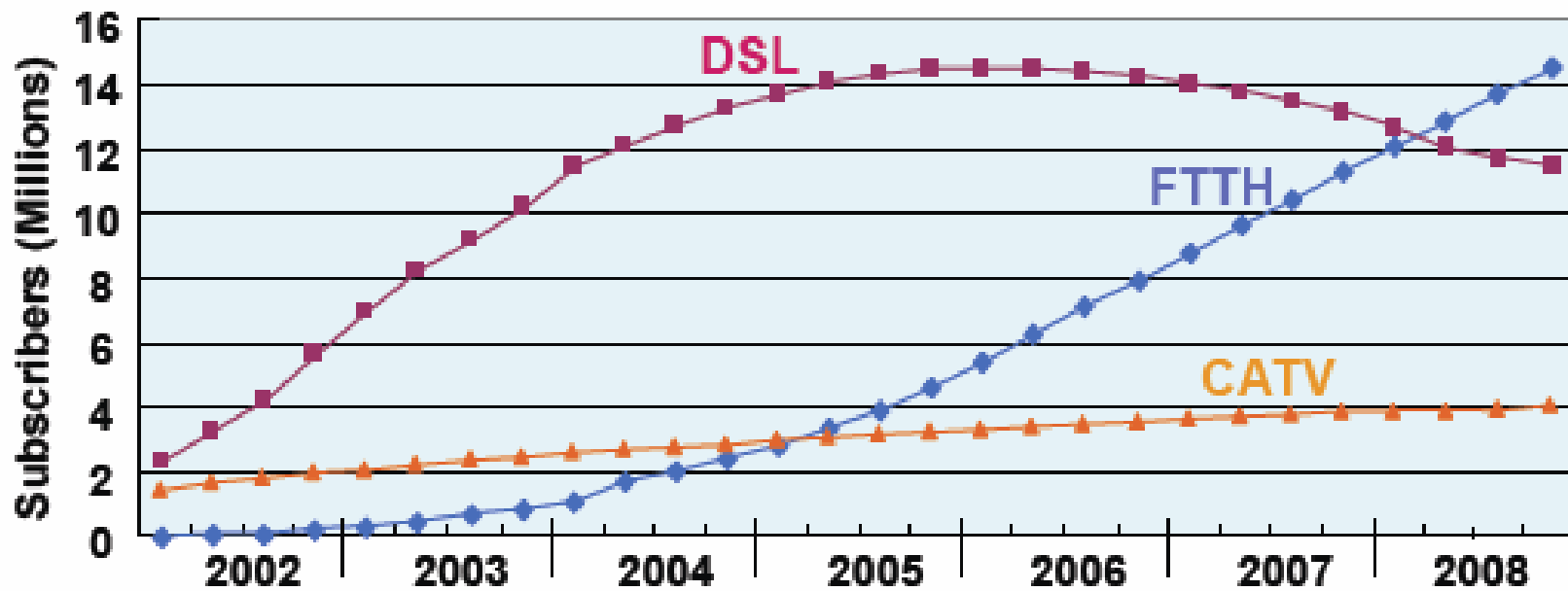
Source: Ministry of internal affairs and communications, Japanese government (March, 2009)

NTT's obligations for unbundling & sharing

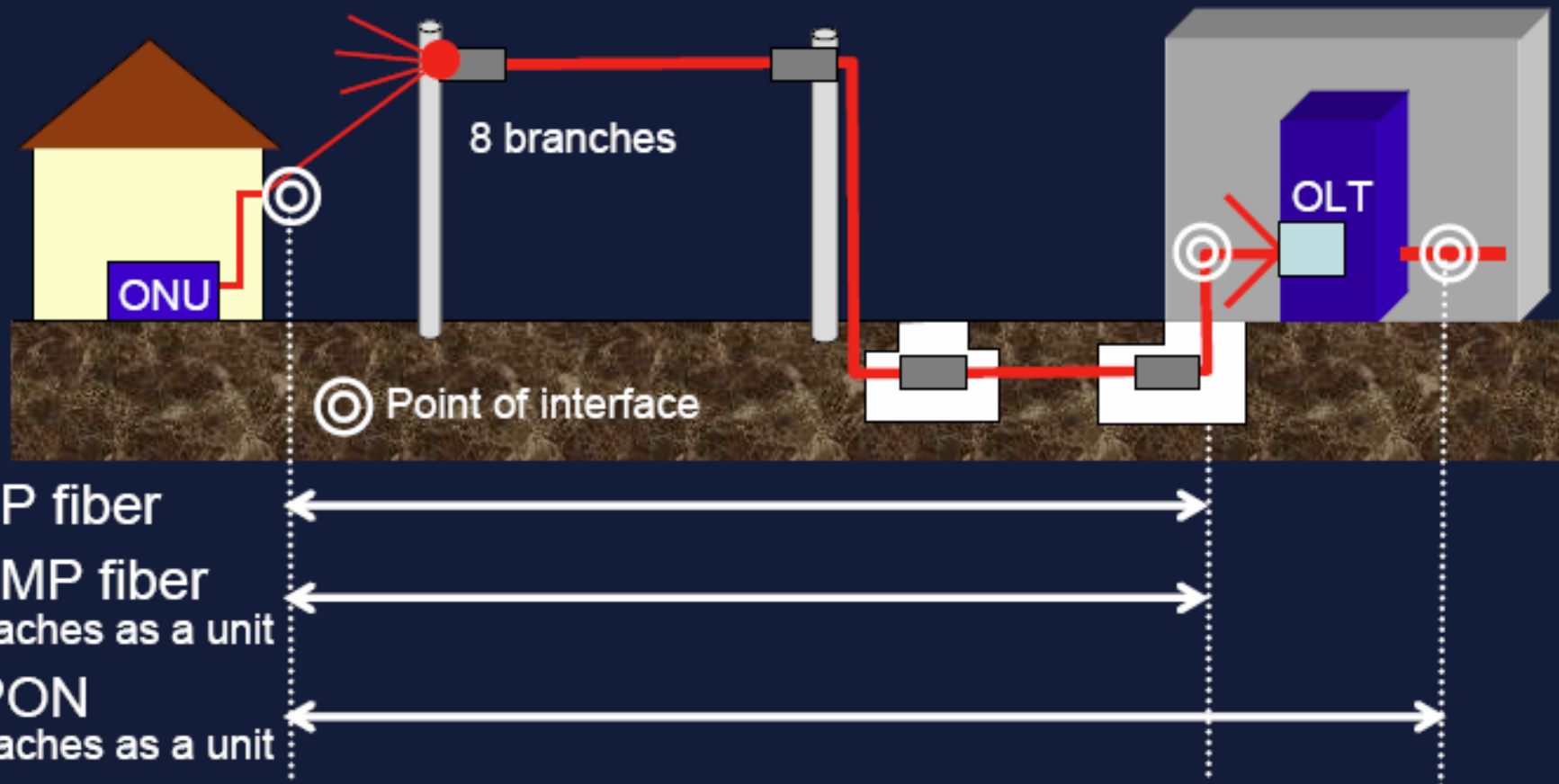- ✓ Dark fiber
- ✓ Poles sharing
- ✓ Ducts must be leased if available

8 branches

OLT

ONU

◎ Point of interface

P2P fiber

P2MP fiber
8braches as a unit

EPON
8braches as a unit

NTT

Typical B-FLET's application services

Transaction	Communication	Broadcast retransmission
Internet access - Shopping - Trading - etc. VOD (IP video) **Flet's square** (content service) **Podcasting** **Location free video**	**VoIP** (with 050 AB….J) **Hikari-denwa** (High-quality IP phone with 0AB……J) **Video telephony**	**RF overlay** **IP broadcast** as NGN service
offered by NTT	offered by NTT in conjunction with ISP or satellite television provider	offered by ISP

NTT

Appendix B: Singapore – Next Gen NBN

Layered Approach to Ensure Open Access

Consumers / End-users

Services
(including services & CPE)

Operational Separation
to ensure Open Access

Structural Separation
to ensure Open Access

Active Infrastructure
(including switches & routers)

Next Gen NBN OpCo

Passive Infrastructure
(including wirelines & ducts)

Next Gen NBN NetCo
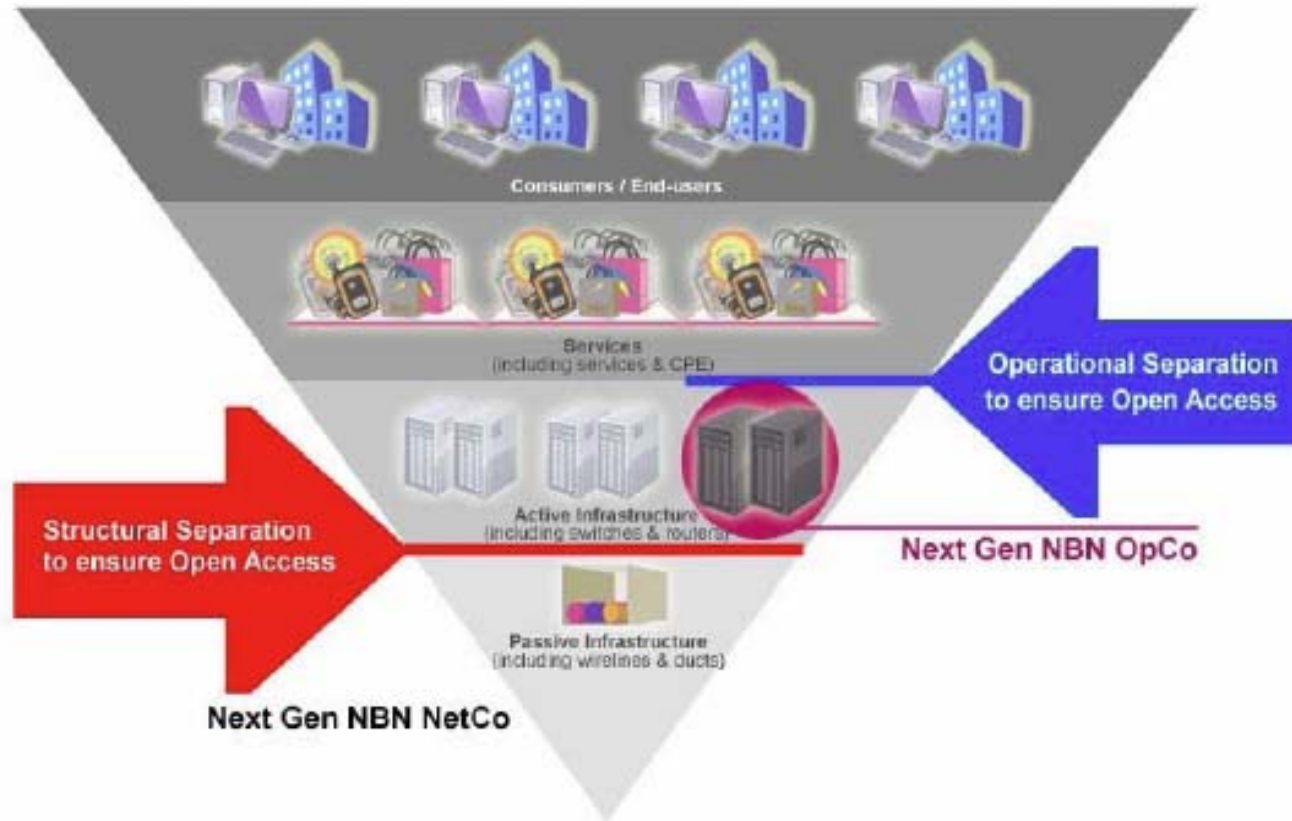
NGNBN Bandwidth Requirements

Bandwidth Type	By Commercial Operations Date	Beyond Commercial Operations Date
Peak Downstream Bandwidth per Residential Connection	**100 Mbps**	Shall be scalable to enable future downlink bandwidths in excess of 1Gbps per End-User Connection
Peak Upstream Bandwidth per Residential Connection	**50 Mbps**	Shall keep pace with or even exceed the downlink bandwidth as it is increased
Committed Downstream Bandwidth per Residential Connection	**25 Mbps**	Shall increase over time *(required to support next generation services e.g. high definition video streams)*

Next Gen NBN Coverage Requirements
Categories of Premise

Residential

- public housing
- private apartments
- private landed housing
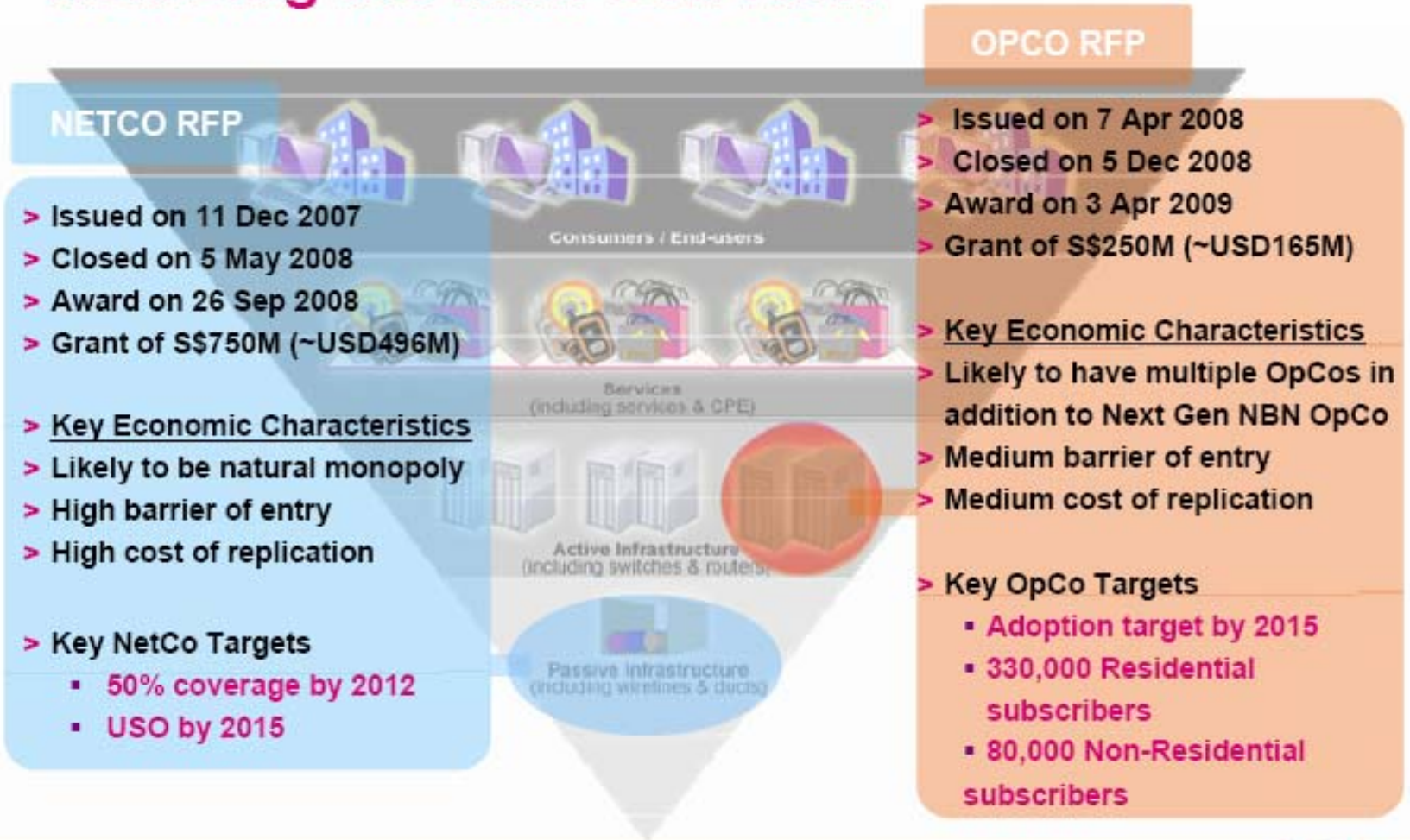
Non-Residential

- commercial blocks
- industrial blocks
- institutional properties
- government offices
- schools
- hospitals
- libraries
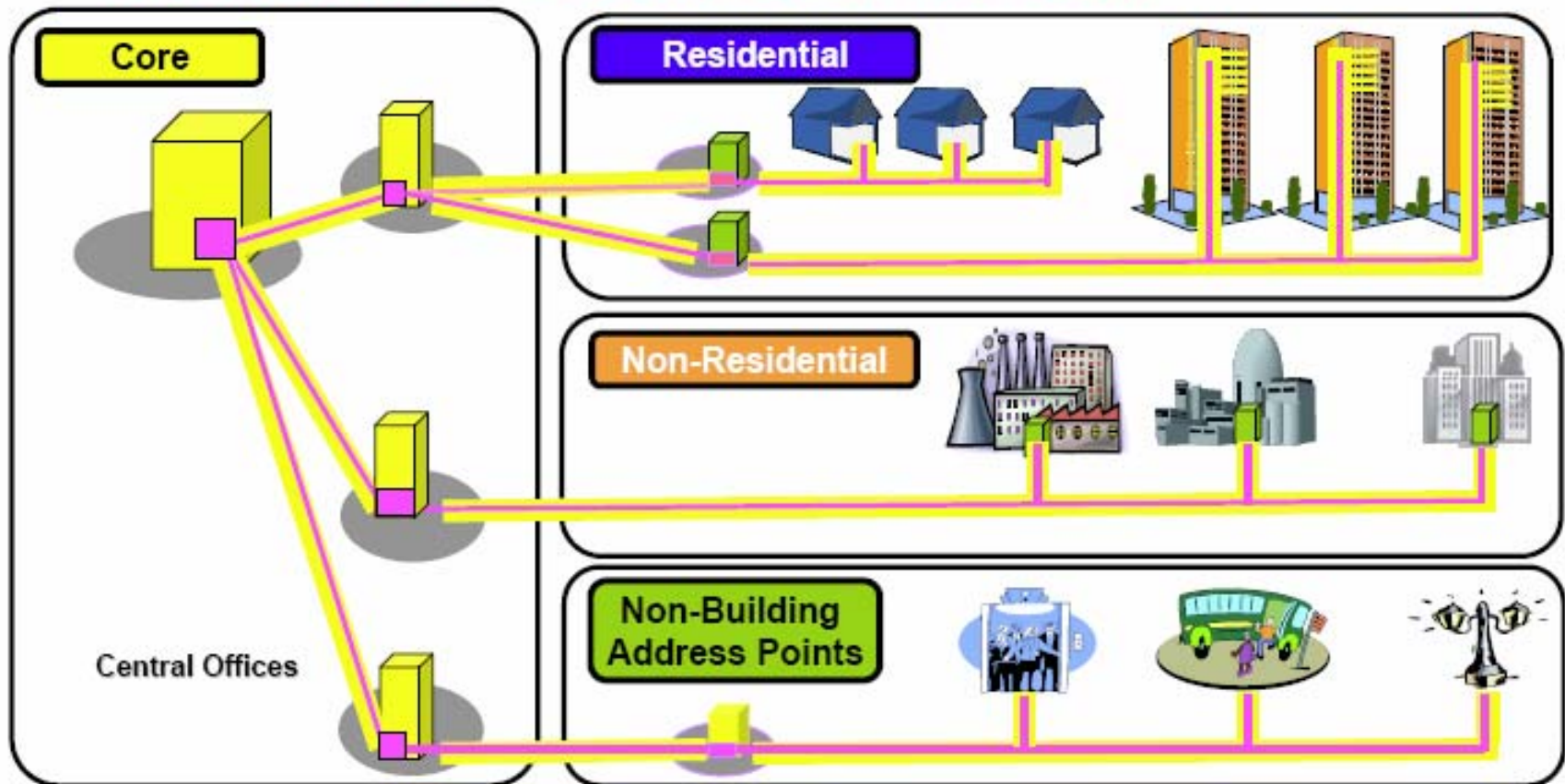
Non-Building Address Points

- lamp-posts
- bus stops
- traffic junctions
- lift monitoring rooms
- lift lobbies
- wireless access points
- street-side display signs
- other address points in Singapore and connected islands

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Realising the Next Gen NBN

OPCO RFP

NETCO RFP

> Issued on 11 Dec 2007
> Closed on 5 May 2008
> Award on 26 Sep 2008
> Grant of S$750M (~USD496M)

> Key Economic Characteristics
> Likely to be natural monopoly
> High barrier of entry
> High cost of replication

> Key NetCo Targets
  - 50% coverage by 2012
  - USO by 2015

Consumers / End-users

Services
(including services & CPE)

Active Infrastructure
(including switches & routers)

Passive Infrastructure
(including wirelines & ducts)

> Issued on 7 Apr 2008
> Closed on 5 Dec 2008
> Award on 3 Apr 2009
> Grant of S$250M (~USD165M)

> Key Economic Characteristics
> Likely to have multiple OpCos in addition to Next Gen NBN OpCo
> Medium barrier of entry
> Medium cost of replication

> Key OpCo Targets
  - Adoption target by 2015
  - 330,000 Residential subscribers
  - 80,000 Non-Residential subscribers

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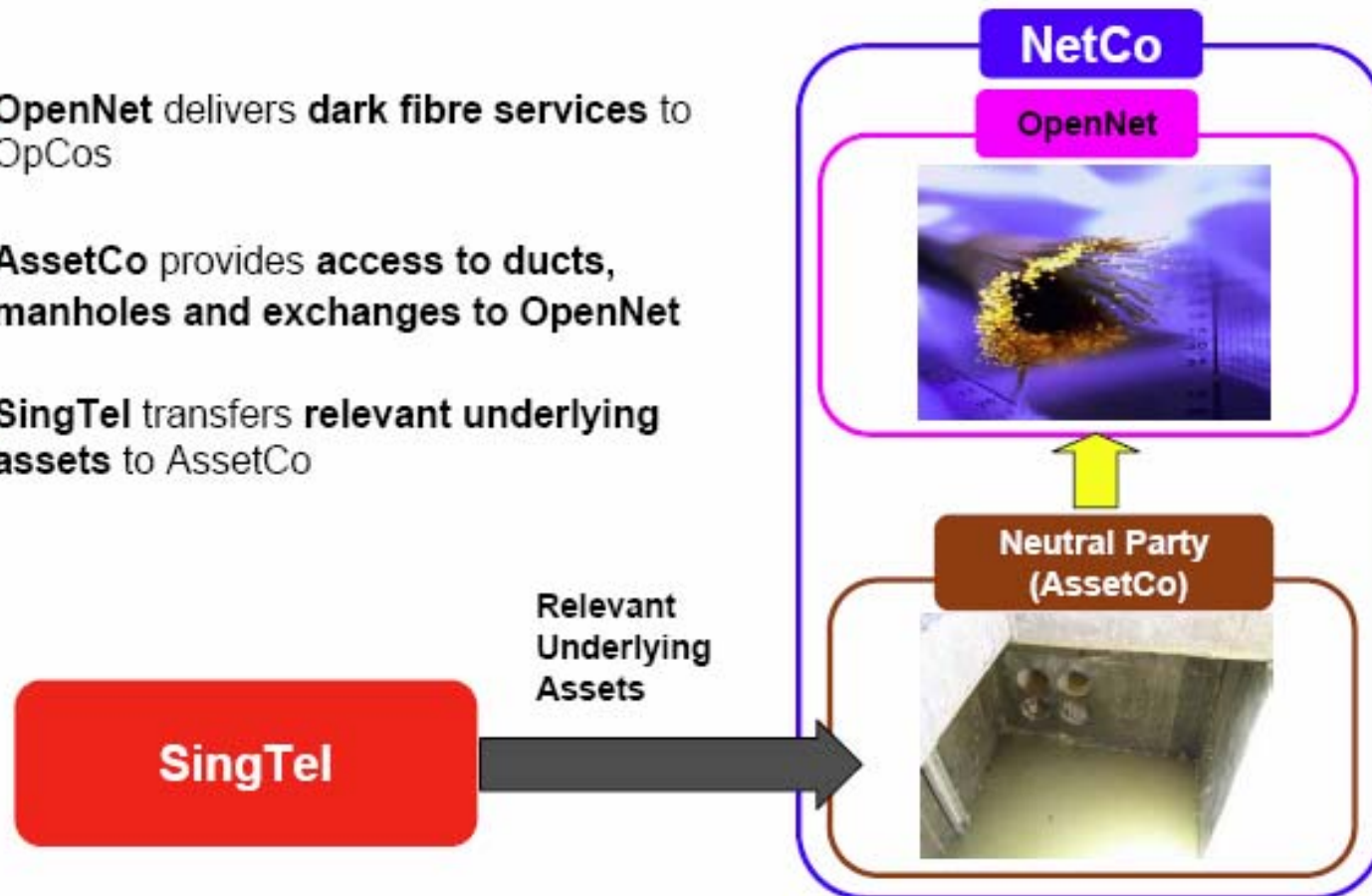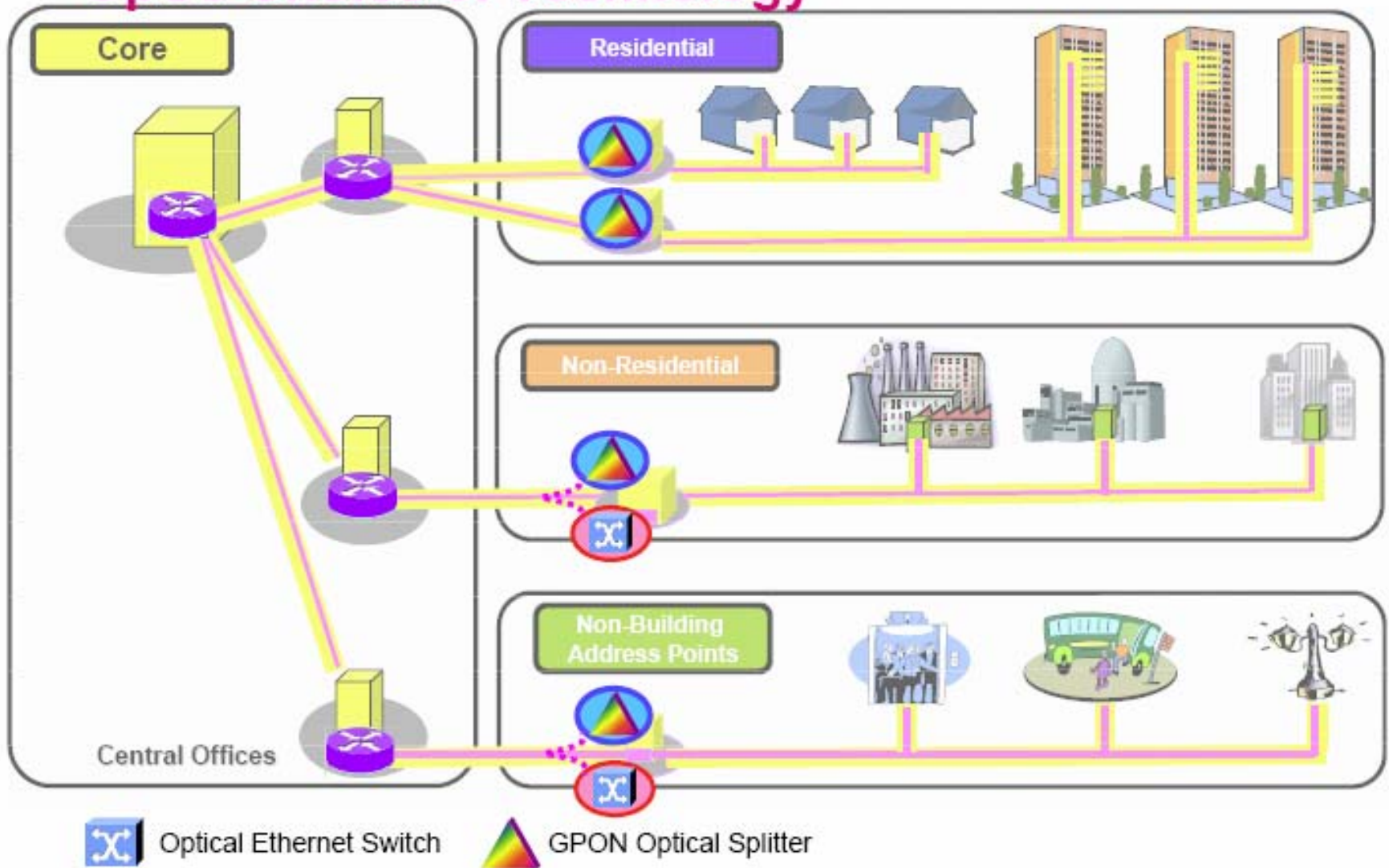
Relationship between OpenNet and AssetCo

> **OpenNet** delivers **dark fibre services** to OpCos

> **AssetCo** provides **access to ducts, manholes and exchanges to OpenNet**

> **SingTel** transfers **relevant underlying assets** to AssetCo

NetCo

OpenNet

Neutral Party (AssetCo)

Relevant Underlying Assets

SingTel

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NGNBN OpCo

Highlights of Nucleus Connect's Proposal
OpCo Choice of Technology

Core

Residential

Non-Residential

Non-Building Address Points

Central Offices

Optical Ethernet Switch   GPON Optical Splitter

NGNBN Rollout Timeline:
NetCo and OpCo Joint Rollout

Industrial Blocks Power Stations Private Apartments HDB Housing

Commercial Blocks **Non-Residential** Govt Offices Private Landed Housing **Residential**

1.1m households

OpenNet

| 60% Year 2010 | 95% Year 2012 | USO 1 Jan 2013 |

Nucleus Connect

Joint Rollout — USO 1 Jan 2013
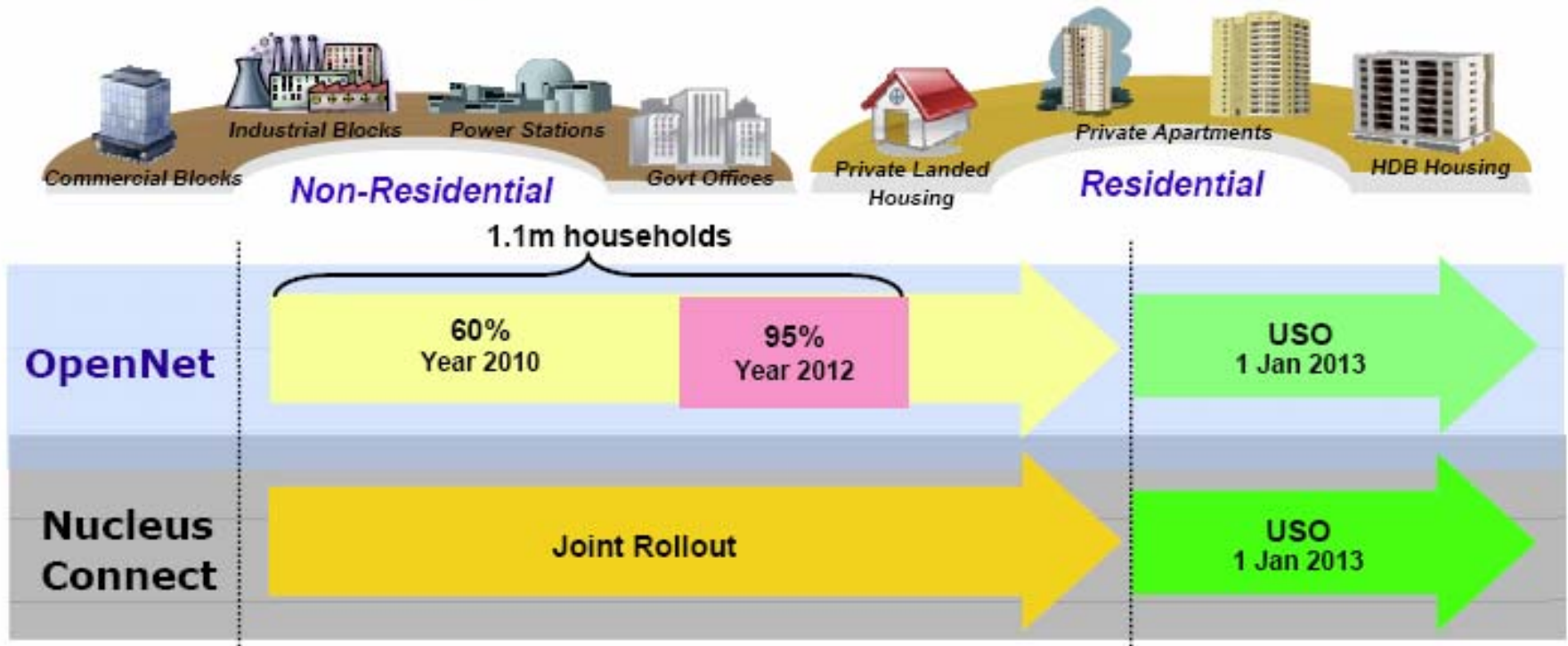
> Nucleus Connect's services made available soon after OpenNet has declared coverage of a building;

> Universal Service Obligation (USO) from 1 Jan 2013.

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Highlights of Nucleus Connect's Proposal
Wholesale Service Offerings*

Residential

Non-Residential

NBAP

VPN Services

Core Services

Co-location

Residential:

Bandwidth Service	
Downlink	Uplink
100Mbps	50Mbps
1Gbps	500Mbps

Non-Residential:

Bandwidth Service	
Downlink	Uplink
100Mbps	100Mbps
1Gbps	1Gbps

Modular
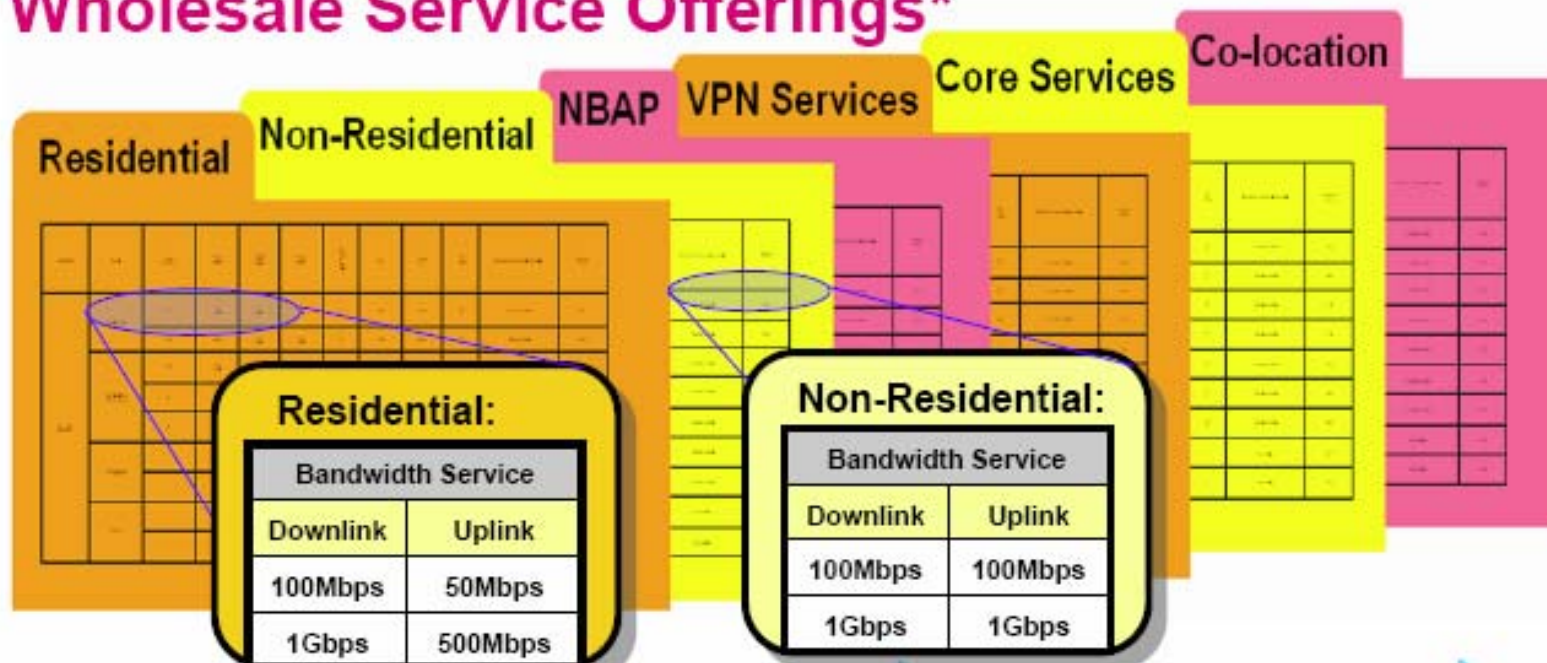
> Unbundled services
> Able to add-on bandwidth increments and different classes of service
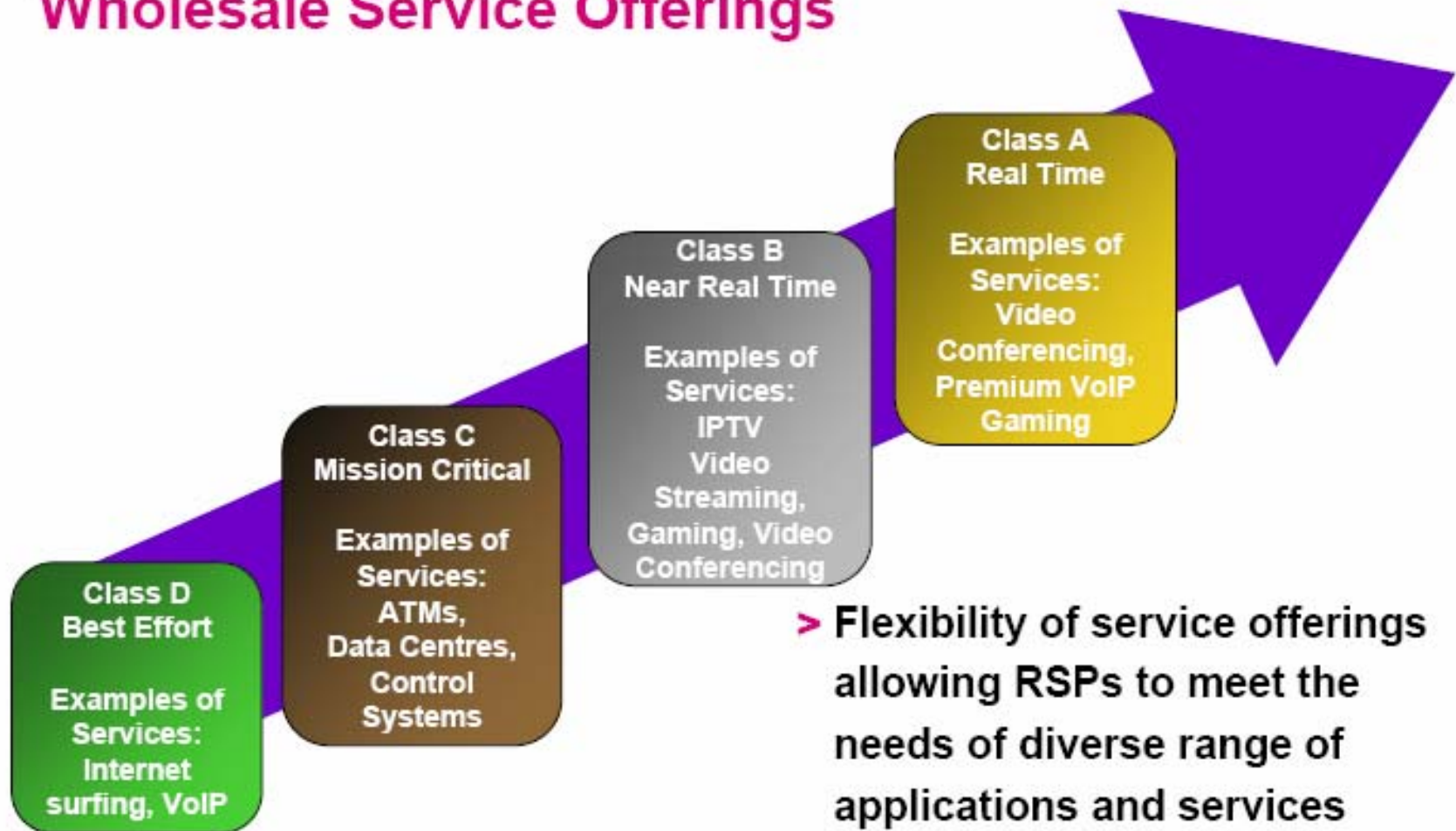
Flexible

> OpCo provides online platform for self-provisioning by RSPs

Comprehensive

> 1 Gbps available
> Facilitates RSPs having fast and easy market entry

*Interconnection Offer (ICO) to be subject to industry consultation and available to qualified Licensees

Overview of Next Gen NBN Wholesale Prices

End-Users

Innovative Services and
Competitive Retail Prices

RSP

OpCo Wholesale Price to RSPs:
From S$21(~14USD)*/month (Residential)
From S$75(~50USD)*/month (Non-Residential)
*includes NetCo Wholesale Price

OpCo

NetCo Wholesale Price to OpCo:
S$15(~10USD)/month (Residential)
S$50(~33USD)/month (Non-Residential)

NetCo

Consumers / End-users

Services
(including services & CPE)

Active Infrastructure
(including switches & routers)

Passive Infrastructure
(including wirelines & ducts)

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