



CTTE CONFERENCE
on Telecommunication Techno-Economics

Workshop on
“Deployment and
Business Impact of
Next Generation
Optical Access”

Long Term Research Questions in the Business Case of FTTH .

This paper represents the opinion of the authors and not necessarily the opinion of the company.

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Life is for sharing.



- I. Introduction and motivation
- II. Architecture and technology options for next generation access networks
- III. Business/Co-operation scenarios
- IV. Conclusions

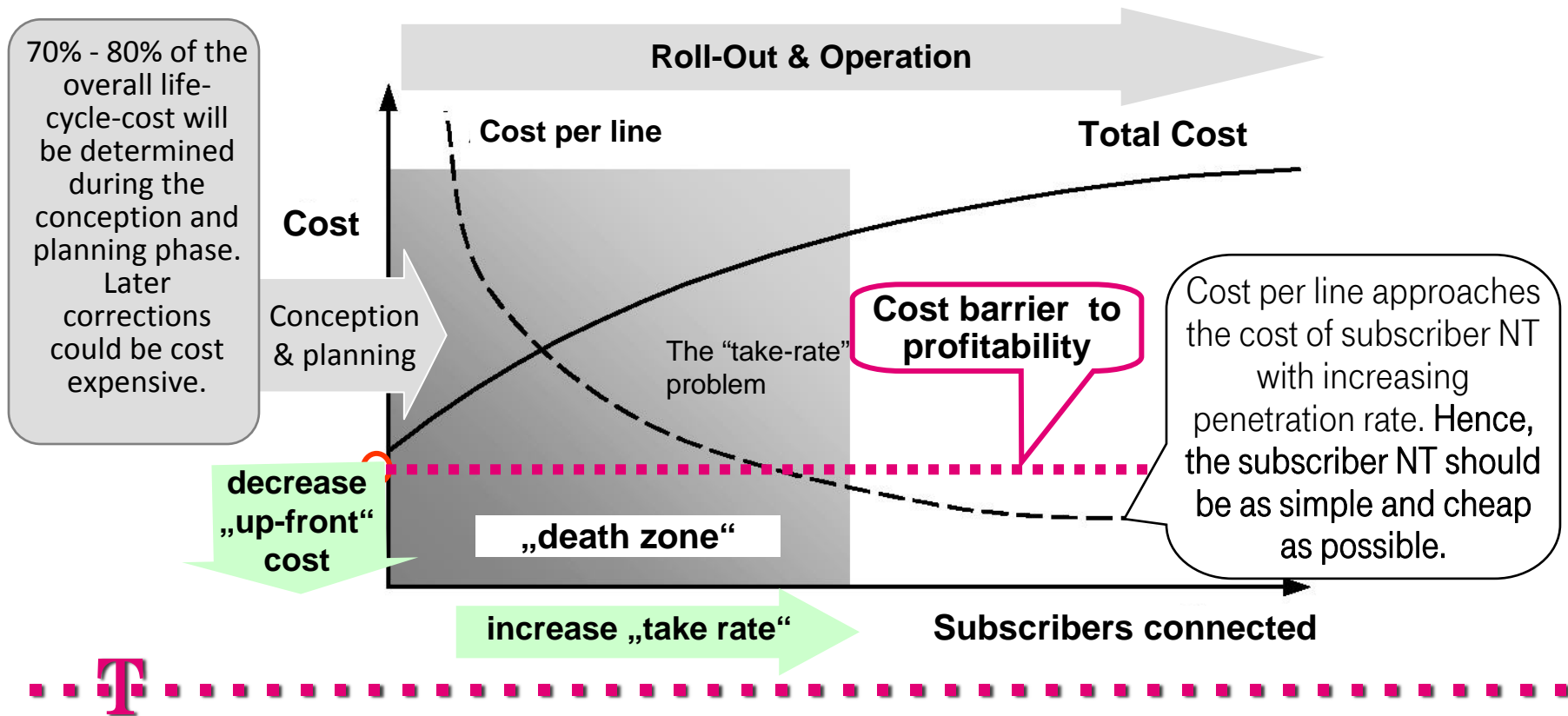


Introduction and motivation.

Efficient production of high quality services on minimized TCO.



- Profitability requires that the cost per line fall below an accepted threshold.
- The business case will fail, if the requested penetration rate will not be achieved.
- Risk minimising requires a decrease of the Up-Front cost and optimised deployment strategy.

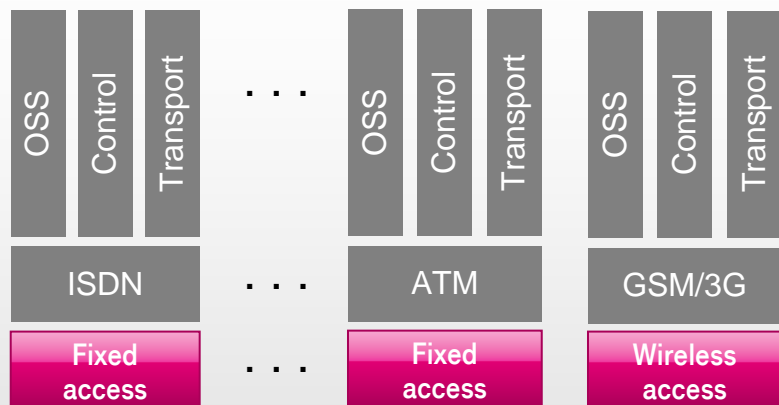


Introduction and motivation.

Separation from service and network architecture.

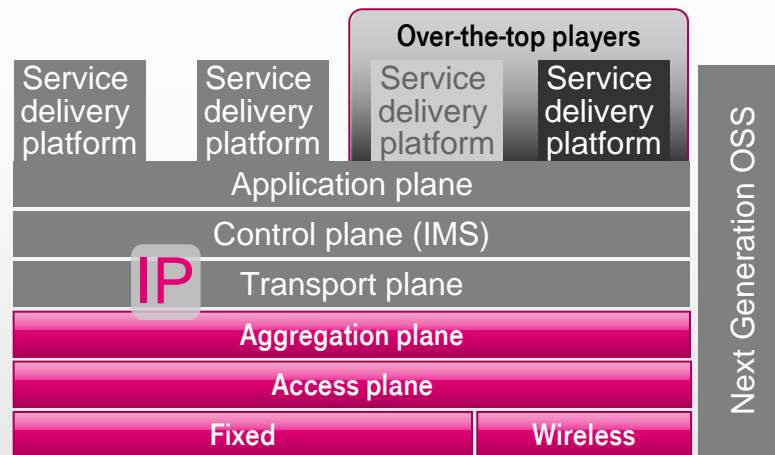


From “stovepipes” per service ...



- Vertical integration
- Different services rely on different technologies
- Control of customer relationship and service provision maintained

... to open standardized layered architecture



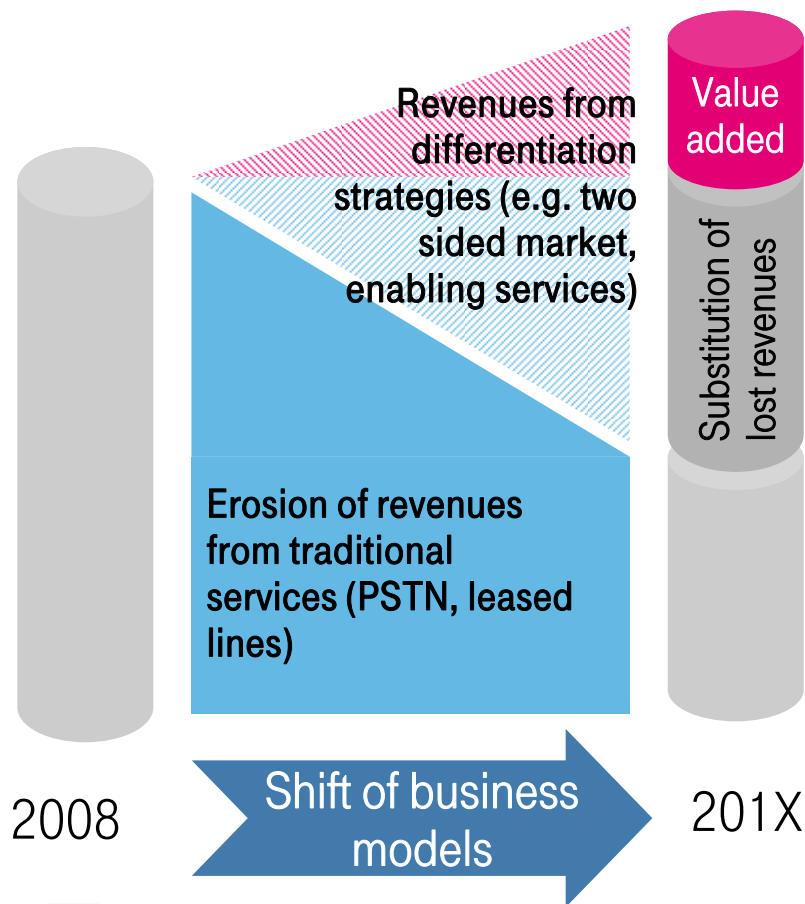
- Horizontal layering replaces stovepipes
- IP as universal convergence layer
- Service neutral network. i.e. network and service are effectively decoupled
- Optical and copper in access

Change of the access networking paradigm towards open, multi-layer next generation networks.



Introduction and motivation.

How to generate revenues from differentiation in NGN?



- **Technical challenge:** How to differentiate services such that each services maintains a pre-defined service level?

✓ **Technically feasible**

- **Business challenge:** How to motivate the customer (or other carriers in case of wholesale products) to pay for the service differentiation? What does the new value chain look like?

How to adapt the business models?

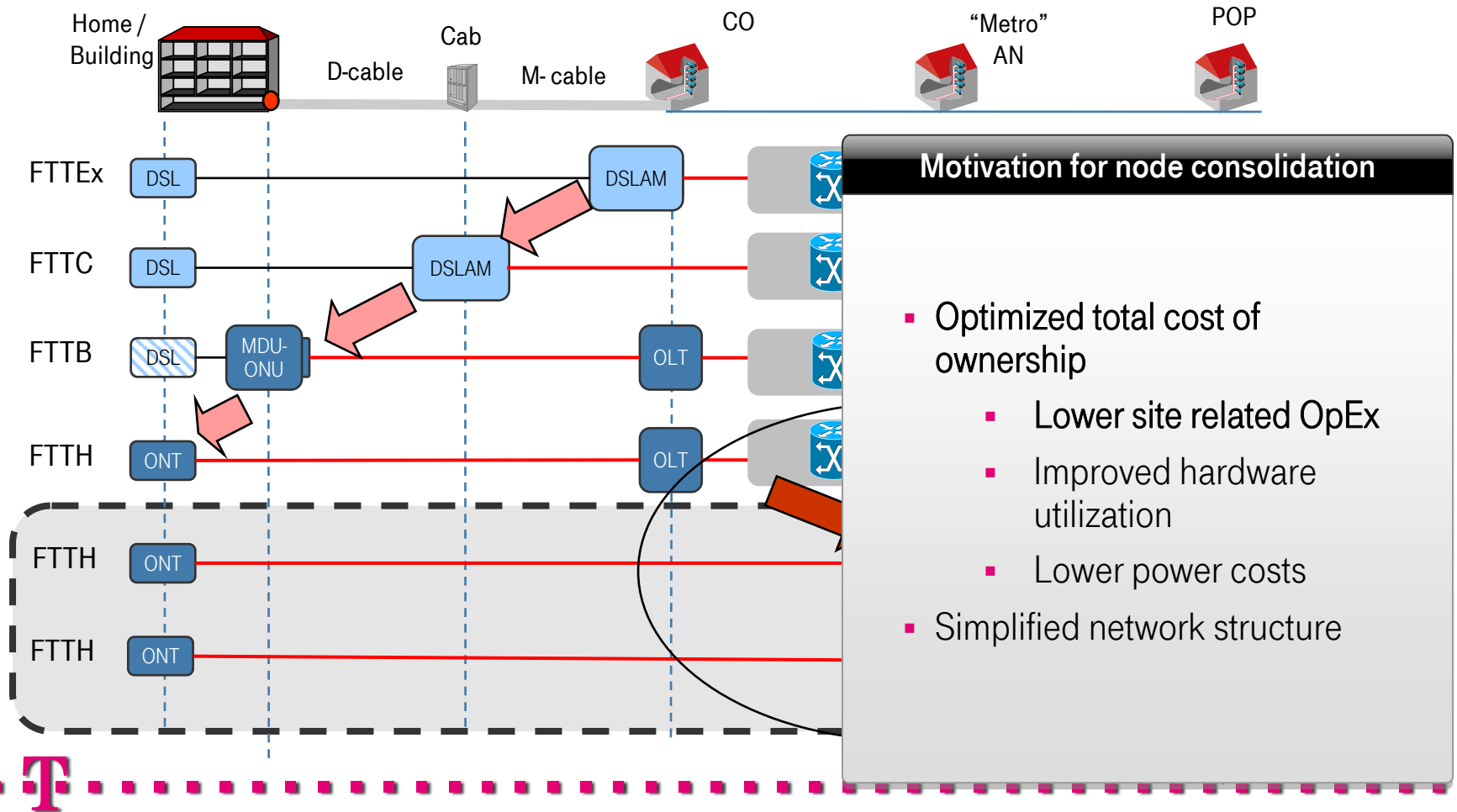
Part II:

Architecture and technology options for next generation access networks.

Fiber optics enable network infrastructure changes.



Towards Next Generation optical Access networks.



Optical Access Seamless Evolution (OASE) in a nutshell.



Structural network changes with NG-Access Technologies.

Migration based on copper infrastructure

Migration to FTTH access:

- Removes copper-access bottleneck
- Enables service portfolio ≥ 100 Mb/s

transformation

Optic enables new access structures

Migration to NG-access supporting:

- TCO optimization
- ≥ 1 Gb/s per user
- Energy efficiency
- Co-operations

The aim of OASE is the development of next generation access architecture and system concepts supporting co-operations for the “2020” time horizon, based on European requirements.



Architecture and technology options for NG access networks.

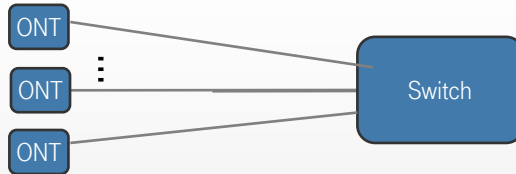


Technology - Alternatives.

System options

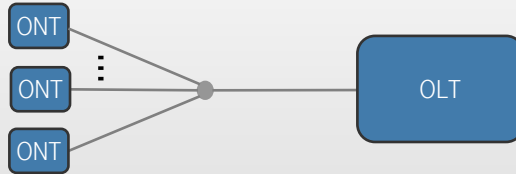
AON (Ethernet)

Ethernet PtP switch based



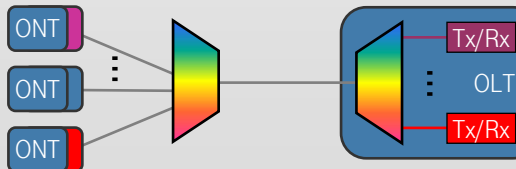
TDM-PON

Power Splitter based PON



WDM-PON type 1:

Wavelength router in the field



AON vs. power splitter vs. WDM concepts

- AON
 - PtP operation based on switch
- TDM-PON
 - PtMP operation on a power-splitter based fiber access network.
- WDM-PON type 1
 - the system key element, the wavelength-router replaces the power splitter and is therefore part of the passive fiber access infrastructure network and may limit the future system upgrade capability.

What is the optimal technology and architecture ? What is a needed sustainable/peak data rate?

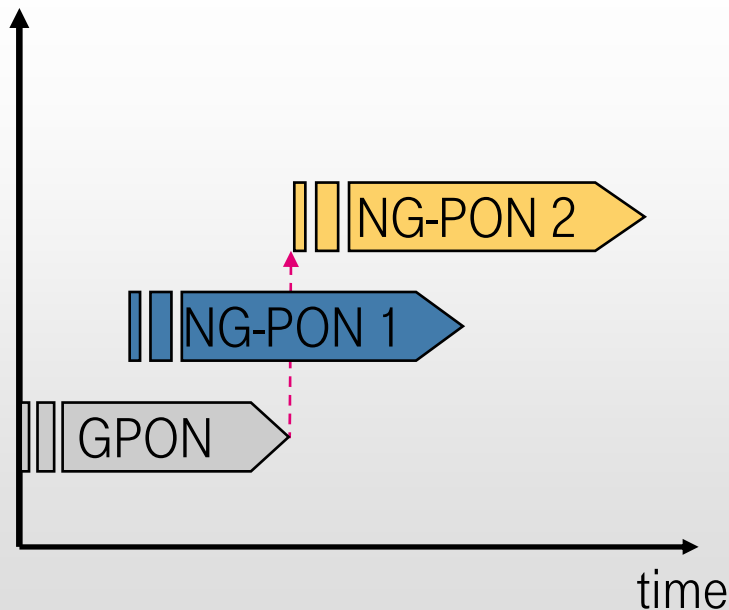


Architecture and technology options for NG access networks.



Technology cycle and migration philosophy.

Migration strategy



Goals

- The basic infrastructure must be able to satisfy also future service requirements
- The network must be capable for upgrading single customers on demand
- The network must allow technology migration on existing infrastructure without any service interruption
- Avoid more than 2 different technology generations at the same time on the same fiber infrastructure?
- Reuse of passive infrastructure
 - Splitter
 - fibers
- Preplanned parallel usage of different technologies
 - Older technology remains untouched

Which migration steps are needed (technology and architecture wise)?

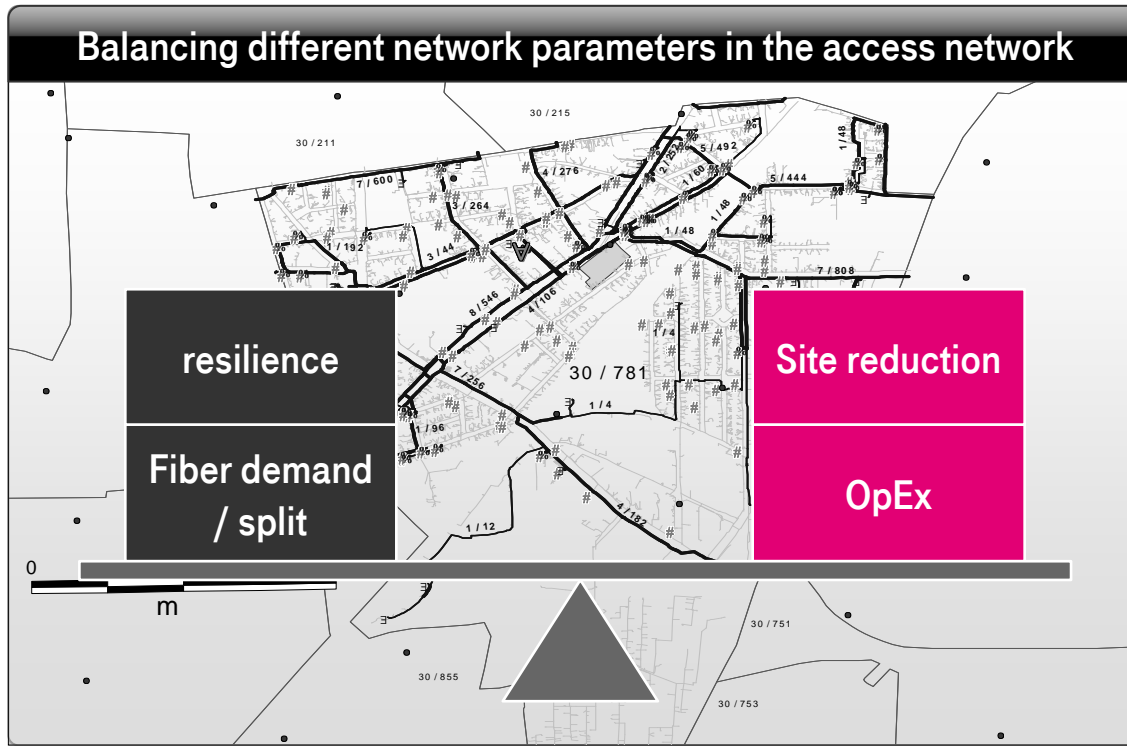
When do we need NG-PON2?



Architecture and technology options for NG access networks.



Find the optimum balance between 4 parameters.



- ### Boundary conditions
- Four critical parameters determine the optimum balance for the access network:
- Fiber demand / distance / splitting ratio (cable and duct length)
 - Resilience (maximum failure penetration range)
 - Site reduction (potential to give up entire locations by passivization)
 - OpEx reduction (e.g. reduced service, energy consumption)

What is the optimum balance between node consolidation, OPEX, resilience and infrastructure costs?



Best Practice rules and network design requirements

....applied on Next Generation Access Networks



Best Practice rules

- Long-term view
 - The network must be able to satisfy also future service requirements
- Stable but flexible
 - The network must be capable for upgrading single customers on demand
- Migration proof
 - The network must allow technology migration on deployed infrastructure without service interruption

General Requirements

- Zero touch
 - Service activation and changing is possible without any further truck roll out
- Keep it simple
 - Avoid heterogonous and manifold solutions

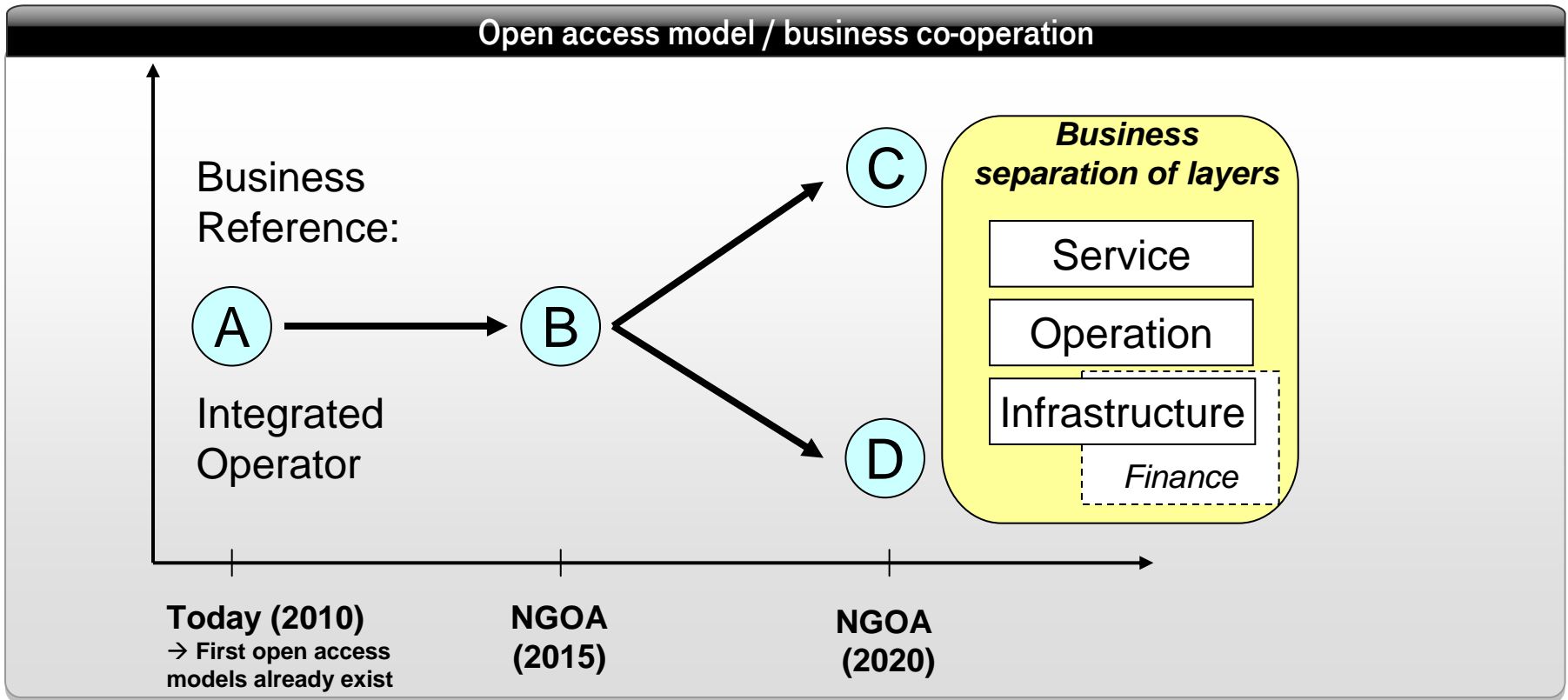


Part III:

Business/Co-operation scenarios.

Business scenarios and analysis framework.

Generic scenario description.

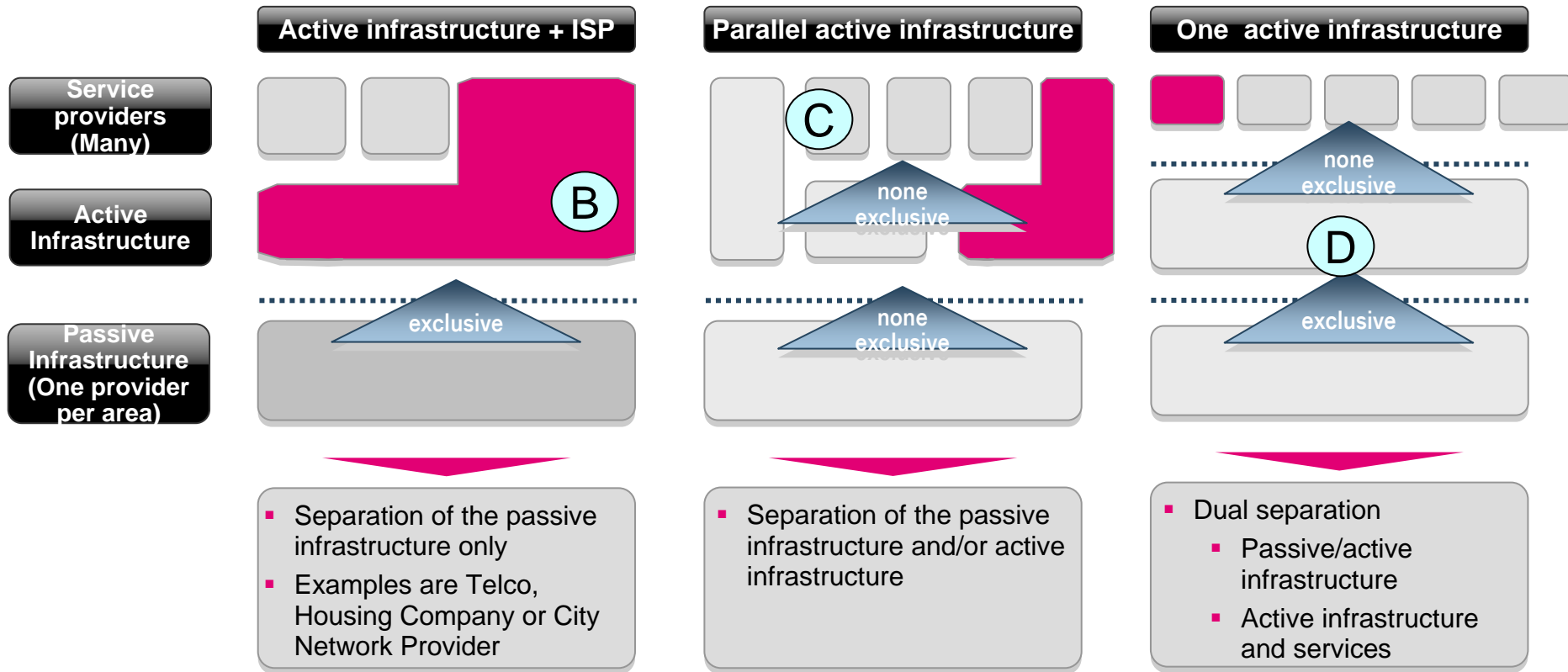


What are the Pros and Cons of the open access model for the different players?



Business scenarios and analysis framework.

Various use cases of open access networks – an extraction.

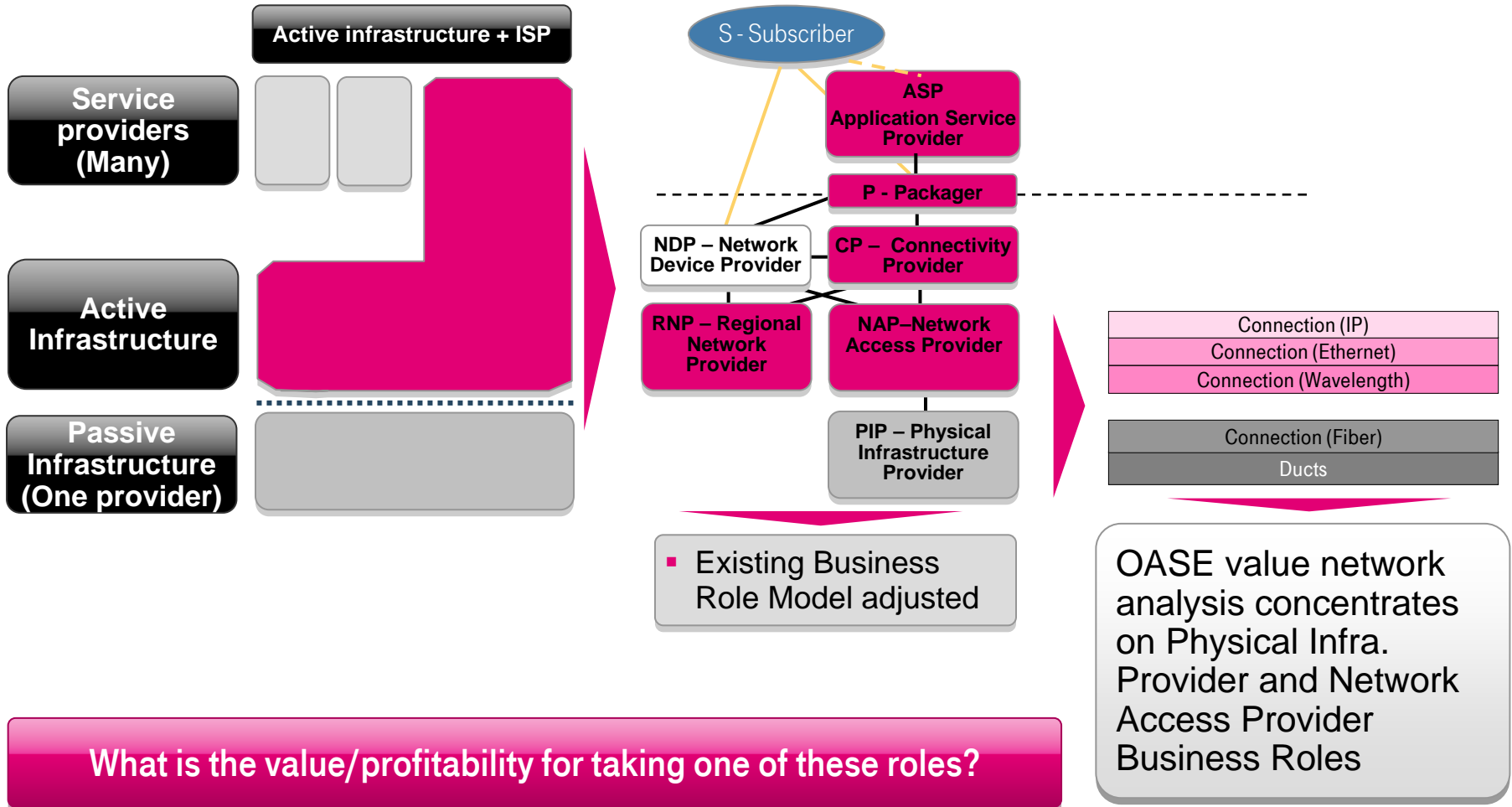


What is the most probable long-term evolution for the different players?



Business scenarios and analysis framework.

Definition of eco-system value network & business roles.



Business scenarios and analysis framework.



Initial qualitative assessment: Pros & Cons for use case: „Active infrastructure + ISP“.

- Use Case targets an interrelated “Whole-buy” solution on physical infrastructure level: Housing Company or City network provider cooperation in order to broaden the customer base

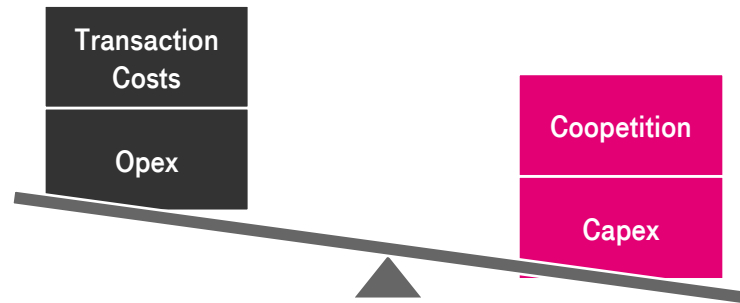
Contrary conditions

(1) Transaction costs:

- Minimize transaction costs (e.g. contract related costs including initiation, negotiation and execution costs)

(2) Opex Increase of:

- Number of Interface locations related and general process cost by
 - Maintenance, Churn related costs, IT related costs, etc.



Gain conditions

(1) “Coopetition” (= Cooperation & Competition)

- i.e. cooperation in less attractive & competition in highly attractive areas (geographical & risk dependent),
- collaborative funding efforts in least attractive areas

(2) Capex Decrease:

- Upfront investment (digging, ducting, fiber, etc. related)

Part IV: Conclusions.

Architecture and Technology

- Node consolidation technically feasible but what about techno-economics?
- Operators require upgradeability on technology with minimal infrastructure impact => Migration strategy needed!

Future business environment

- Support for different co-operation models is needed: What co-operation models should be supported?
- What are the pros and cons of an open access model for the different players?
- What are the drivers in transaction costs?
-



Thank you!

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