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FACULTEIT INGENIEURSWETENSCHAPPEN

Future proof strategies towards fiber to the home

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INTEC

IBCN intec broadband communication networks

IBBT

Research question

- Formulation of the problem
  - **Slow rollout of fiber to the home in Europe compared to the rest of the world**
  - **(Future) regulation concerning opening up access networks to competitors**

- Research question
  - **Which technical competition model will lead to a future proof FttH network, taking into account uncertain future regulation and viability of the business model?**

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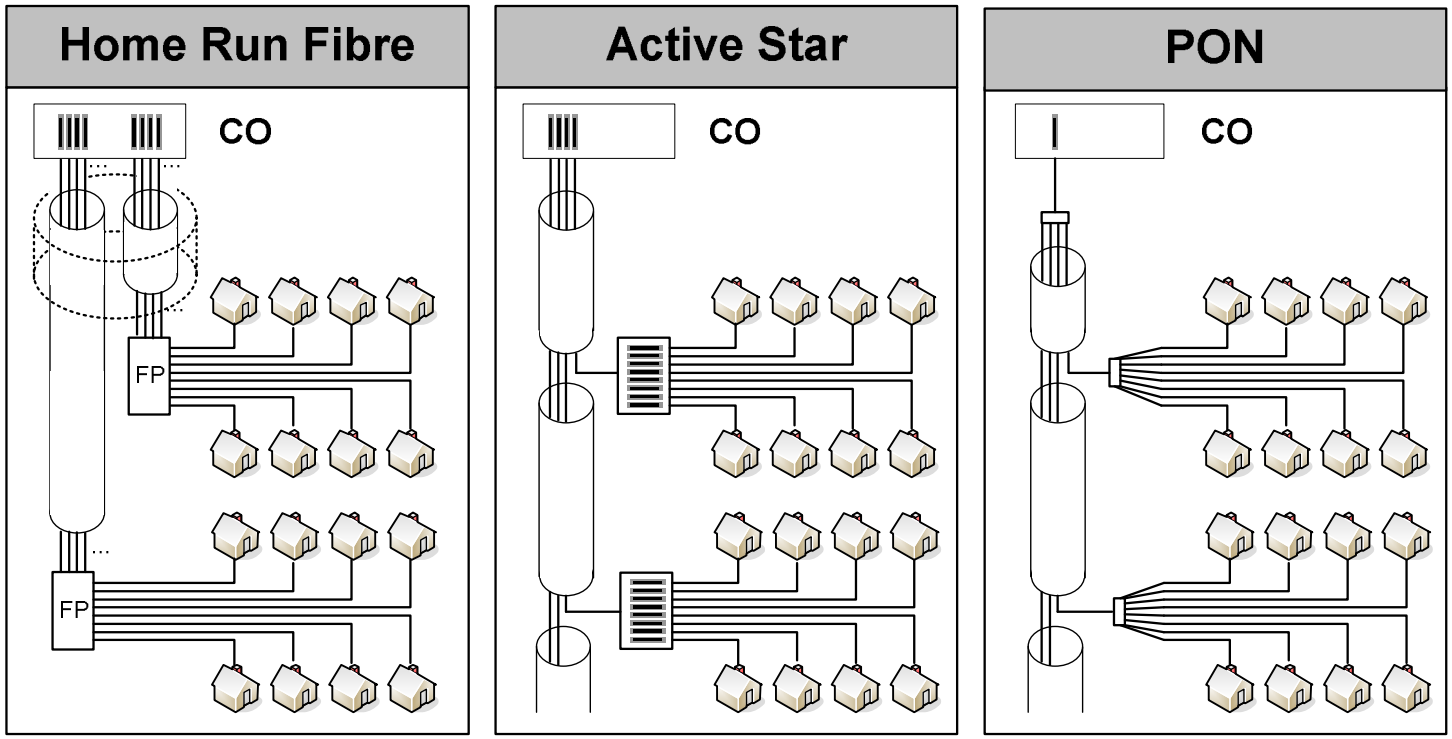
TECHNICAL MODELS

3 different architectures for FTTH

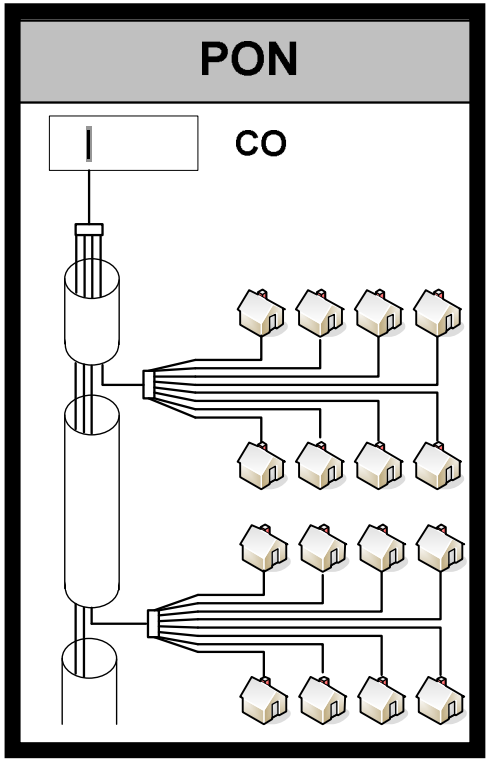


3 different architectures for FTTH

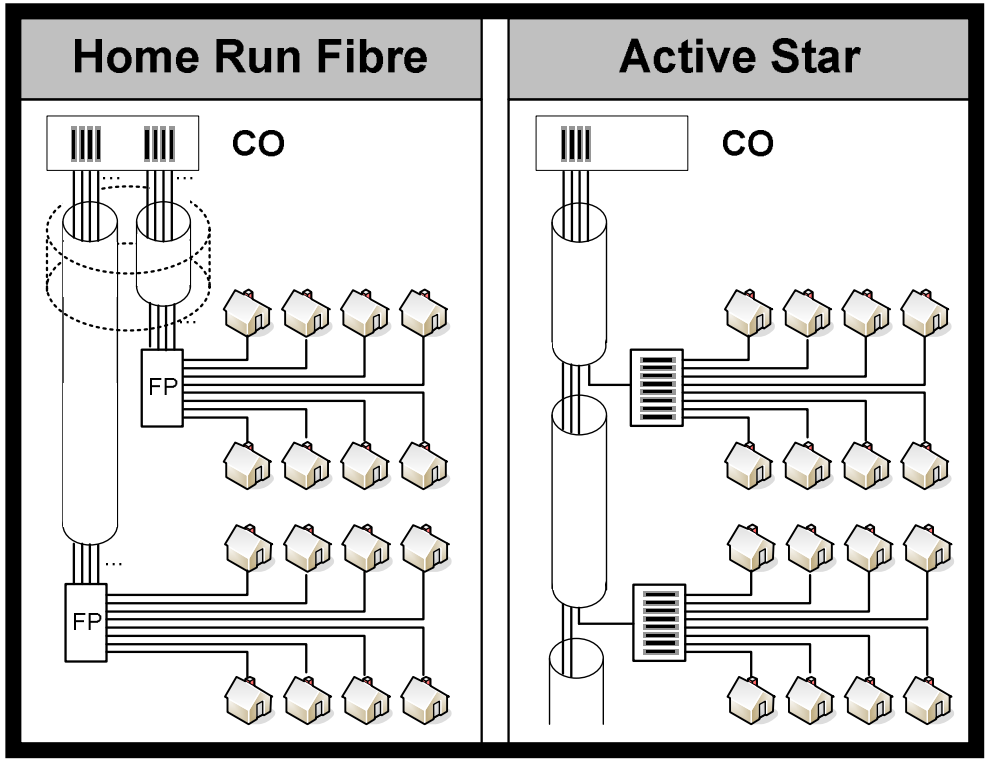
Telecom operators

+ Cheapest network rollout
  Start from existing situation
  Passive components

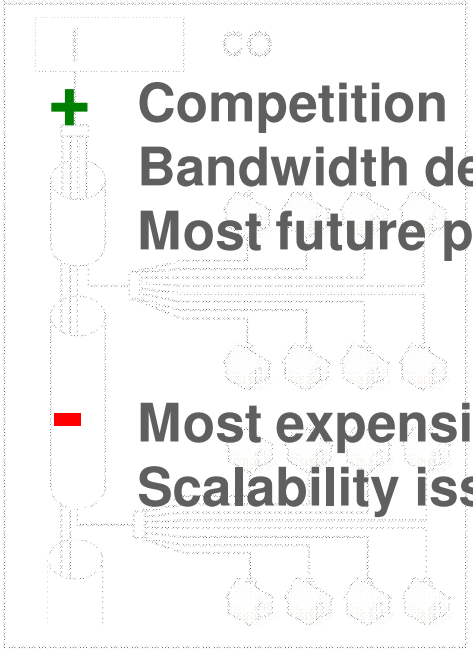
- Shared bandwidth
  Competition



3 different architectures for FTTH



Community networks



+ Competition
  Bandwidth dedicated
  Most future proof (HR)

- Most expensive
  Scalability issues

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ROLES & ACTORS

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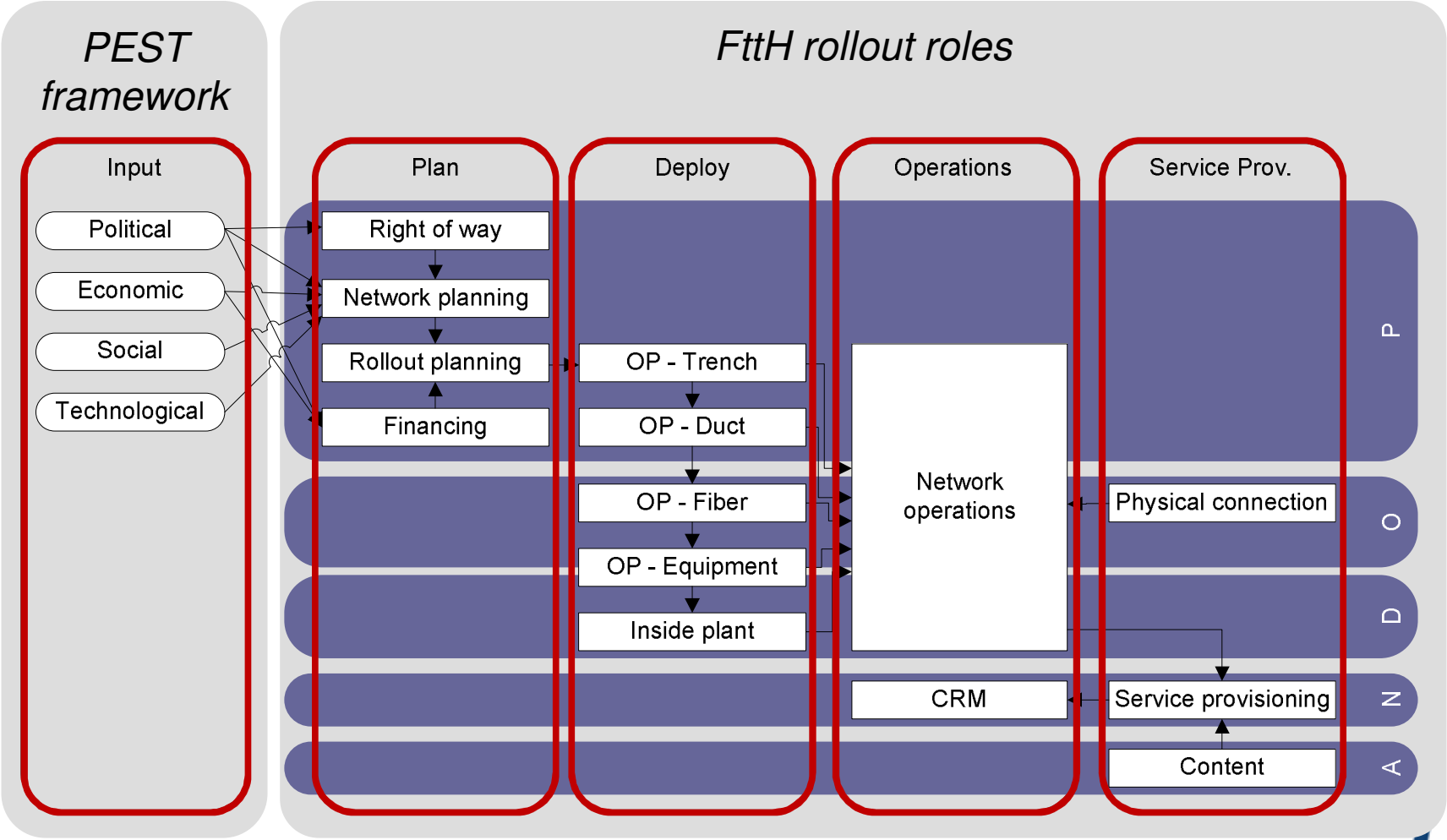
Roles


PEST framework
FttH rollout roles
Input
Plan
Deploy
Operations
Service Prov.
Political
Economic
Social
Technological
Right of way
Network planning
Rollout planning
Financing
OP - Trench
OP - Duct
OP - Fiber
OP - Equipment
Inside plant
Network operations
CRM
Physical connection
Service provisioning
Content
P
O
D
N
A

Main actors involved

Governments

Europe

National / NRA

Local

Customers

Telecom operators

ILEC - CLEC

Service / application providers

Utility companies

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VALUE NETWORKS FOR COMPETITION MODELS

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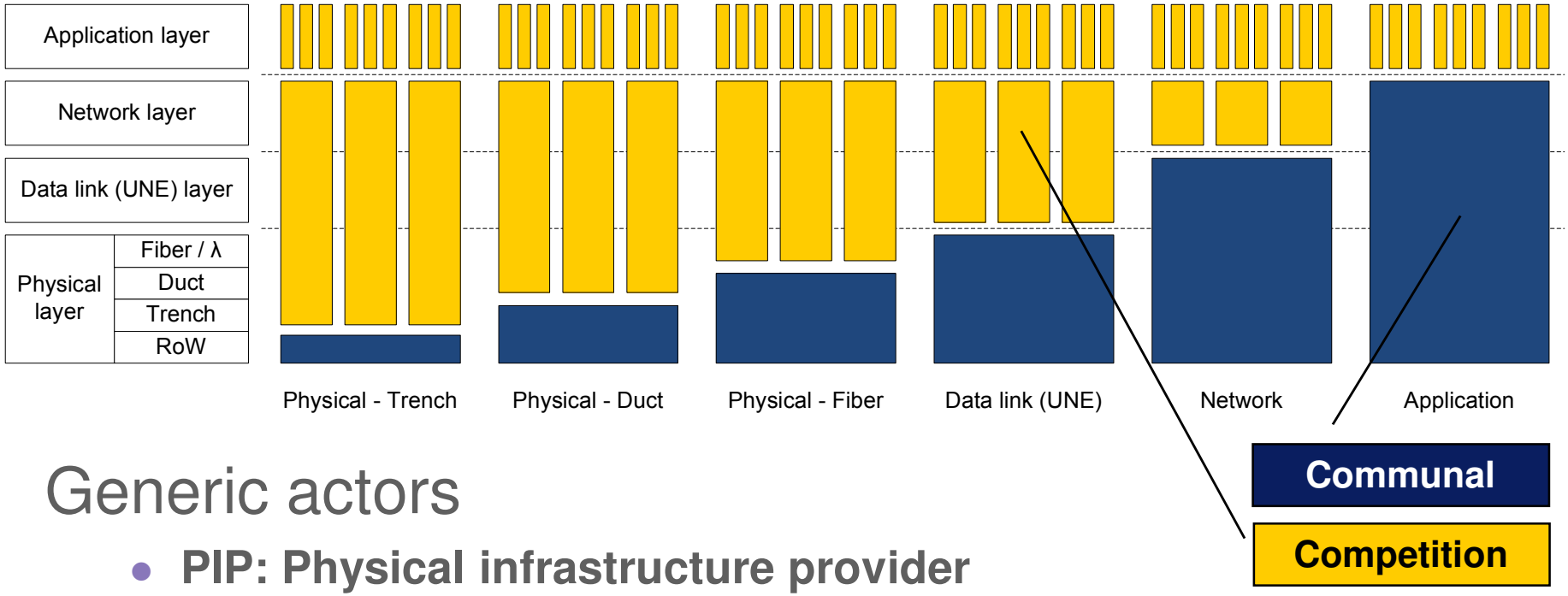
Competition models

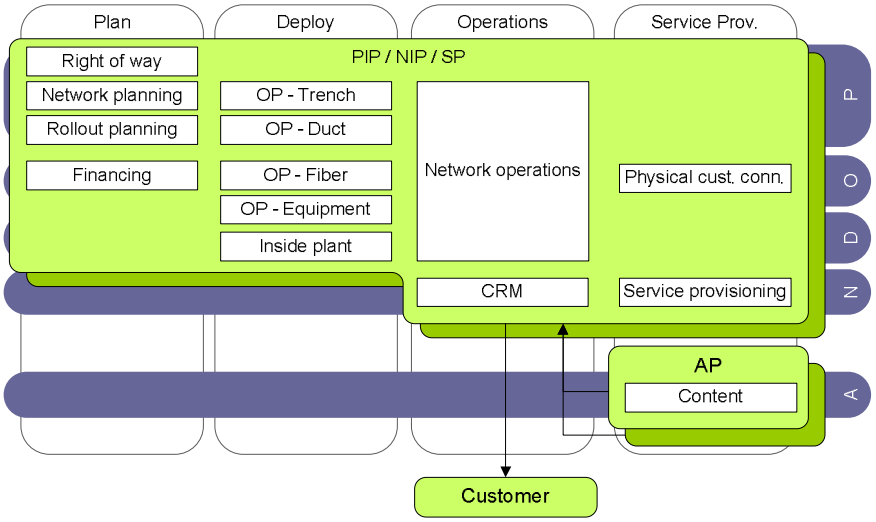
Models considered



Generic actors

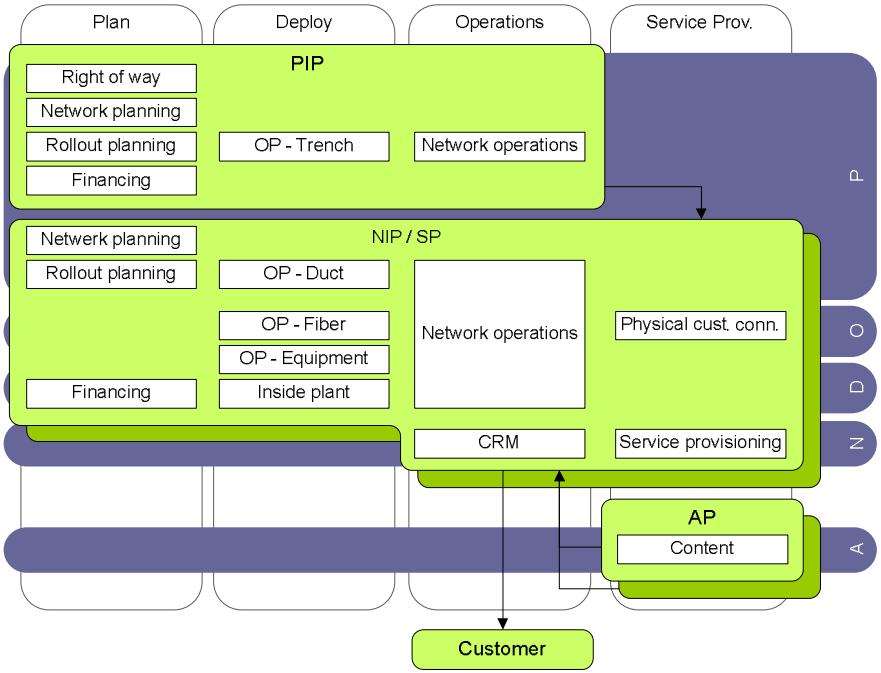
- **PIP: Physical infrastructure provider**
- **NIP: Network infrastructure provider**
- **SP: Service provider**
- **AP: Application provider**

Physical infrastructure based competition (trench)



- Full infrastructure competition
  - **One or more private infrastructure providers (PIP)**
  - **Multiple trenches**
- Government: facilitating role for stimulating rollout

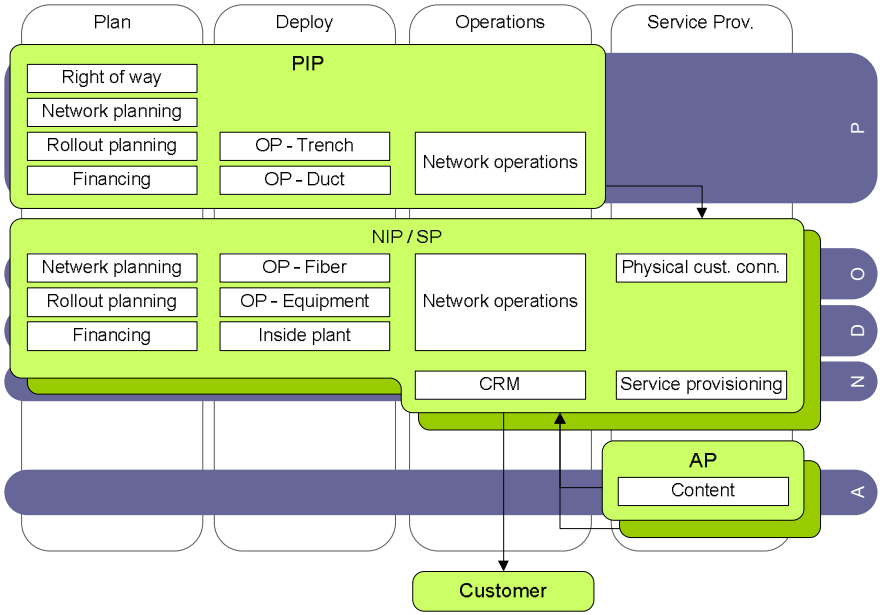
Physical infrastructure based competition (duct)



- One trench
- Competition at duct level

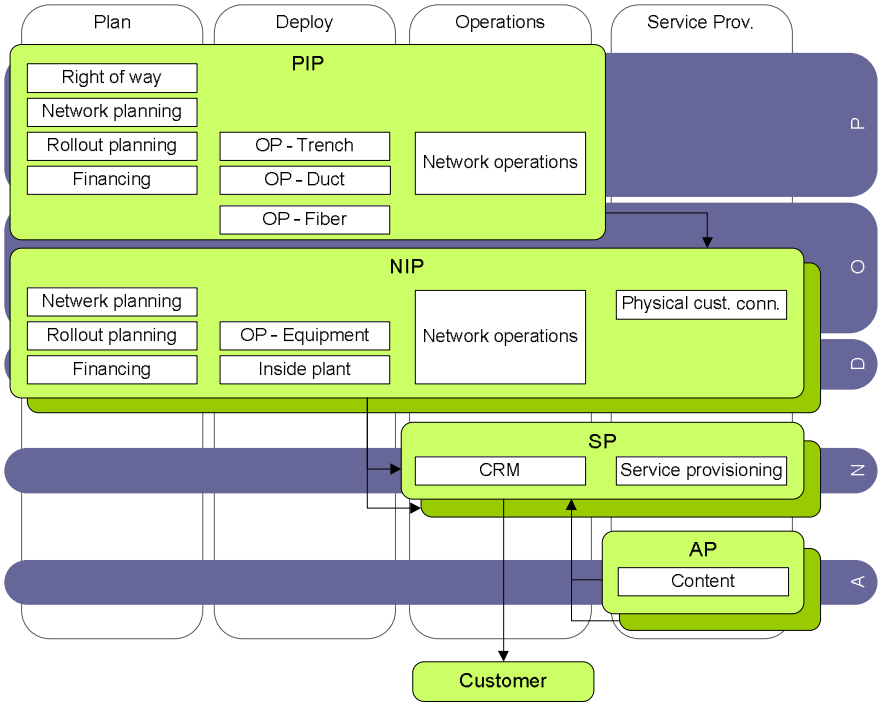
- Multi-use of trenches
- Combination of actors involved:
  - **(Local) governments**
  - **Utility companies**
  - **Telco operators**

Physical infrastructure based competition (fiber)



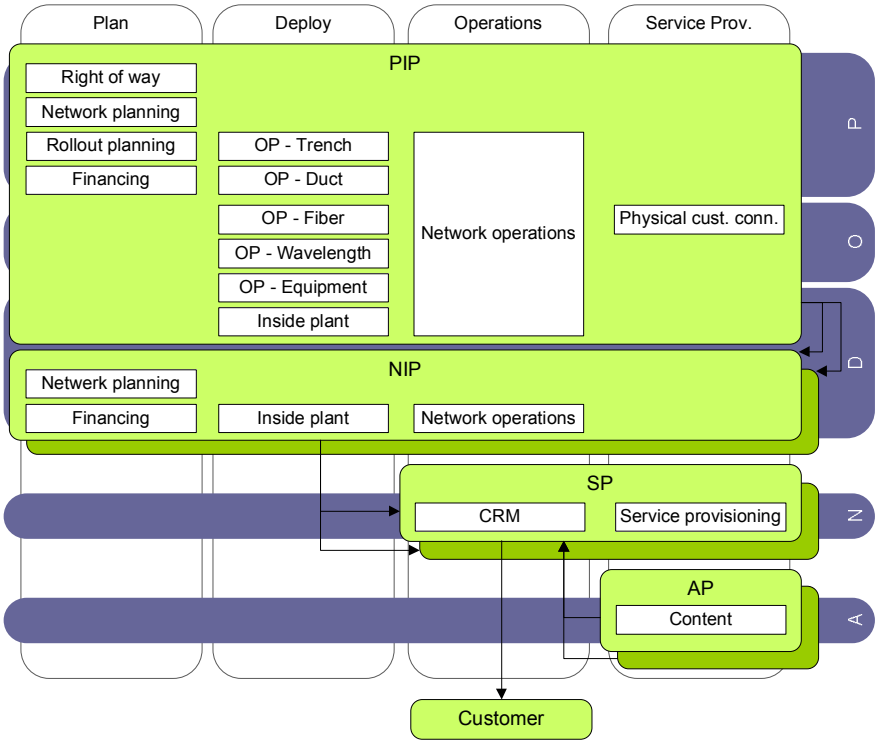
- One trench / duct infrastructure
- Competition at fiber level
- Incremental rollout of multiple FttH networks possible
- PIP actors:
  - **(Local) government**
  - **Utility company**
  - **Telco operator**

Data link layer based competition (UNE = fiber)



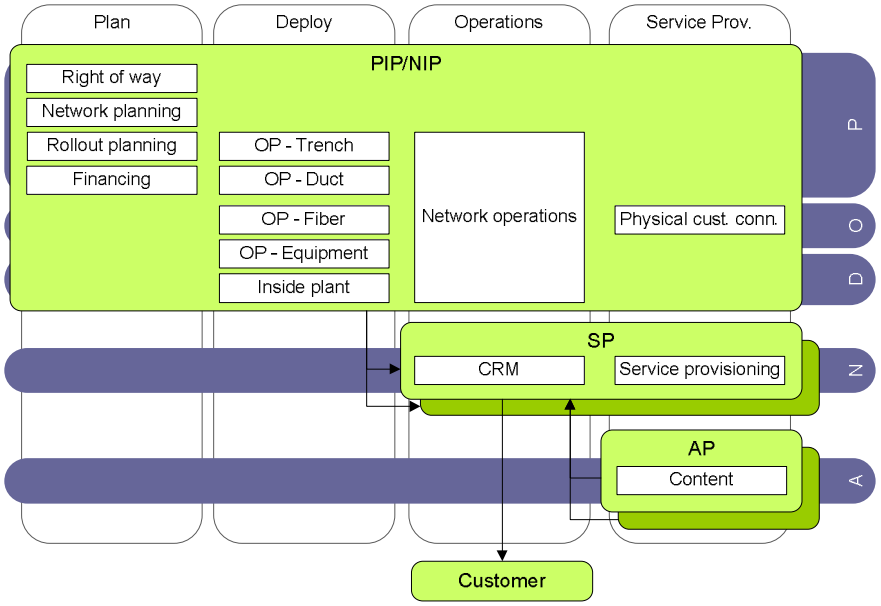
- One fiber infrastructure
- Competition at data link layer
- Incremental rollout of multiple FttH networks possible
- NIP: choice of data link layer technology

Data link layer based competition (UNE = wavelength)



- One fiber infrastructure
- Competition at data link layer (UNE = wavelength)
- 2 models:
  - **Wavelength per service provider**
  - **Wavelength per user**

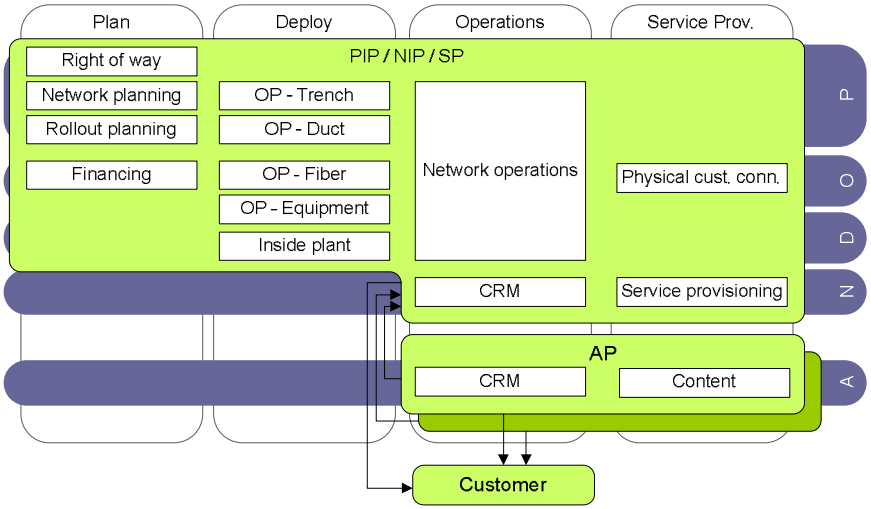
Network layer based (open access based) competition



- One outside and inside plant infrastructure
- Competition at network layer (IP)

- Proactive:
  - **Municipality initiative**
- Reactive:
  - **Telco initiative**

Application layer based competition



- One (physical and network) infrastructure
- One network and service provider
- Competition at application layer

- Municipality initiative

Overview

Competition model	Techn. to be used	Entry barrier competition	Main (dis)advantages
Physical layer	All	High	Upgrade from current network situation possible (+) Able to choose technology and network topology (+) High investment costs for all parties (-) Multiple fiber networks(-) Switching SP for customers difficult and expensive (-)
Data link layer	Home run WDM-PON	Medium	Full vertical separation of physical and active infrastructure (+) Limited choice of technologies to be used (-) Difficult to implement (UNE = wavelength) (-) Expensive WDM equipment required (-)
Network layer	All	Low	Single physical and network infrastructure (+) All technologies and architectures can be used (+) Easy solution for SP competition (+) Increasing level of protectionism (-)
Application layer	All	Low	One PIP/NIP/SP, thus monopoly situation (-) Increasing level of protectionism (-) Lock-in situation (-)

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CONCLUSIONS
FUTURE WORK

Conclusions

- Technical models
  - **Technologies**
  - **Competition models at different layers**
    - Physical, data link, network and application layer
- Value networks for competition models
  - **Government should facilitate FttH rollouts by adopting clear communication regarding new regulation**
  - **Split between infrastructure and service provisioning stimulates competition**

Future work

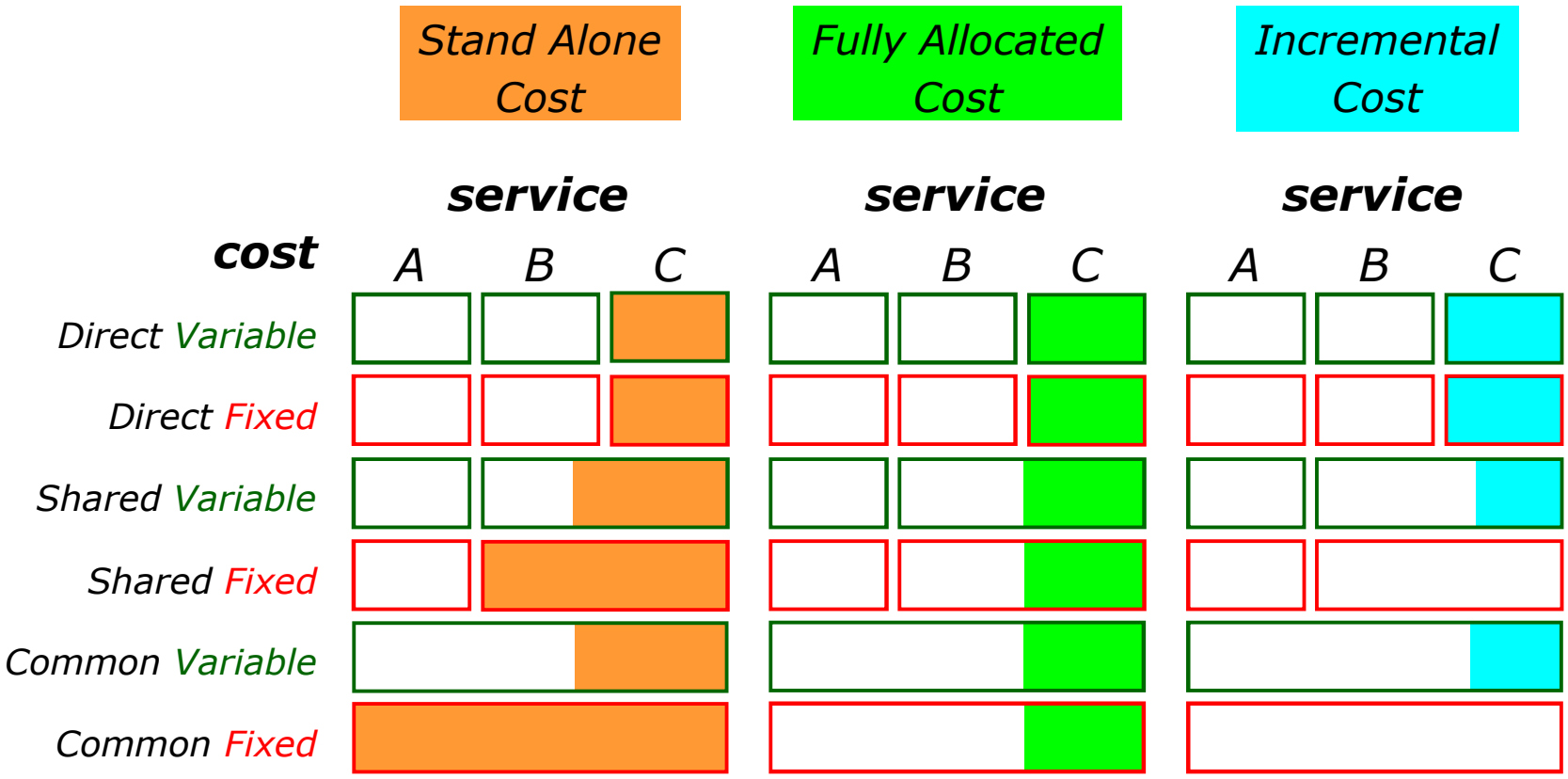
Introduction of real options analysis

- A real option is the right but not the obligation to undertake some business decision, typically the option to make, or abandon a capital investment.

- Examples:
  - **ILEC**
    - Installation of extra infrastructure during xDSL rollout
  - **CLEC**
    - Option to switch from LLU/bitstream to own network
  - **Utility companies (acting as PIP)**
    - Option to lease or sell their telecom infrastructure

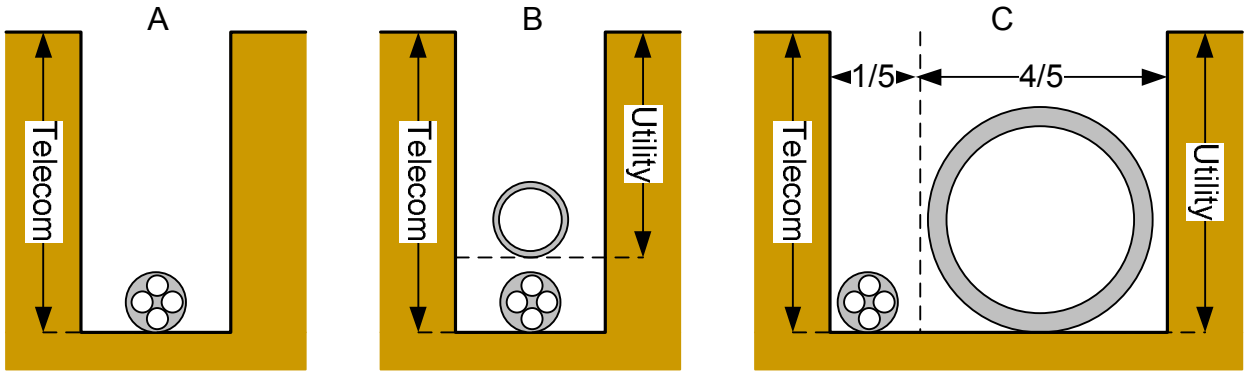
Future work

Cost allocation challenges

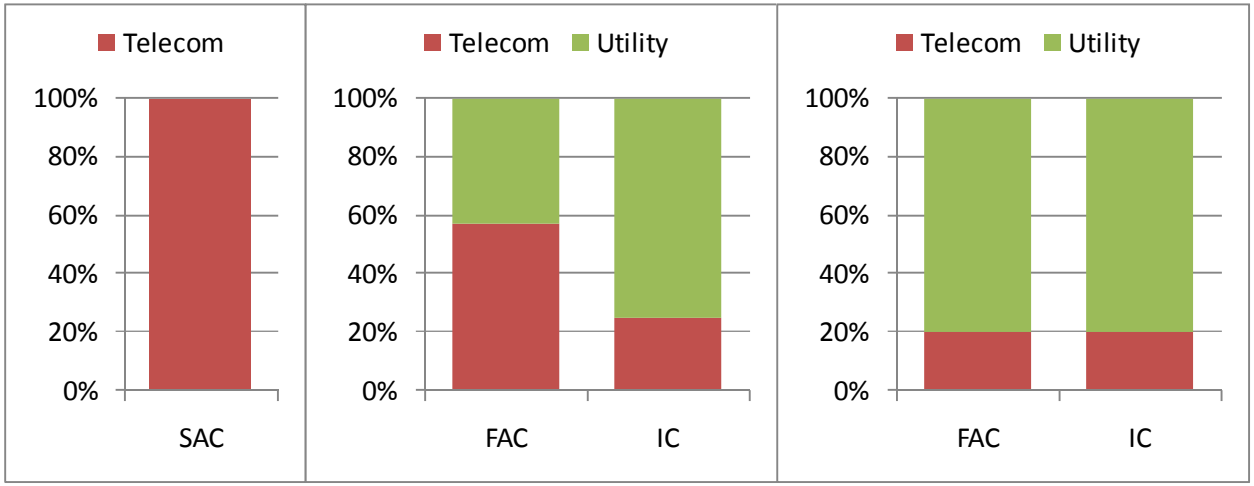


Future work
Cost allocation challenges

Trenching



Cost allocation

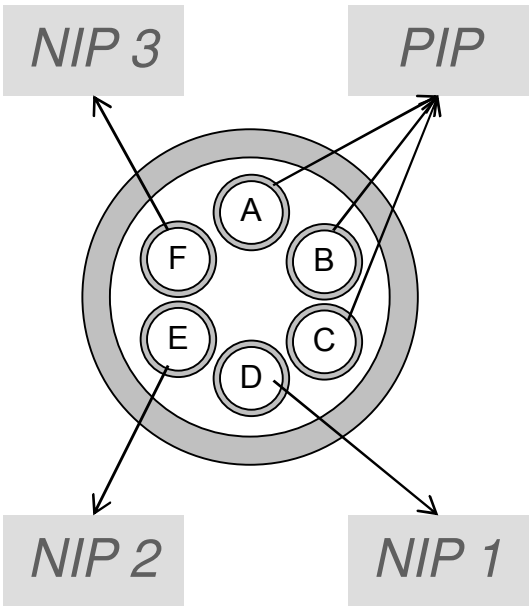


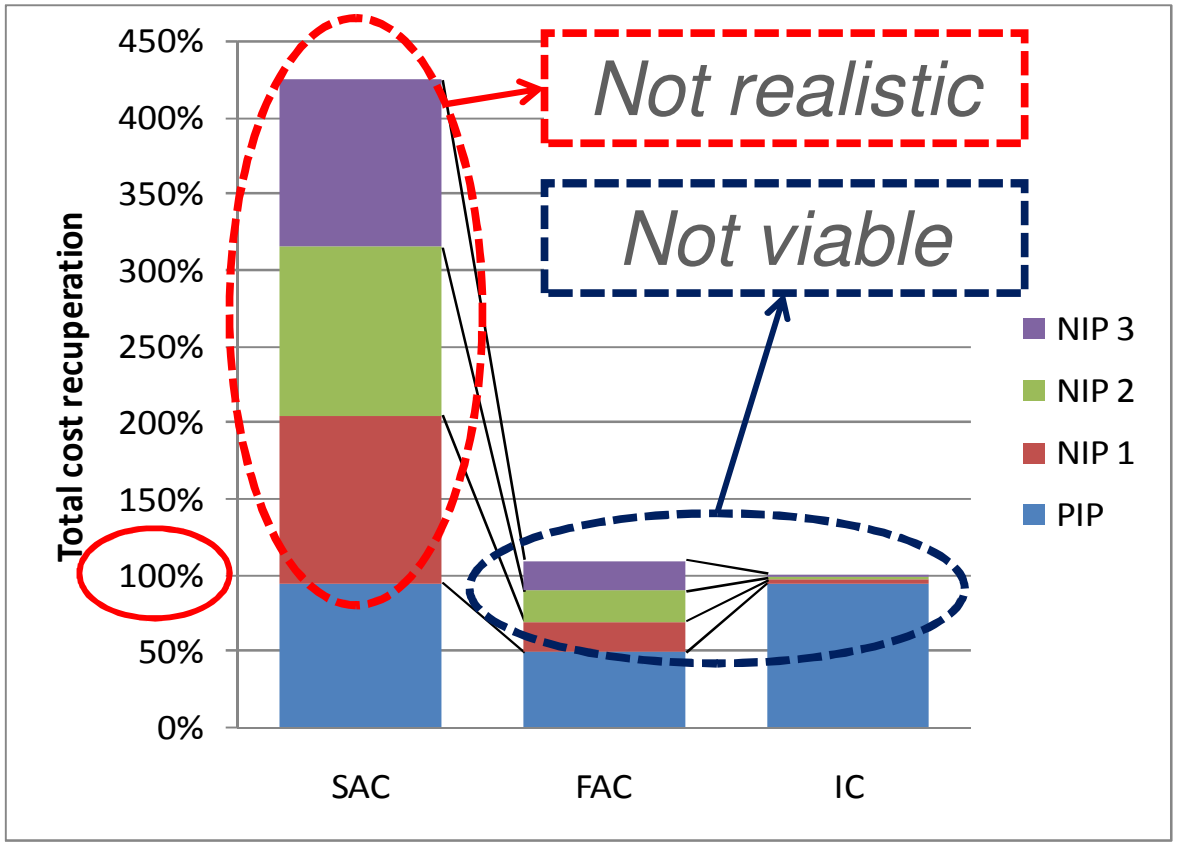
Future work

Cost allocation challenges

Cost based + margin tariffing

Duct with subducts





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Thank you for your attention

Questions?

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