

Global design concepts to promote efficient  
delivery of eGov services

# FIBRE OPTIC ACCESS NETWORKS

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Technological Development and the Need for Speed

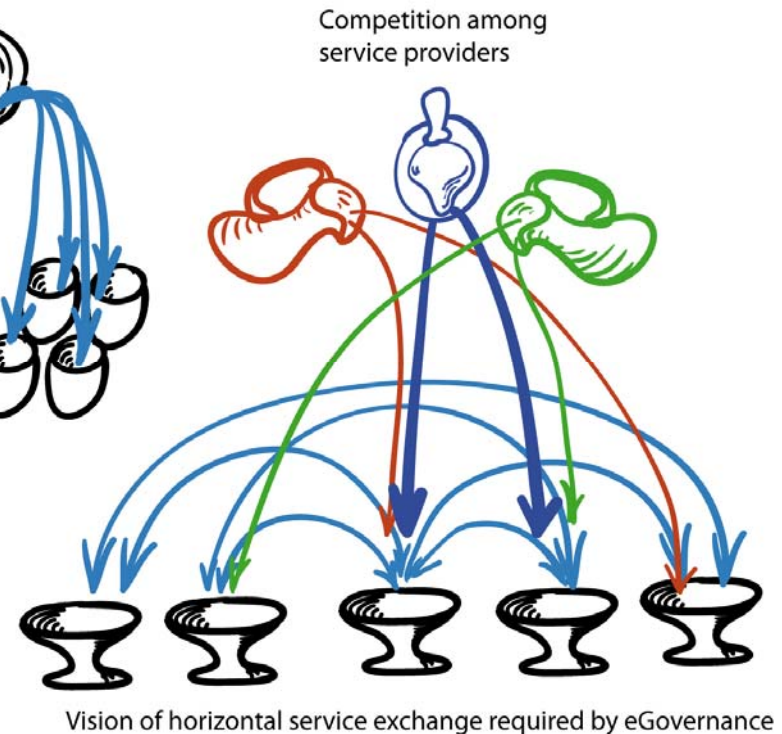
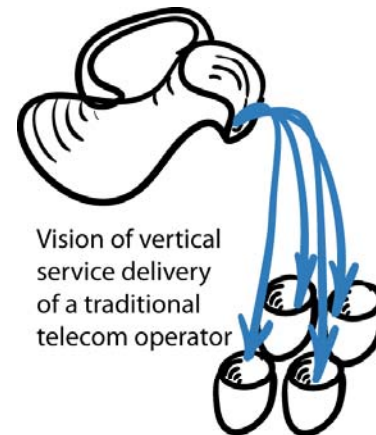
- Broad understanding of
  - Relations between Fibre Optic Networks and eGov
  - Access networks are more than telecom networks
    - Accessing, delivering or exchanging services
    - Fixed and mobile network telecom infrastructures
    - Topologies for fixed networks
    - Differentiation of the bandwidth needs
  - Financing the deployment of optical networks
  - Tracks for solving common problems with innovative solutions
    - Contributing to solve the Digital Divide
    - Providing citizens access to eGov services
    - Preserving the investments made

## Background

- Networks are mainly built and maintained by commercial telecom operators
  - To provide *vertical* ‘Triple Play’ services
  - Concentrate of profitable service markets
  - Arbitrate fixed vs. mobile deployment
  - Get financed
- Strong existing business background
  - Topology based on existing networks
    - More than 100 years old technology
    - Barriers raised to protect market

- Business models independent of eGov needs
- Commercial Services do not match eGovernance needs
  - Govt provided services
  - Public information services
  - Not for profit services (NGOs or associations)
  - State cannot really govern the behaviour of telecom operators
    - regulate universal service
    - regulate competition among providers

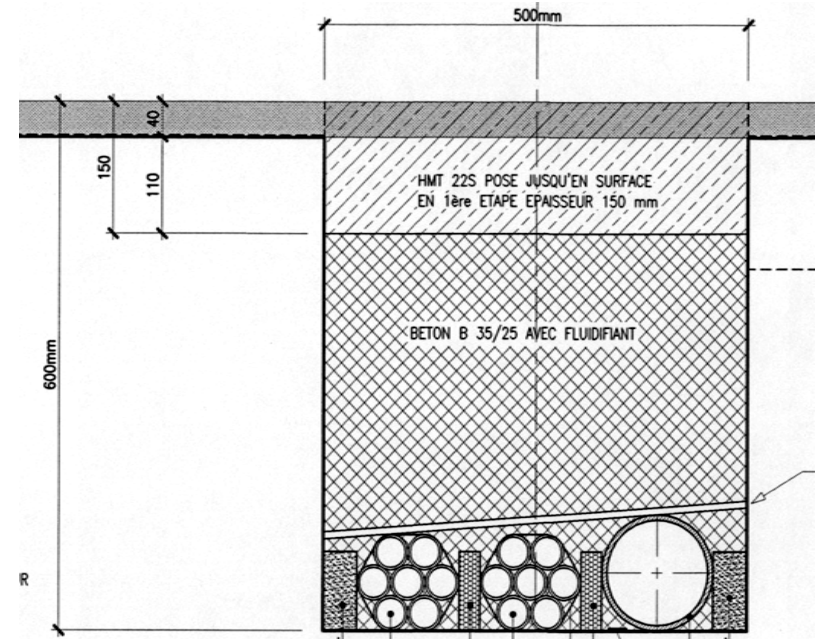
- Do not forget that networks are only provided/used to allow access to services
  - Usage, delivery, exchange
  - Client & server locations
  - Throughput needed to ensure sufficient quality of service delivery





- Manage service delivery using network tools
- Determine the location of service usage
  - Best served through mobile or fixed access ?
  - Public (open) or private access ?

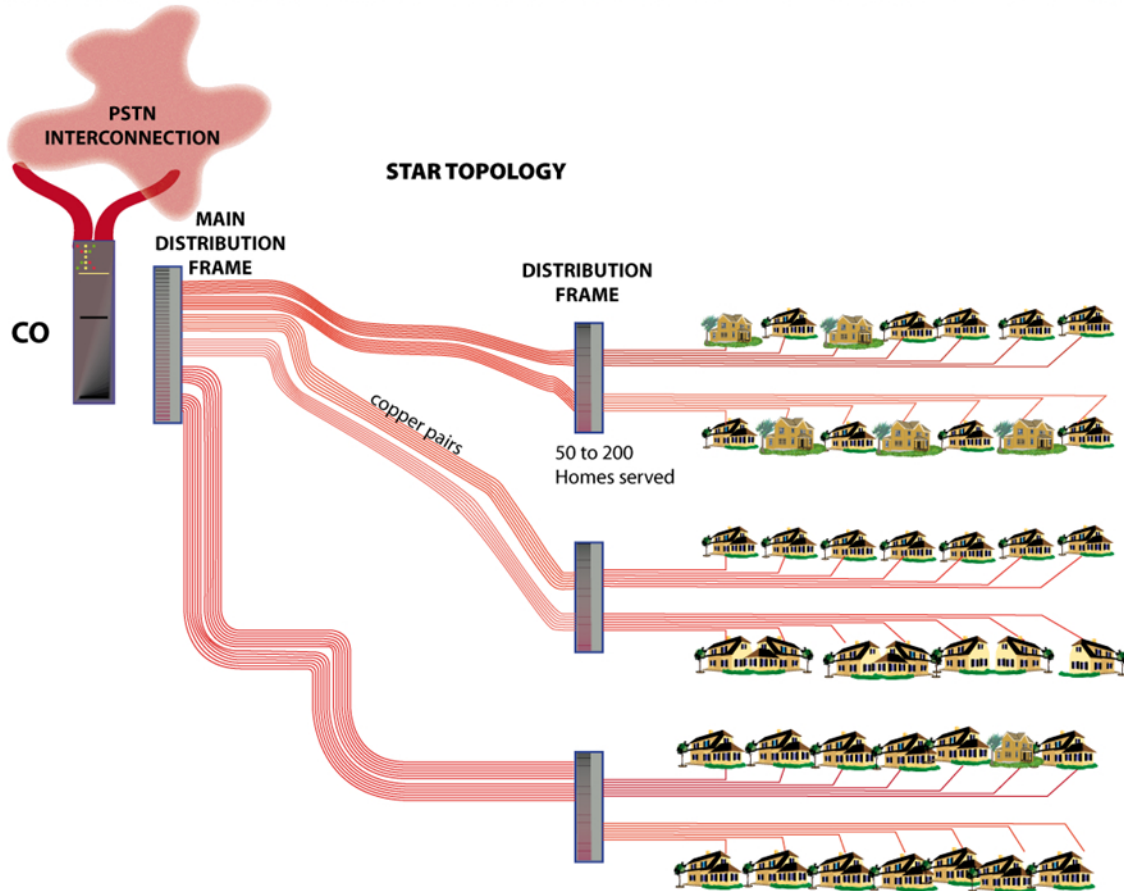
- Mobile also rely on fixed base networks
- Constituents
  - Terrestrial infrastructures
  - Fibre optic characteristics
    - ‘speed’
    - ‘effective range’
    - trunk – capillarity
    - Wavelengths
      - Single usage
      - Multiplex
  - Termination
  - Duration



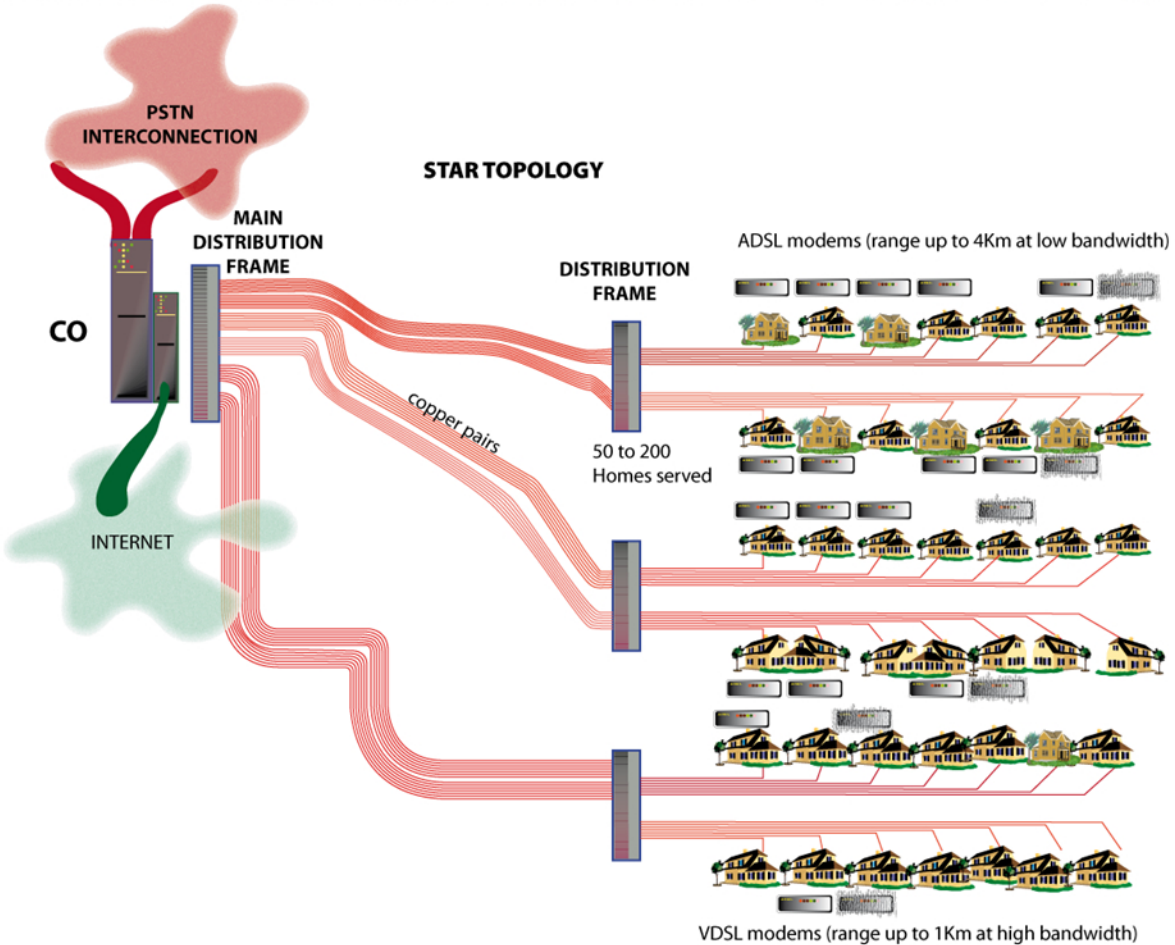
- Usually and historically dependant of
  - legacy networks
  - convergence of supporting technologies
    - examples follow
  - choice between passive and active networks
    - essentially CATV
  - vertical vs. horizontal networks
    - centred on services, not customers



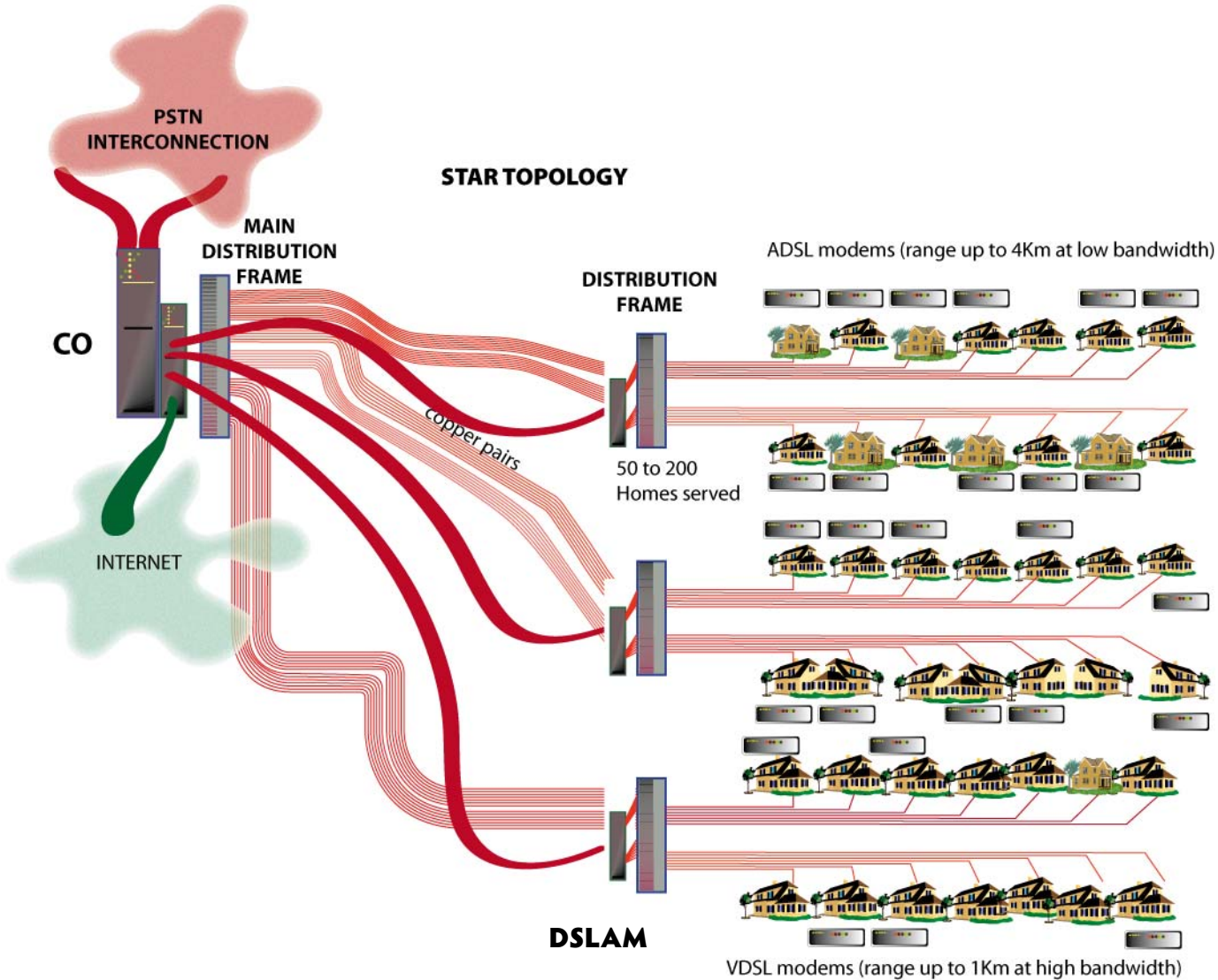
Example: Local loop (telephony) topology



Example: Local loop (telephony) topology

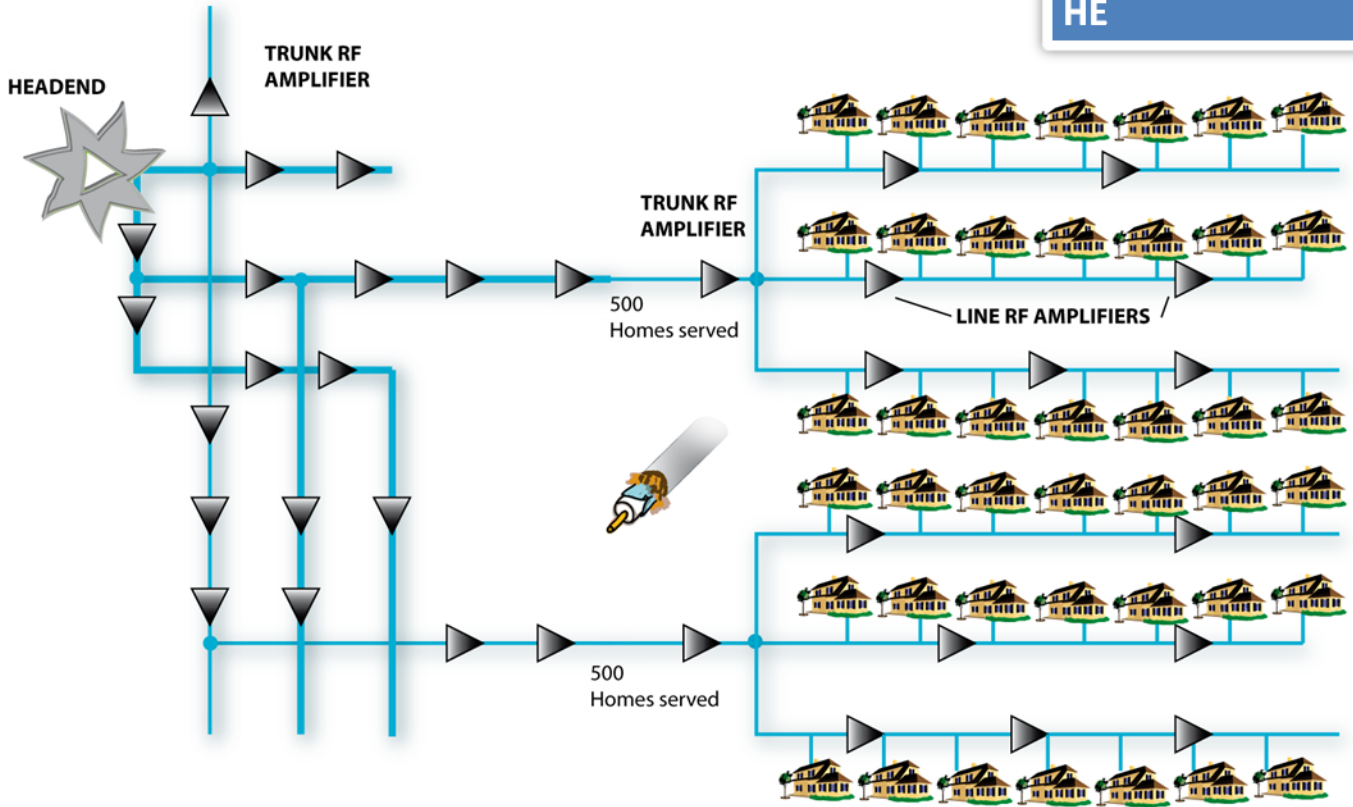


Example: Local loop (telephony) topology



Hybrid fibre/coax (HFC) CATV technology

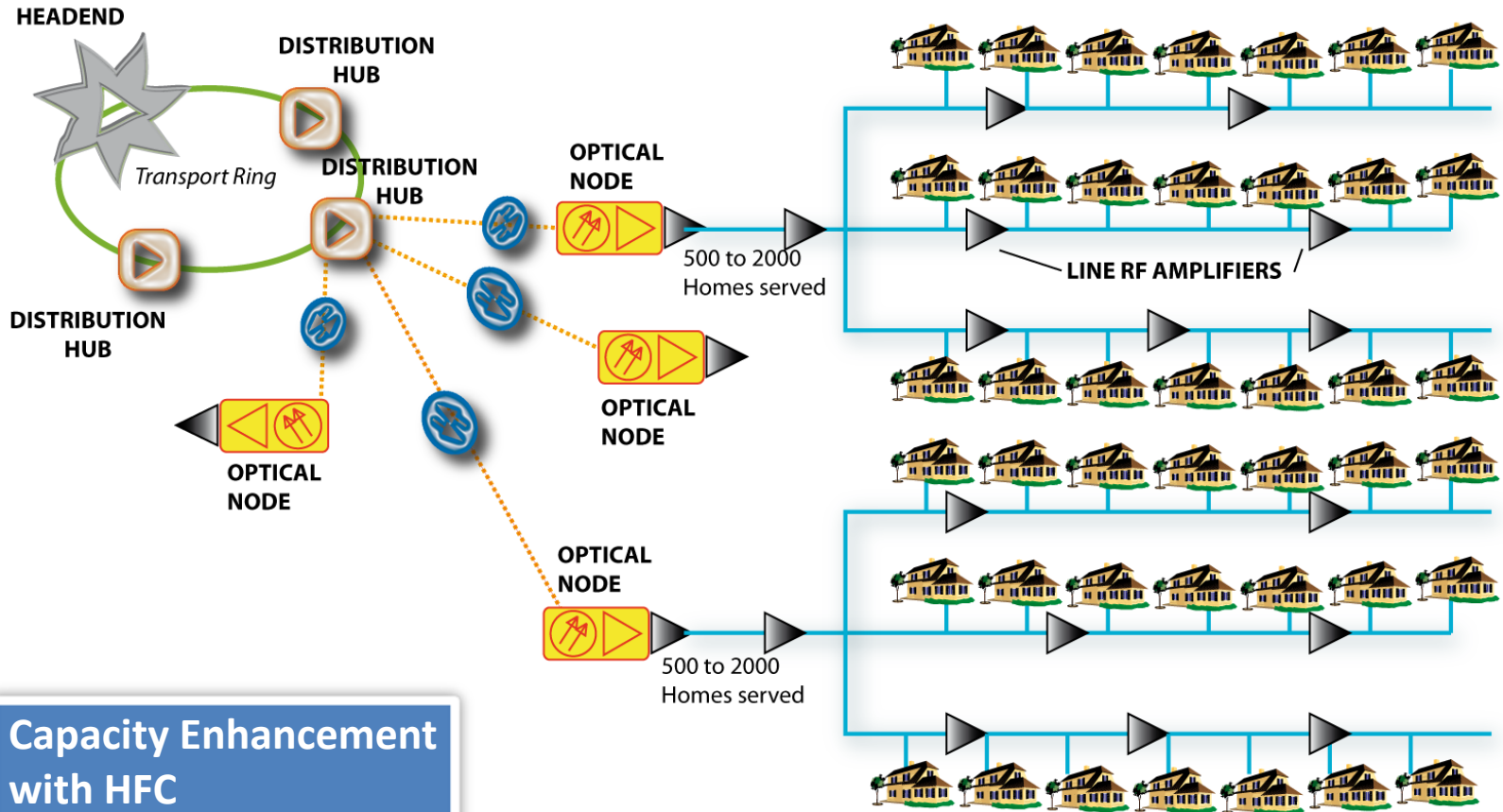
Tree topology from HE





Hybrid fibre/coax (HFC) CATV technology

Tree topology from HE



Capacity Enhancement with HFC

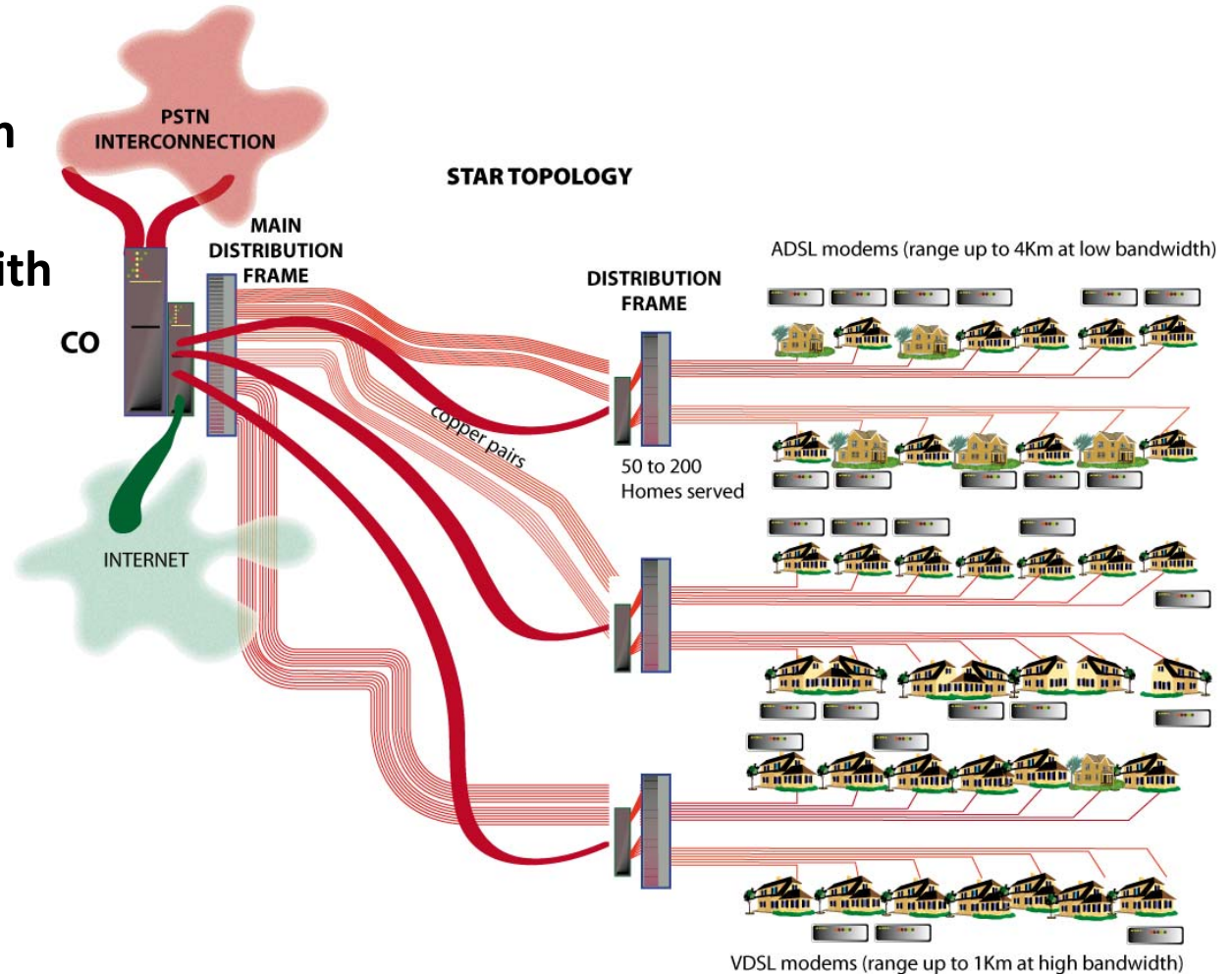


# Classical evolution from xDSL to FTTH

Access Networks Topology

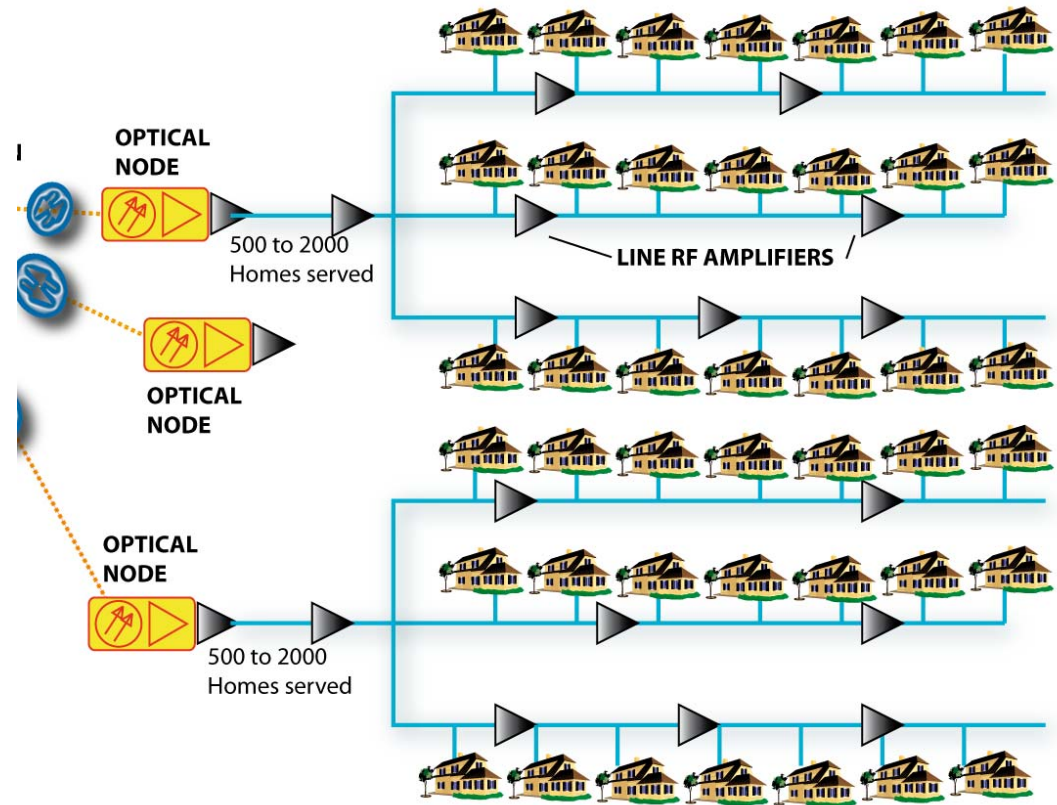
Gradually replace

- copper pairs with fibre
- xDSL modems with O/E converters
- Keep sub-star topology



Gradually replace

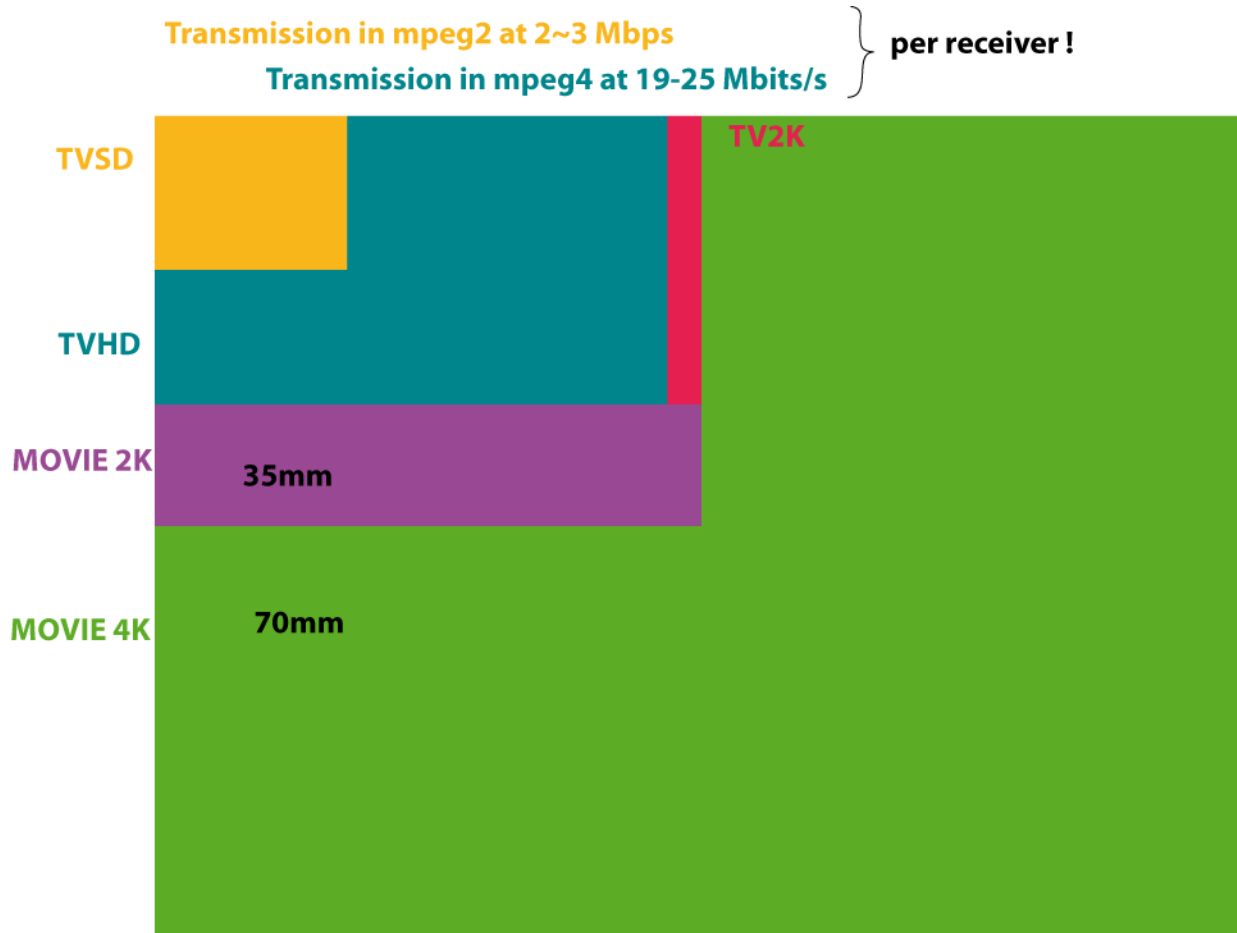
- Coax lines with fibre
- RF amplifiers with O/E converters
- Keep bus topology (PON - Passive Optical Networks)



- Evolution of bandwidth need
  - Conditions
    - Broadcast- Multicast – Single Access
    - Service needs
      - text/ image/ sound/ movie
      - real time/ asynchronous access
      - usage
  - Popularity
  - Offer
    - Profitability
    - Availability (Topology)

- Bandwidth evaluation
  - service used (a measure of ‘power’)
  - number of simultaneous concurrent users (a measure of ‘energy’)
  - most probable network link between client and server
  - branch/ trunk traffic (long distance, metropolitan or local)

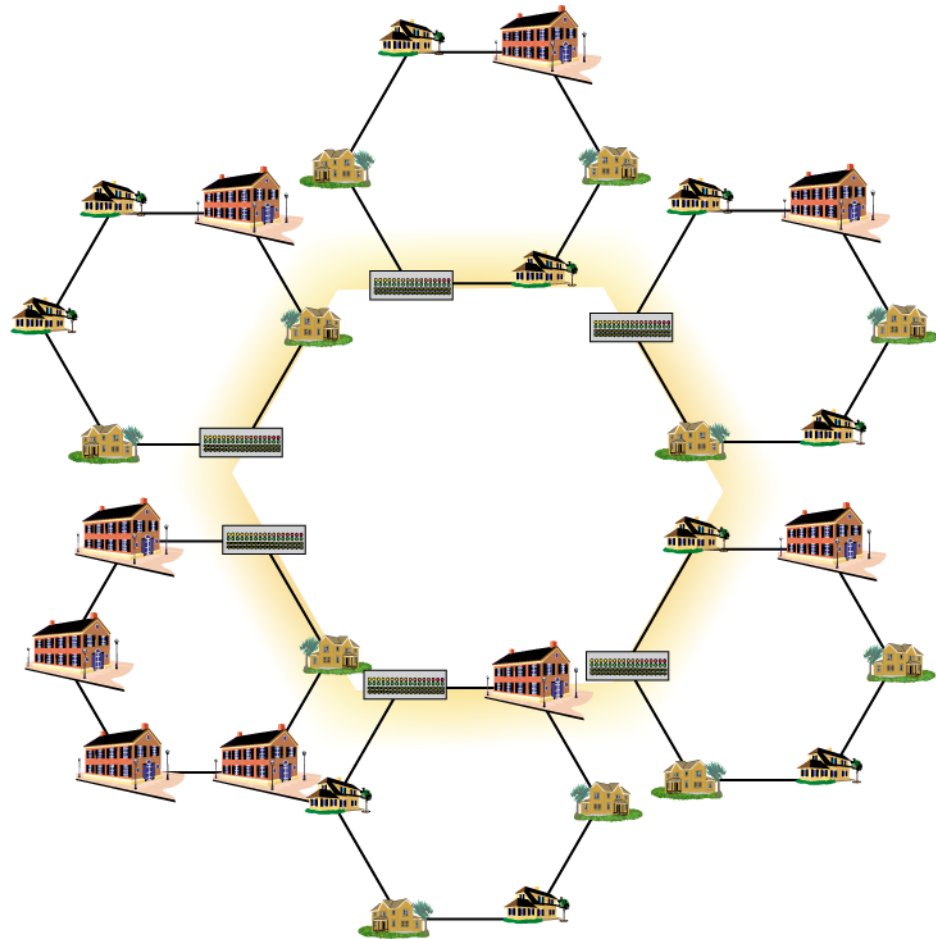
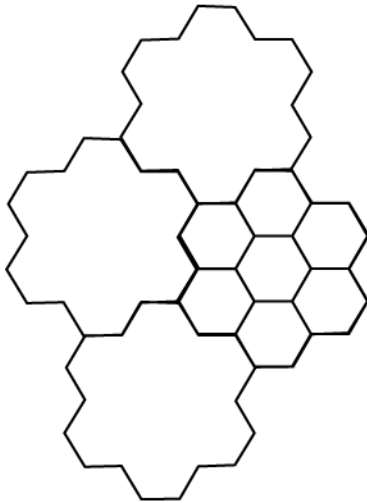
Vertical text: Digital Television





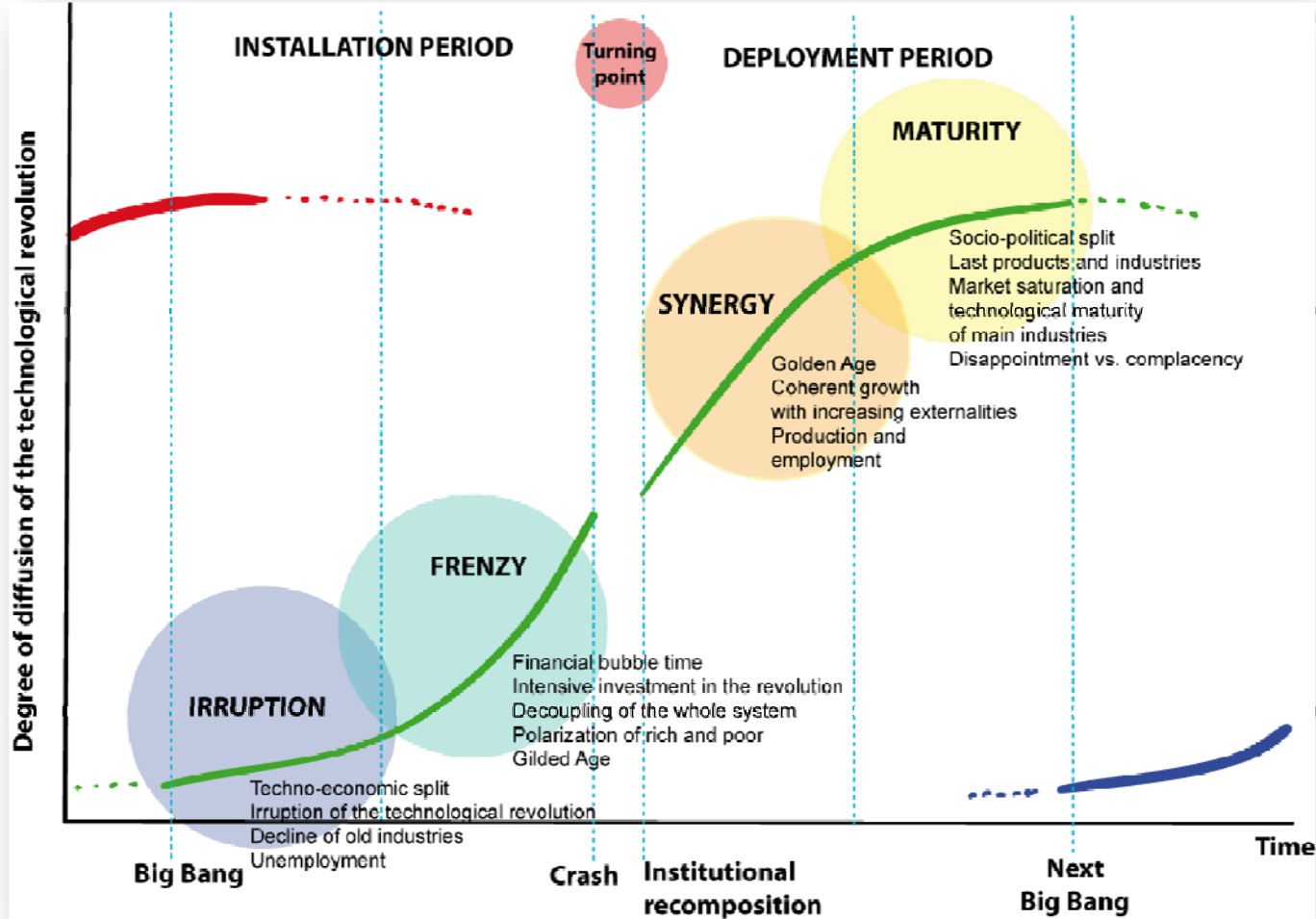
- Two huge problems
  - The transformation of legacy networks cannot answer the challenges of the near future
  - Its cost is prohibitive
- Possible solution:
  - Separate network and services
  - Build fibre optic local area universal access networks
  - Open them to competing service providers

Flexible topology



- Local access to hubs
- Distant access to services
- Managing access networks
- PPP

Finance and develop fibre networks



Carlota Perez; 'TECHNOLOGICAL REVOLUTIONS AND FINANCIAL CAPITAL: The Dynamics of Bubbles and Golden Ages'; Edward Elgar, Cheltenham, UK, 2002

- Understanding the concept of ‘universal’ access networks
- Understanding the bandwidth needs
- Choosing the right network
  - fixed or mobile
- Developing financing models
- Promoting locally controlled access networks



CATV	Community Antenna Television (or Cable TV)
DSLAM	Digital Subscriber Line Access Multiplexer
FTTH	Fibre To The Home
HFC	Hybrid Fibre Coaxial
HSD	High Speed Digital
PSTN	Public Switched telephone Network
VOD	Video on Demand
VoIP	Voice over IP
xDSL	Various transmission technology (x) Digital Subscriber Line