



Hybrid wireless systems and other technologies to enable social impact of real broadband services to rural communities

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OECD workshop on developing broadband access in rural and remote areas
Porto, 25 October 2004

Broadband

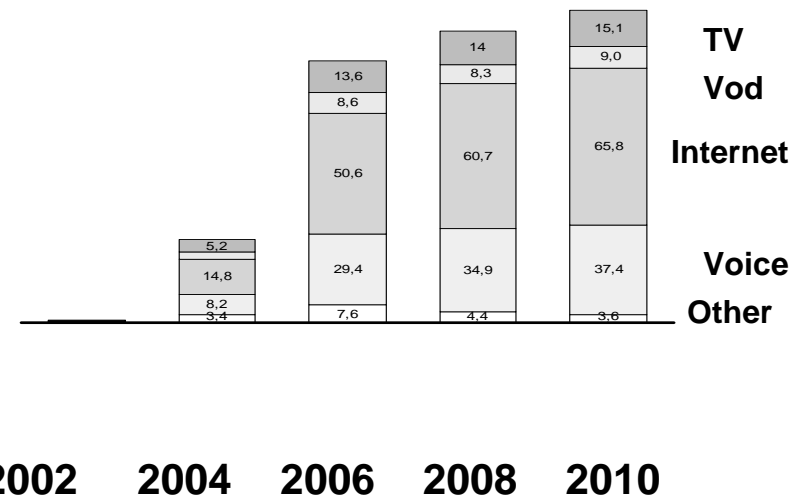
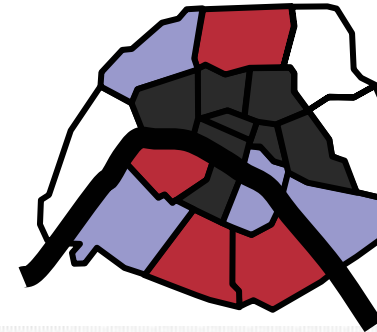
- **Drivers for universal broadband:**
 1. **Economics (increase Enterprise and SME productivity, impacting local and national GDP)**
 2. **Political: broadband as national infrastructure. Better G2C services**
 3. **Social: inclusion (eHealth, teleworking, eLearning)**

- **Definition of Broadband:**
 - **Bit rate of at least ... 2 Mbit/s per “seat”; application driven**
 - **Possibility to growth: +50 – 100% year over year**
 - **No hidden costs**
 - **Manageable complexity (Content provider, Service Provider, Network Provider, end user)**
 - **Ubiquitous coverage**



FTTH (Ethernet) business case sensitivity

- Demographics
- Network topology/maps
- Cost of labour
- SOHO/SME revenues
- Residential revenues
- Capex
- Opex
- Regulatory...



Density Optimisation ⇒ Roll-out Strategy

Methodology

Gather key demographic data at district level (74 zip codes in Munich) :

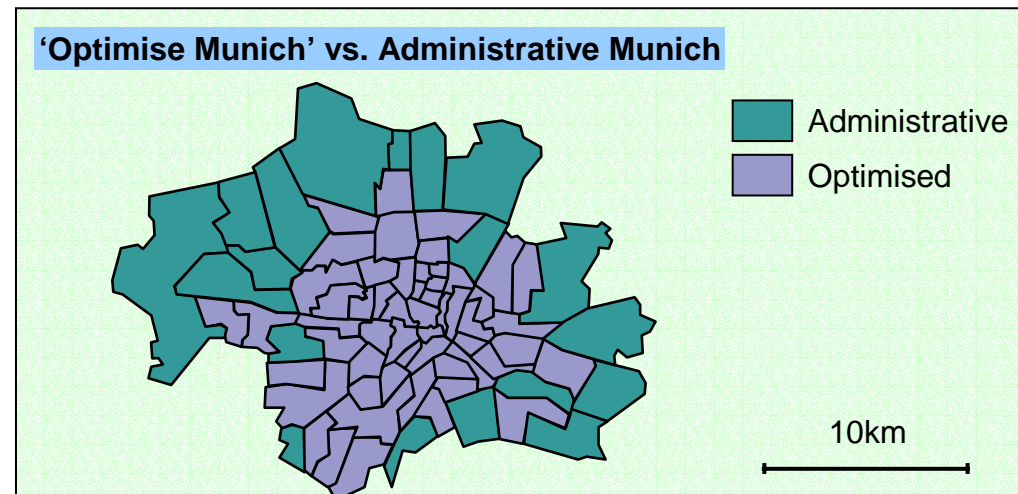
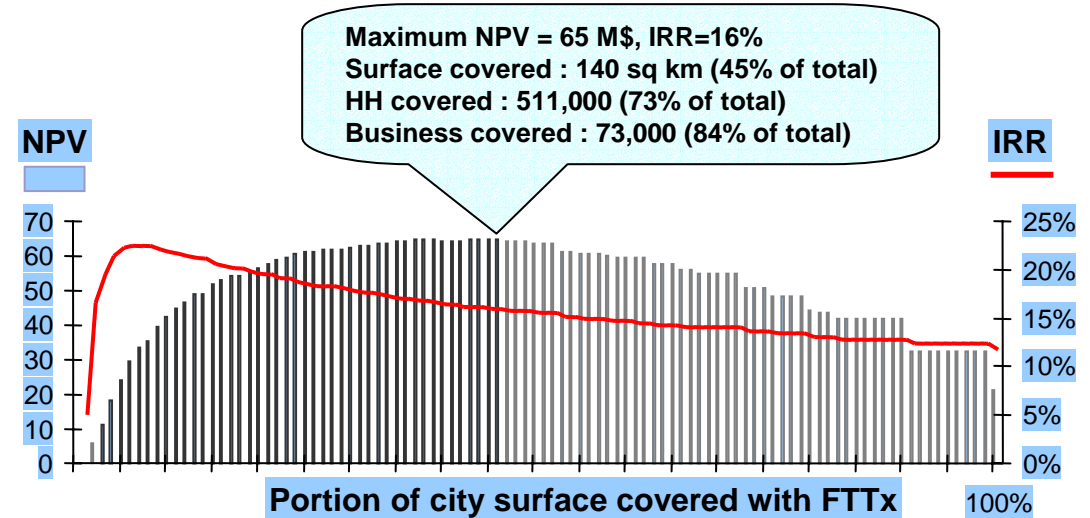
- Population, number of households
- Surface
- Number of businesses

Discard green areas (parks etc.) and sort the districts by decreasing business and household density

Starting with the most dense district, add districts one by one and calculate at each step NPV and IRR

Add districts until the set of districts maximizes the NPV

Result: Munich example



Rural has multiple definitions

- **Densely populated villages**
Multiple last mile options: Fiber, WiFi or DSL
Cost of back-haul can be a barrier
Upfront demand can justify Central Office upgrade, or WiFi will support “pay as you grow” model
- **Scattered single-family houses**
Different last mile options: DSL from rural CO's, Power Line Communication
- **Vital economy vs depressed regions**
Private-Public Partnership vs Public Sector demand aggregation



No single solution for all purposes

Demand is not guaranteed

WiFi for rural areas

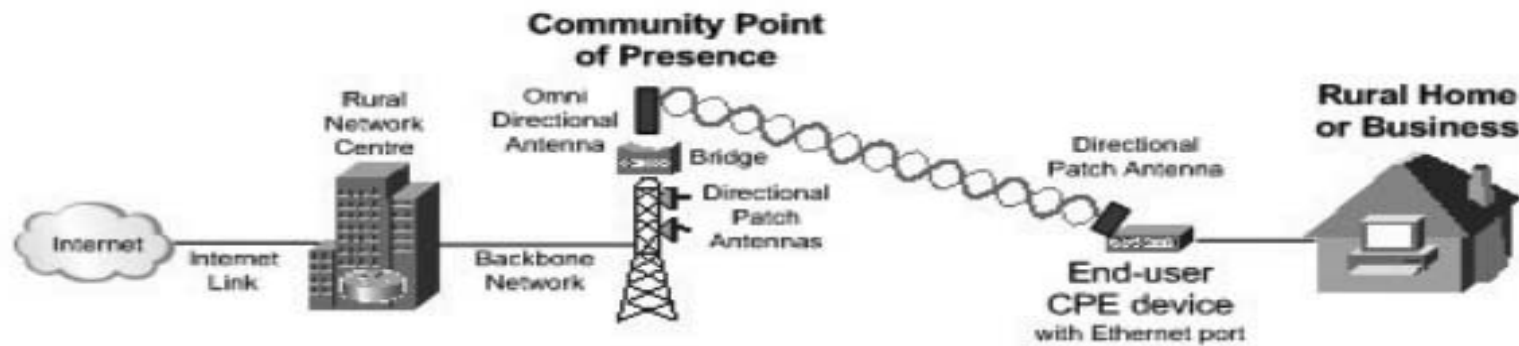


Fig.1 – Basic building blocks of a Rural Point-to-Multipoint Wireless IP broadband network.

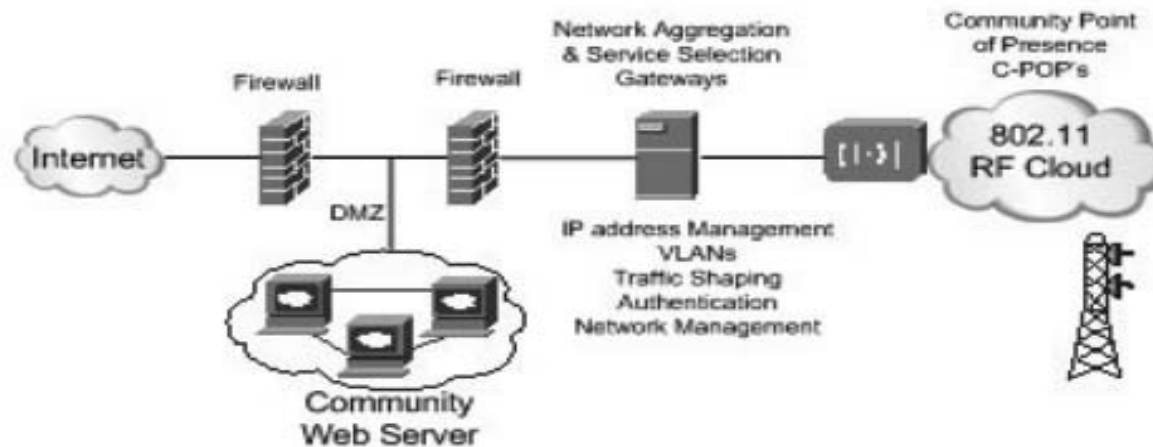
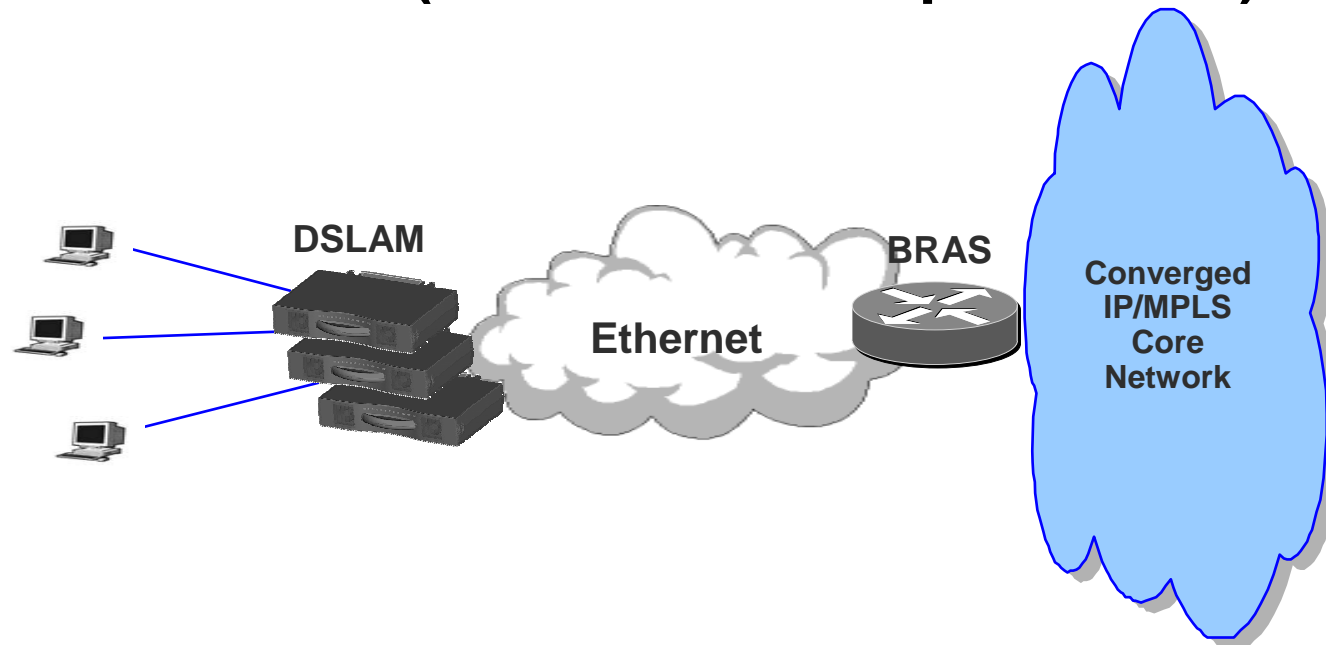


Fig.2 – Basic building blocks within a Rural Network Centre.

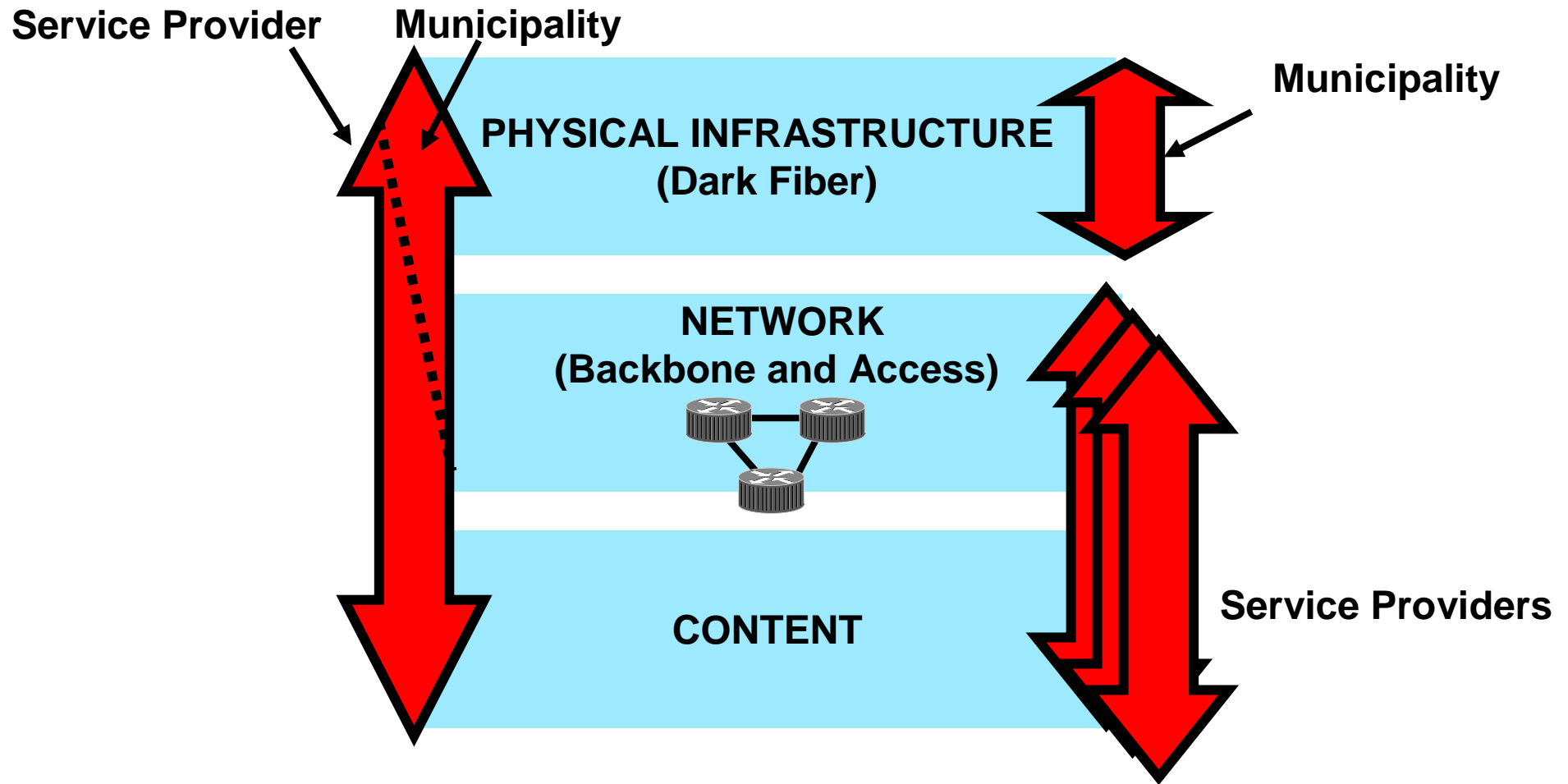
Optimization of DSL for Central Offices upgrades

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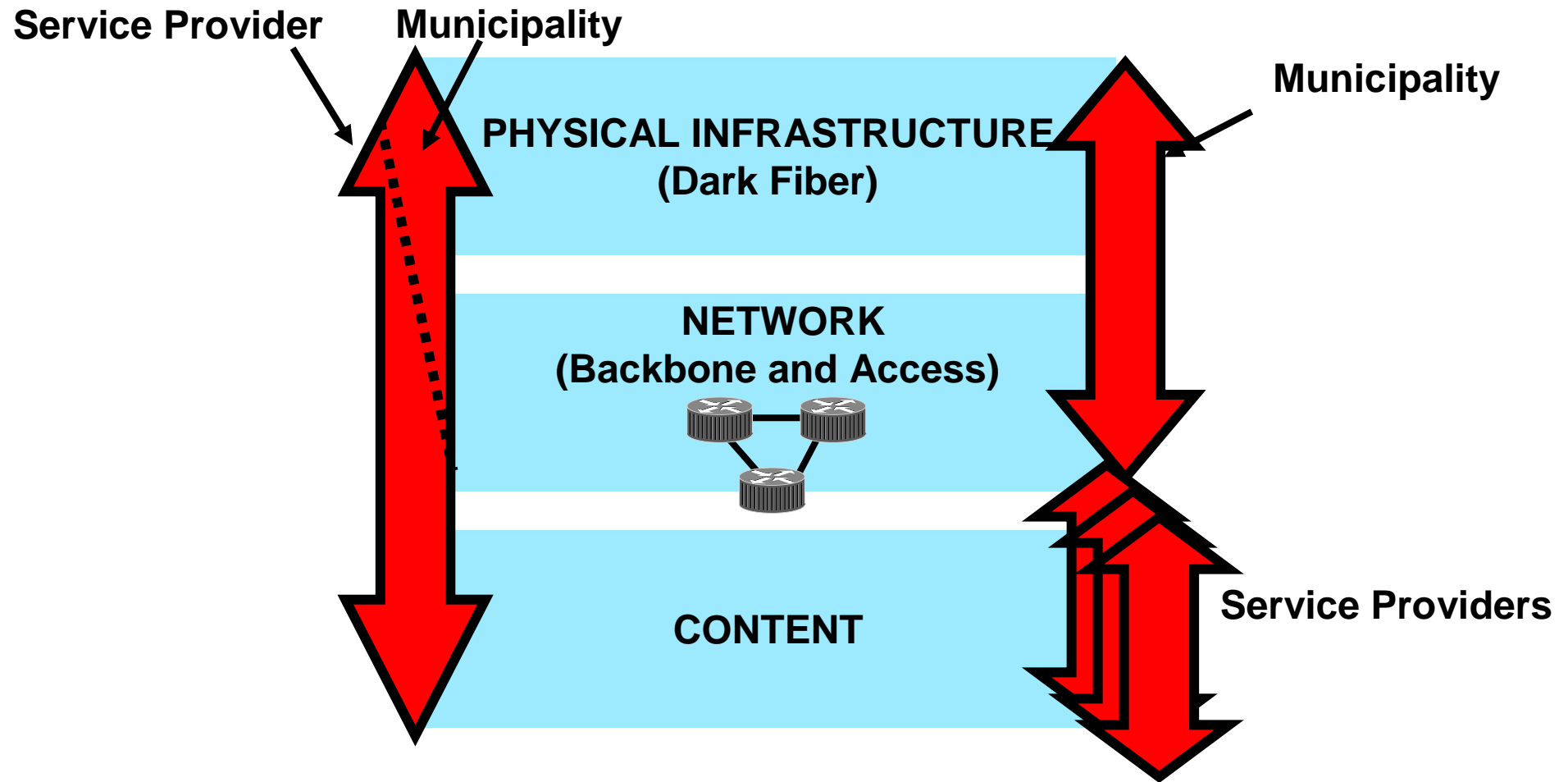
- **Lowest possible cost in the transmission system to reach the Central Office, point to point connections**
- **Small size DSLAM's (also known as "pizza box")**



PPP: Most Common Business Models (1)

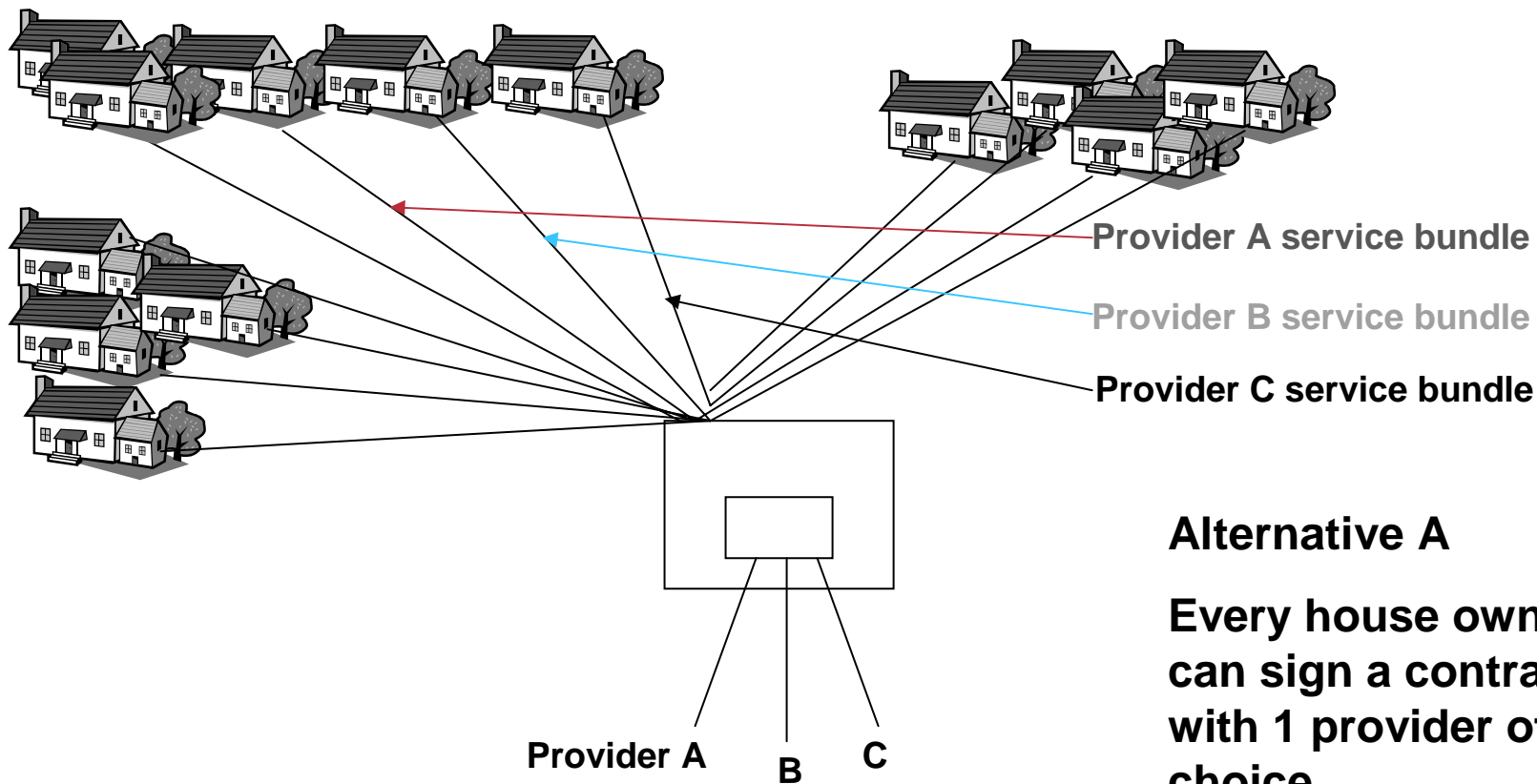


PPP: Most Common Business Models (2)



“Equal Access Networks”

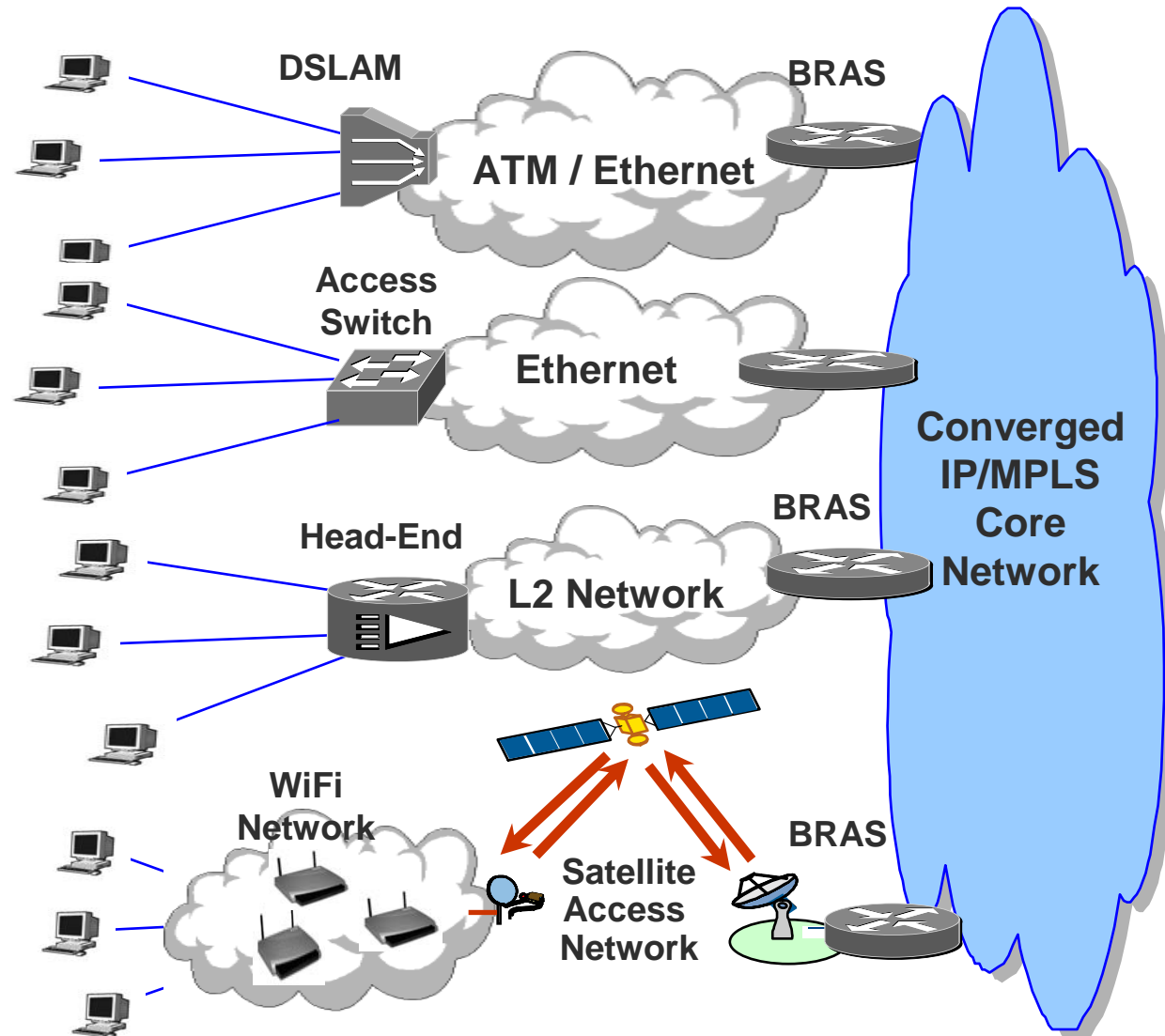
What is an open infrastructure ?



Access Media Transparency

*An Access-Agnostic approach to service delivery:
Common Services, End-User Mobility, ubiquitous access*

- xDSL
- Fiber
- Cable
- WiFi+Sat



Conclusions

- **Ubiquitous access to broadband services is a priority at economical, political and social levels**
- **Rural broadband is segmented by density, end-user sector, access to capital**
- **Partnerships are key to success and are different by region: Private-Public, Local-Central**
- **No one-fit-all technology solution, WiFi with Satellite backhaul or optimized ADSL access have proven viability**
- **Metro Ethernet fiber deployment can be made viable as well, when supported by proper cooperation models (PPP, incentives)**

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