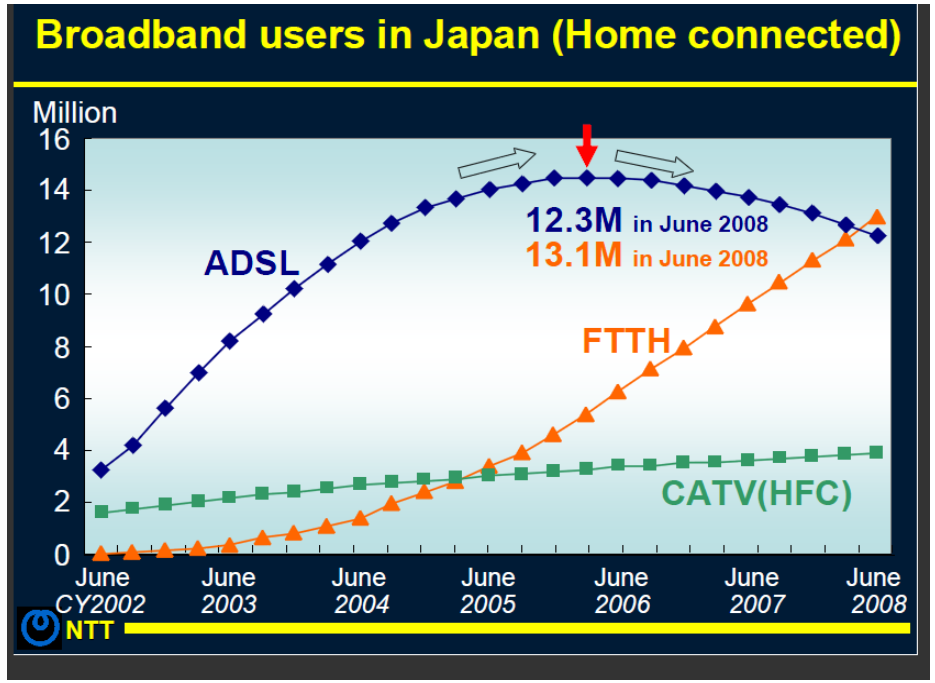
Current situation of NGAN

- Definition of Large Bandwidth (LB)
  - The ITU-T I.113 reccomendation defines Large Bandwidth (LB) as the “transmission capacity that is faster than primary rate Integrated Services Digital Network (ISDN) at 1.5 or 2.0 Mbit/s”
  - The Federal Communications Commission defines it as “broadband as 200 kbit/s (0.2 Mbit/s) in one direction, and advanced broadband as at least 200 kbit/s in both direction”
  - OECD defines it as “broadband as 256 kbit/s in at least one direction”
  - The European Commission defines it as “broadband capacity as downstream capacity equal to or higher than 144 kbit/s”
- Definition of Ultra Large Bandwidth (ULB)
  - Usually ULB is defined as ranging above 30 Mbit/s in the downstream direction, per user

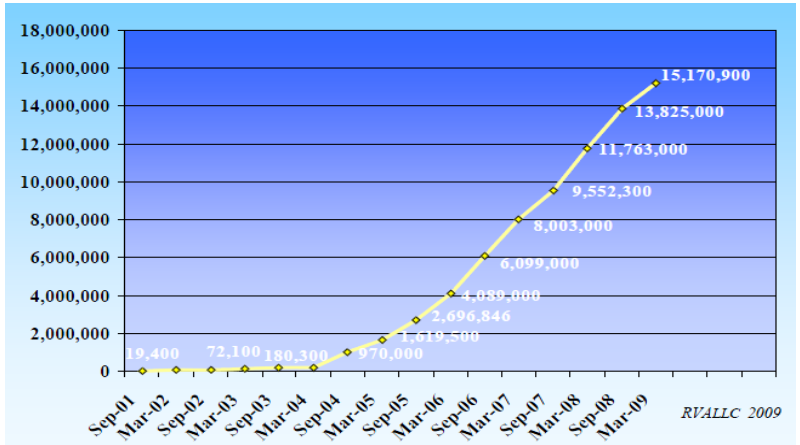
Worldwide NGAN

- In Japan NTT holds about 75% of the FTTH market
- Where operators offer wide spread ULB access, the number of xDSL terminations is decreasing



Worldwide NGAN

- In the USA FTTH is increasing steadily
- The Figure plots the growth of FTTH terminations in North America
- Since the contribution of Canada, Mexico and Caribbeans is about 1,5% of the total, plotted data refer essentially to the USA



Ultra Large Bandwidth

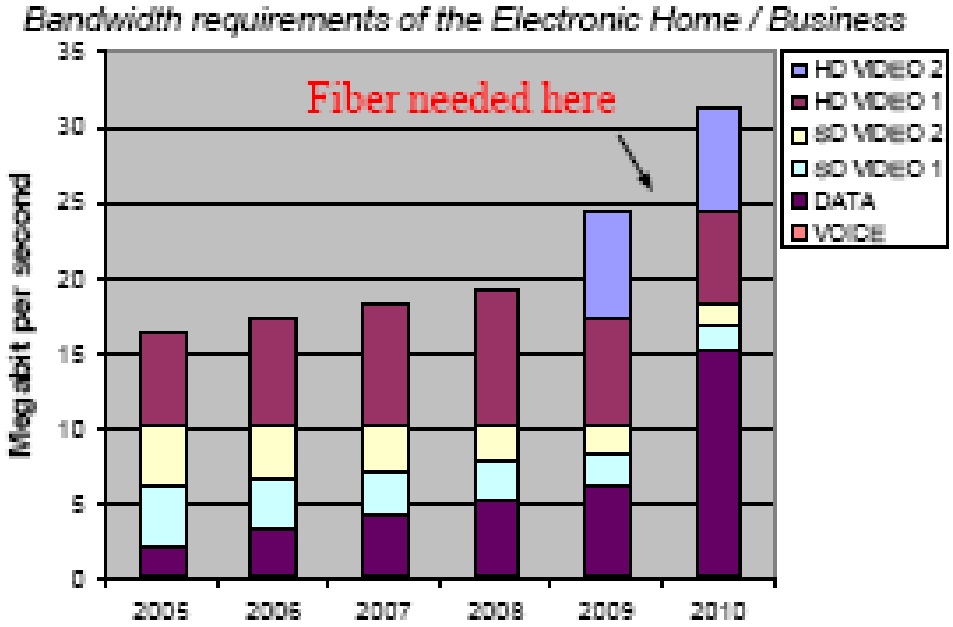
- The 30+ Mbit/s access speed of ULB refers to the peak capacity of the user's downlink
- The actual average capacity available to the individual user can be less than 30 Mbit/s, depending on the traffic concentration polices adopted by operators
- Thus, the definition of ULB is referred to a theoretical maximum capacity, real transmission speed depends on the operator's investments in upgrading its access network and metropolitan network

Ultra Large Bandwidth

- A strategy for the deployment of the NGAN must take into account business issues
  - The required investments for the NGAN will make it really available an upgrade of user's services?
  - If yes, will it be profitable for operators to deploy the NGAN?

Ultra Large Bandwidth

- For residential users, the increased bandwidth will enable services that users will be willing to spend for?
- The figure shows that with a ULB access individual users could benefit of at least two HDTV channels (about 8 Mbit/s each), a number of lower resolution TV channels, high-speed data access (8-10 Mbit/s) and VoIP services
- The issue is the cost of these services



Ultra Large Bandwidth

- Only a subset of user's population will be willing to pay for such serv ices
- However, the high speed data channel will enable fast peer to peer services, and this is likely to increase the size of the user's population interested to ULB access
- In fact, the ranking of users in p2p systems depends mainly on the user's access capacity
- The higher the user's access capacity, the higer the user's rank in the p2p system

Ultra Large Bandwidth

- Thus, it is likely that increased speed of access links will create new service demands, according to the general principle “new streets create more traffic”
- Moreover, Small Office Home Office (SOHO) and Small Medium Enterprise (SME) will be potentially interested in an upgraded network access

Deployment of NGAN

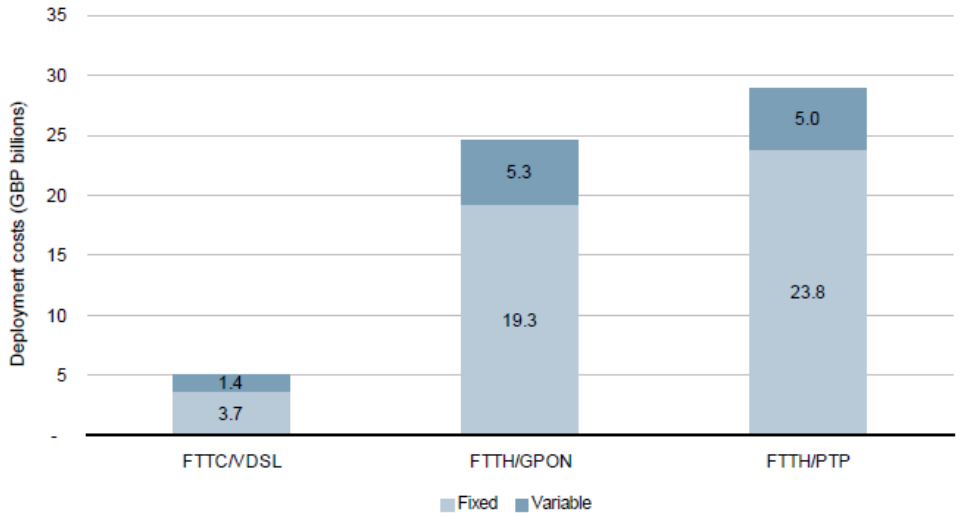
- FTTx access architectures are expensive infrastructures
- The migration towards a 100% FTTH architecture requires higher costs than FTTC/FTTB
- Thus, once again operators must seek a tradeoff between performance and costs
- In Italy, the cost difference between FTTC/FTTB and FTTH is relatively smaller than in other countries
- This depends on the current status of the copper access network, on the distribution of user population and goegraphical features of the national territory

Deployment of NGAN

- FTTH can require up to 5 times investment costs than FTTC
- FTTH P2P requires about 10% investemt costs more than FTTH
- One of the main cost components is constituted by cabling, exscavations in streets
- A significant issue is the replication of the infrastructure to allow sharing among operators; this will be advantageous only in densely populated areas

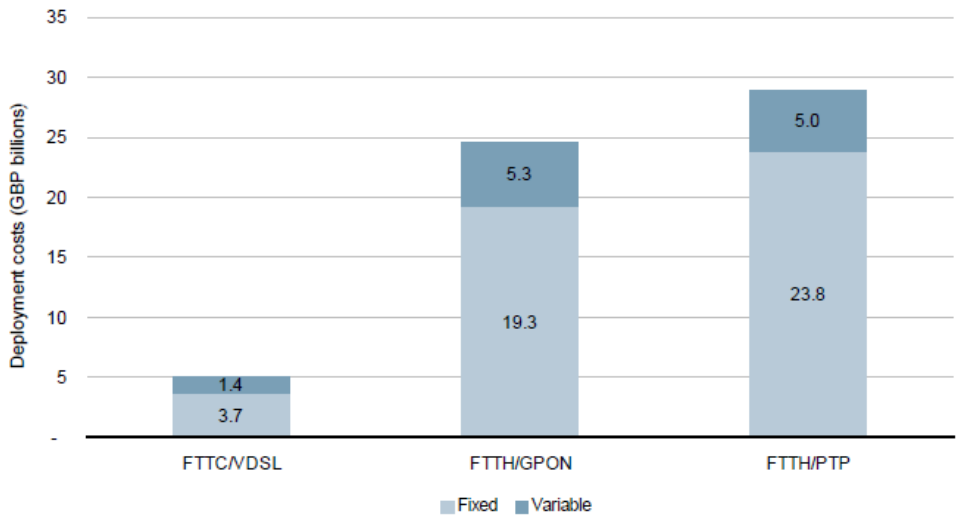
Deployment of NGAN

- The figure plots data relative to the deployment of the NGAN in great britain (comparing FTTC/VDSL, FTTH/GPON and FTTH/P2P), in order to connect 100% of the user population
- FTTH/P2P offers better performance, but higher costs
- FTTH costs 5 times more than FTTC
- FTTH/P2P costs about 15% more than FTTH/GPON



Deployment of NGAN

- In the Figure, fixed costs (to build the infrastructure) are much higher than variable costs (costs to activate user's connection)
- A common strategy of Incumbent Operators is to build a FTTC infrastructure as a transition step towards FTTH

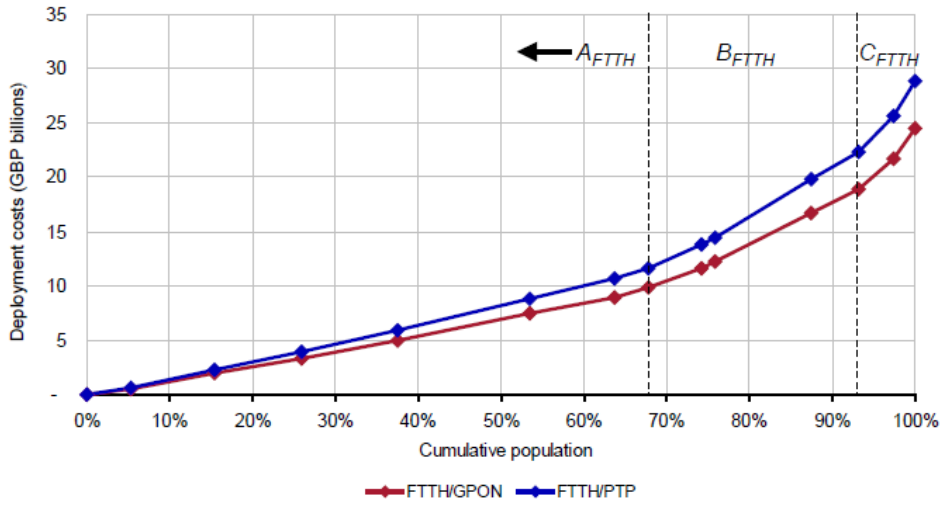


Deployment of NGAN in Italy

- In Italy VDSL solutions are relatively convenient, due to the shorter span of final copper twisted pairs
- Moreover, in Italy about 60% of the user population lives in apartments (densely populated areas) while in UK the percentage drops to 15%
- The two situations are quite different, because deployment costs for densely populated areas are smaller than for suburban areas

Deployment of NGAN

- The cost per user grows as we pass from users living in metropolitan areas to users living in rural areas
- Cost per users is steady for the first 60% of population (urban A population in metropolitan areas)
- Then it increases for the next 20/30% of population (urban B: suburban areas)
- The highest cost per user is for rural users



Digital divide

- Covering 100% of the population may not be convenient
- This is creating a second-generation digital divide, between users with ULB access and users with standard LB access
- It is likely that the gap of the second-generation digital divide can be filled only through government funding, based on the principle of providing equal acces to all people

Digital divide

- Great Britain:
- Standard LB to all users by the end of year 2012
- ULB access to 90% of users within year 2017
- France:
- LB acces @512 kbit/s to all users by the end of year 2012