



# Overview of Broadband Technology Platforms

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**Regional Educational Workshop  
On Rural Broadband  
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**Note: The views expressed in this presentation are those of the author and may not necessarily represent the views of the Federal Communications Commission**

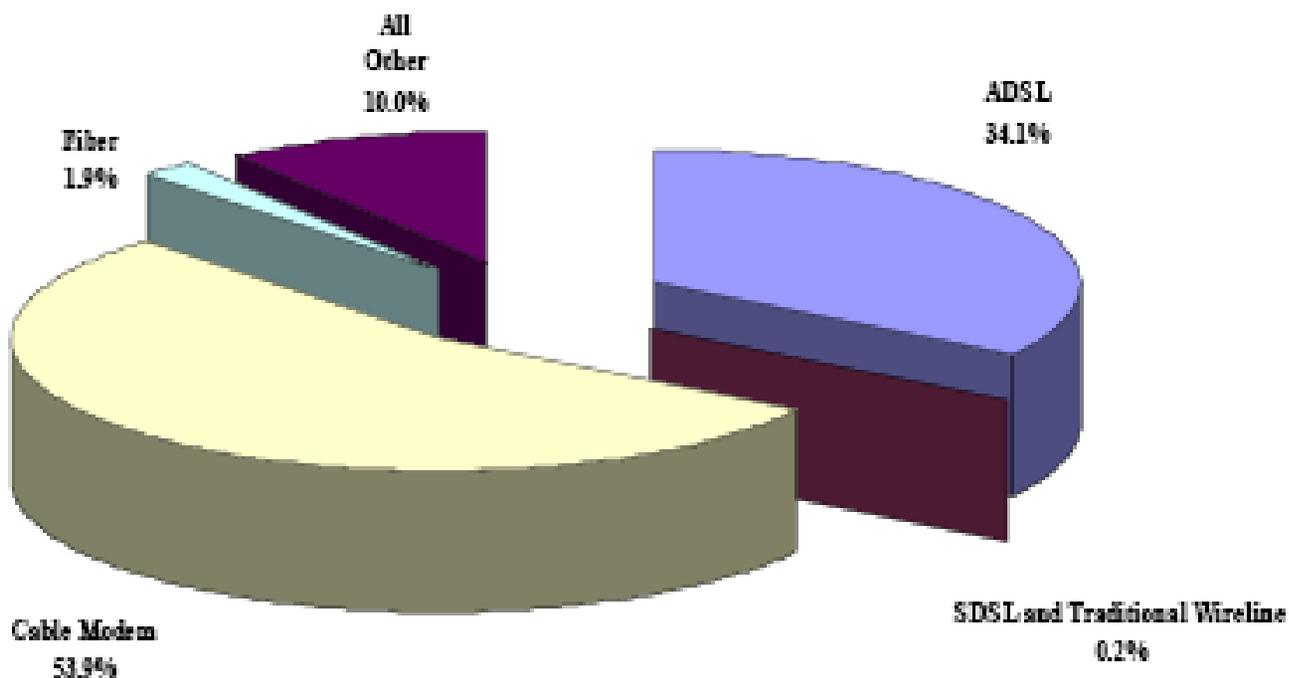


# Overview

- Digital Subscriber Line (DSL)
- Cable Broadband Service
- Fiber
- Satellite
- Fixed Wireless Service - Licensed
- Mobile Wireless Service - Licensed
- Wireless Internet Service Providers (WISPs) - Unlicensed
- Broadband Over Power Lines



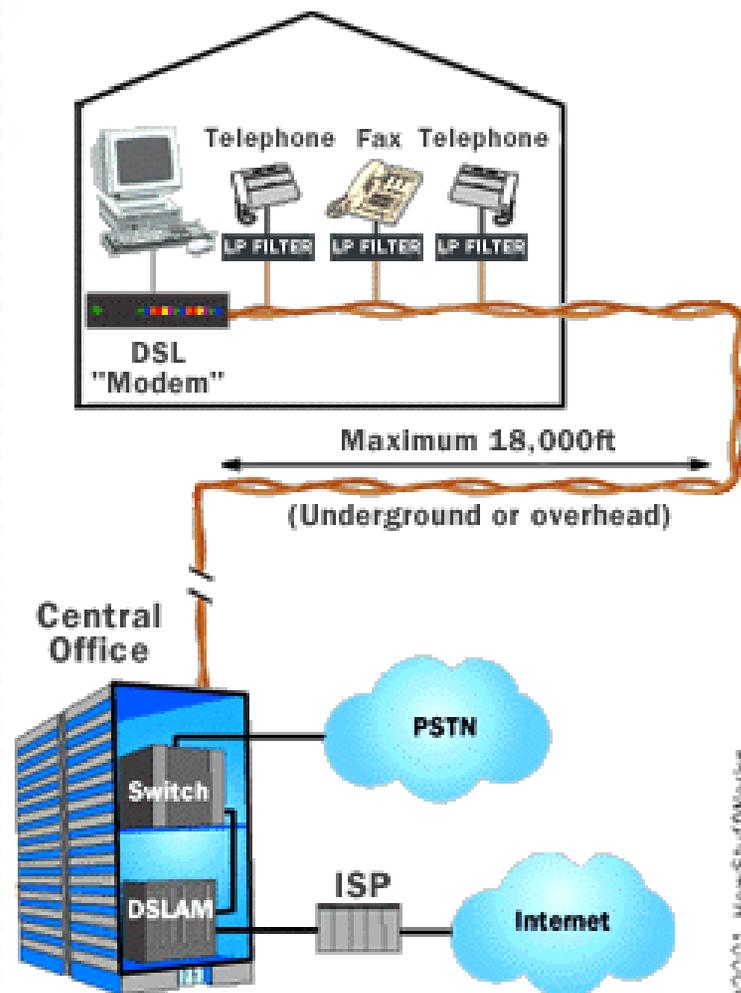
# Residential Advanced Services Lines by Technology as of June 30, 2007





# Digital Subscriber Line (DSL)

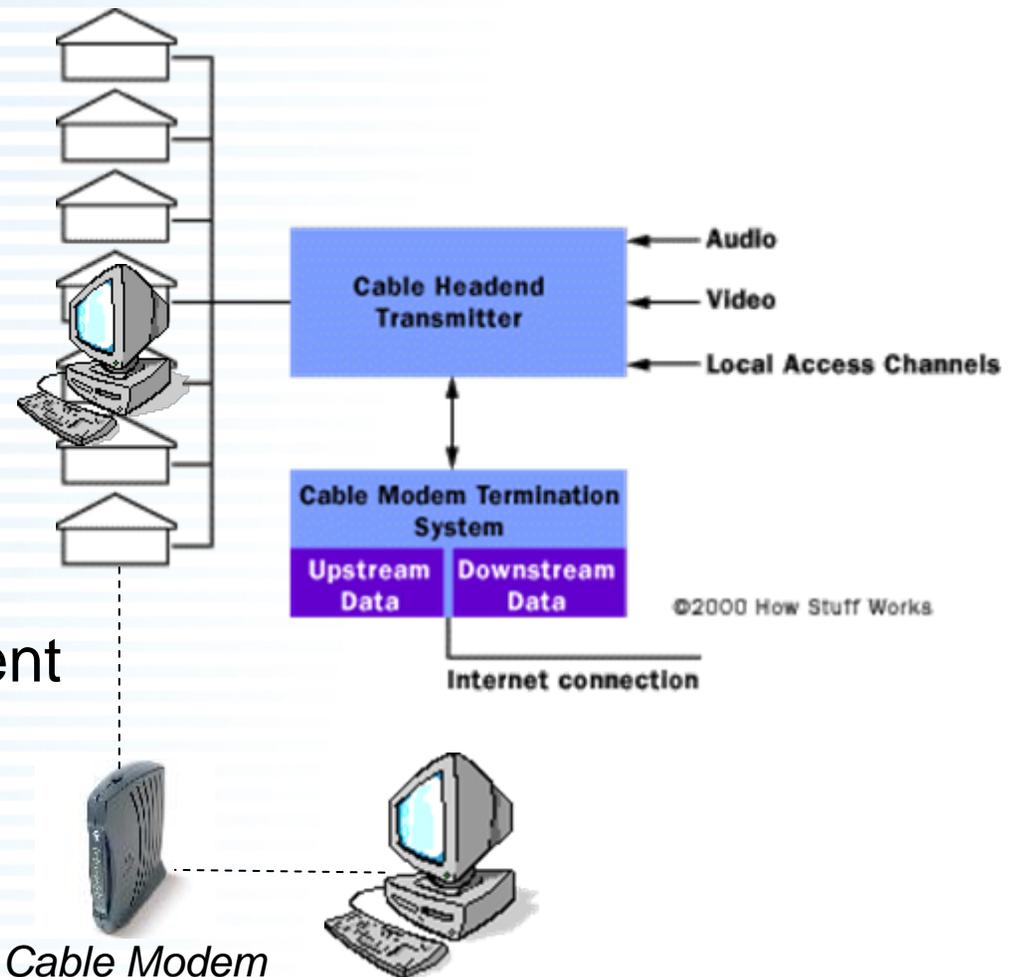
- Most commonly used by local telephone carriers
- Variations: ADSL, VDSL
- Up to 7 Mbs download; 1 Mbs upload
- Distance dependent





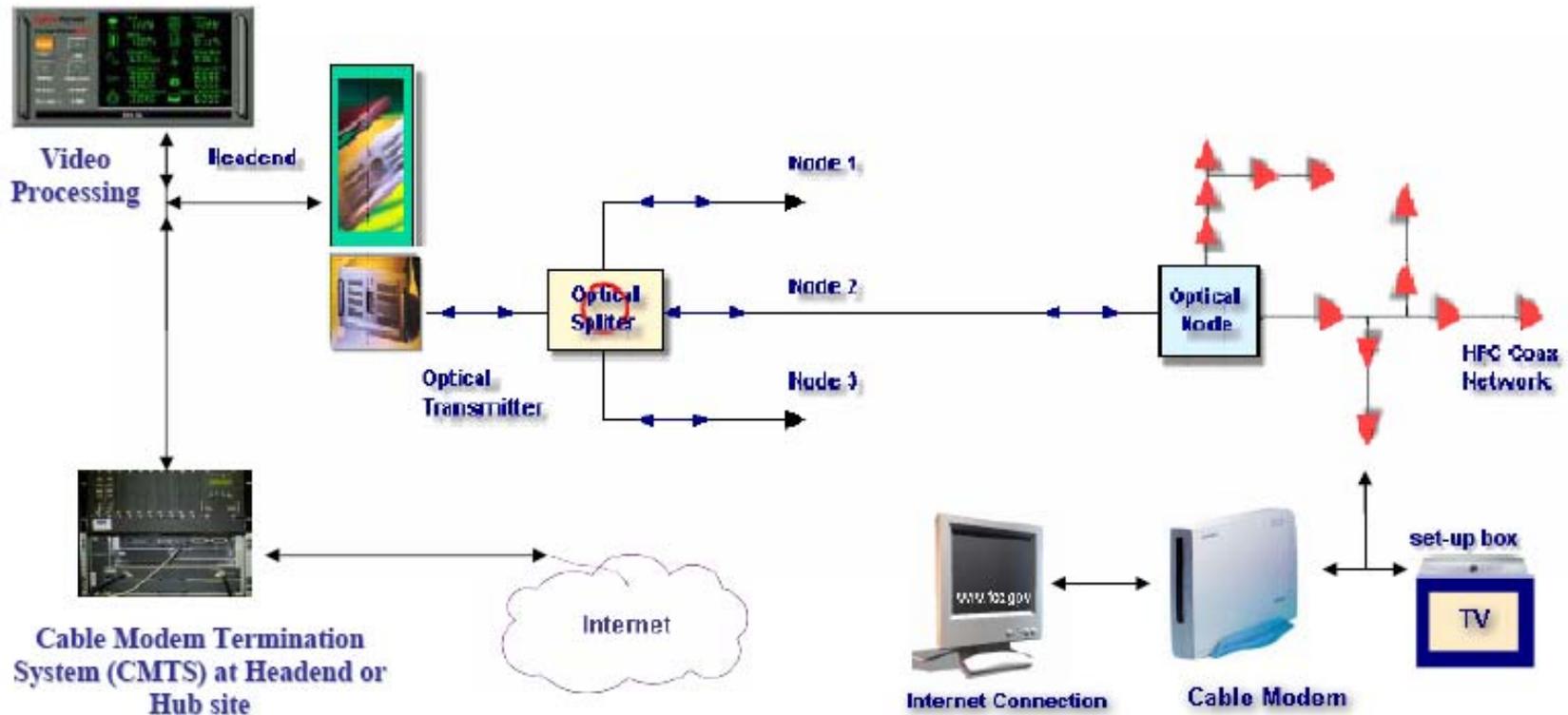
# Cable Broadband Service

- Developed for TV distribution
- Evolved to provide TV/Data/Voice
- Up to 15 Mbs download;  
2 Mbs upload
- Distance independent
- Register w/ FCC



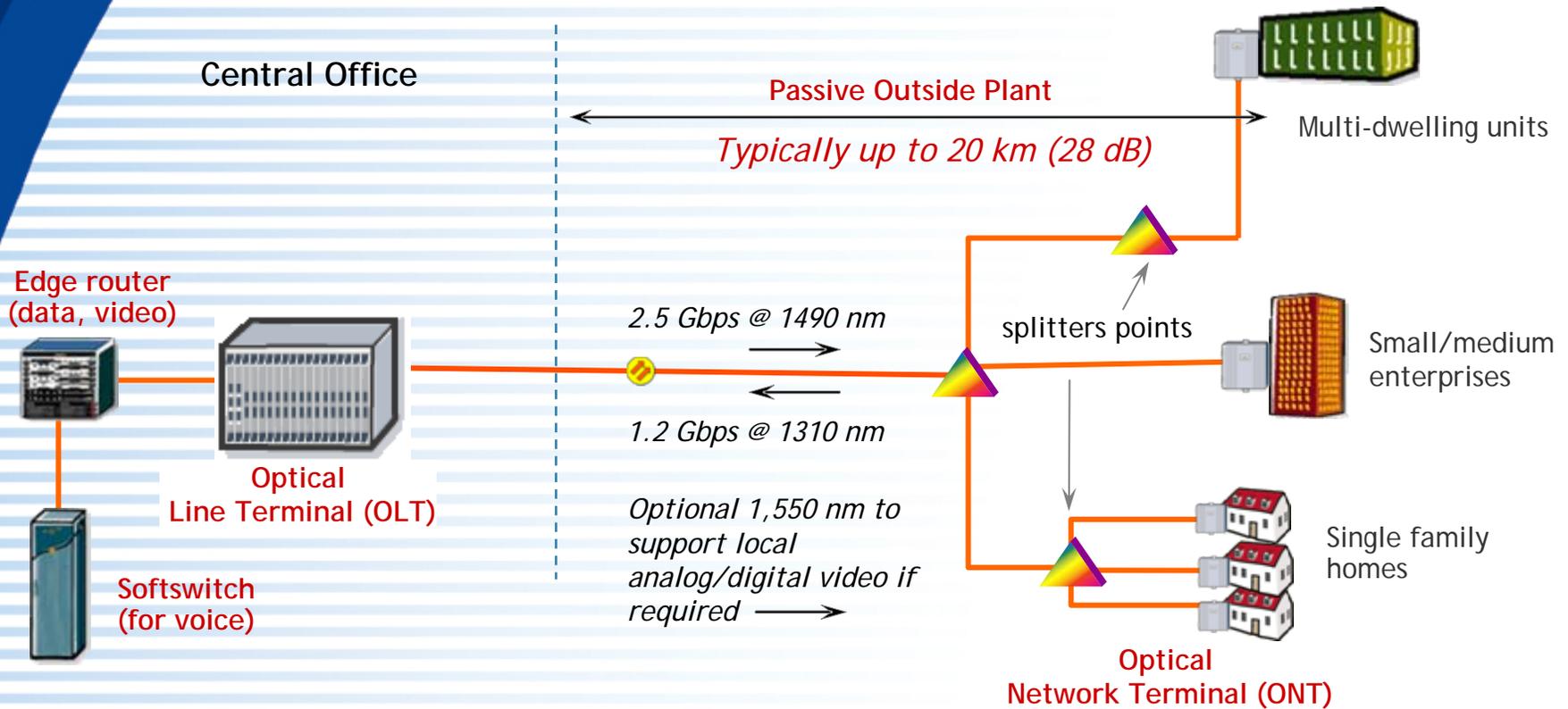


# Hybrid Fiber/Coax (HFC) CATV Network





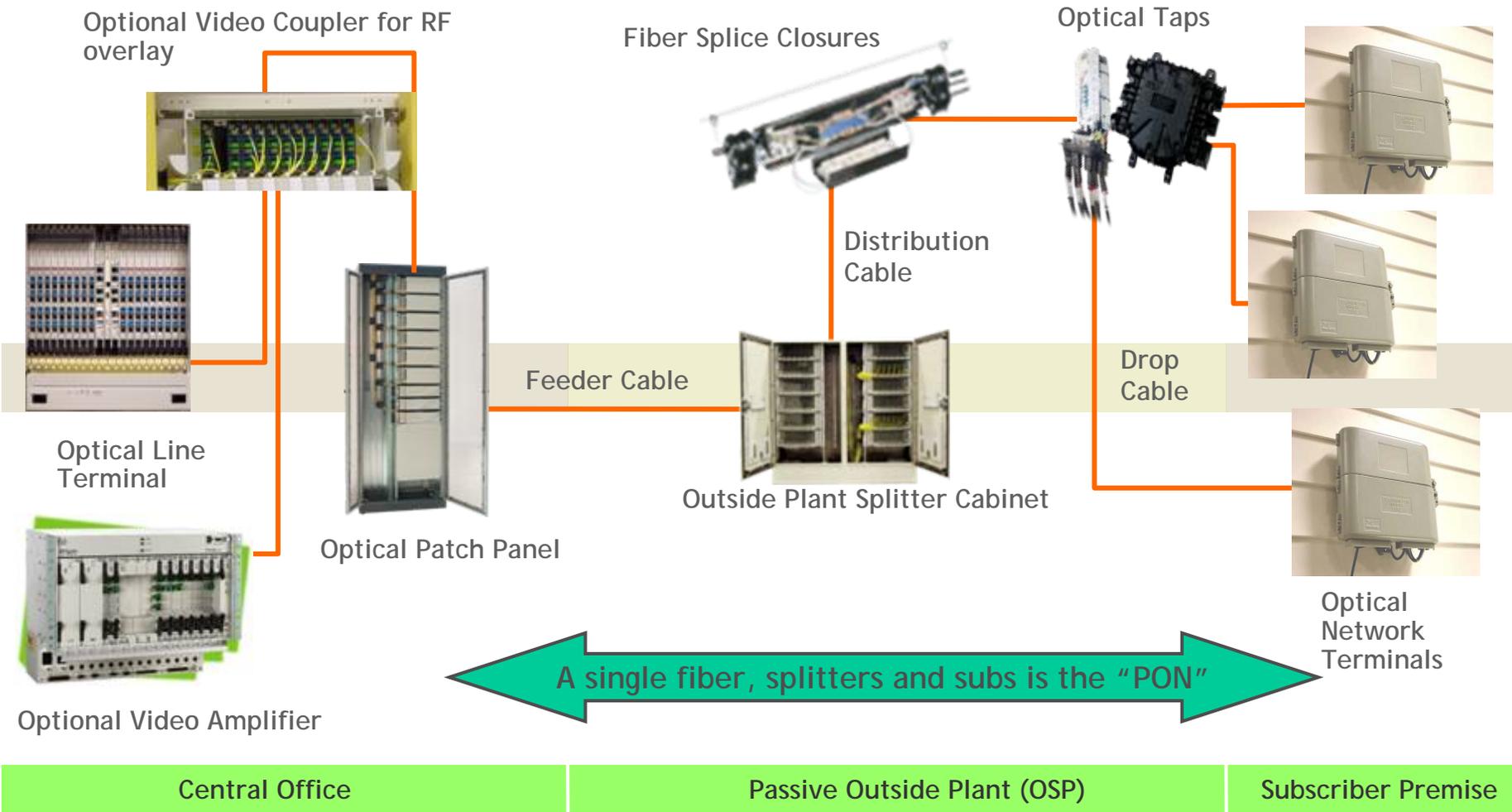
# Gigabit Passive Optical Network (GPON) Fiber to the Home Architecture



Source: Fiber to the Home Council



# Typical GPON Components



Source: *Fiber to the Home Council*



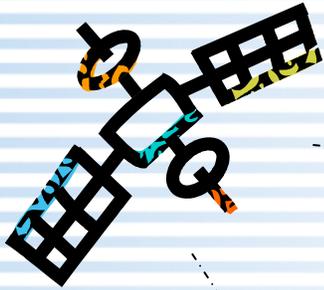
# Satellite

- Geos; Non-Geos; Leos
- Fixed:
  - C-band – 4 & 6 GHz
  - V-Sats – 11 & 14 GHz
- Mobile Satellite Service
- Satellite advantage:  
Ubiquitous coverage
- Limitation: Foliage, rain,  
etc. can affect availability



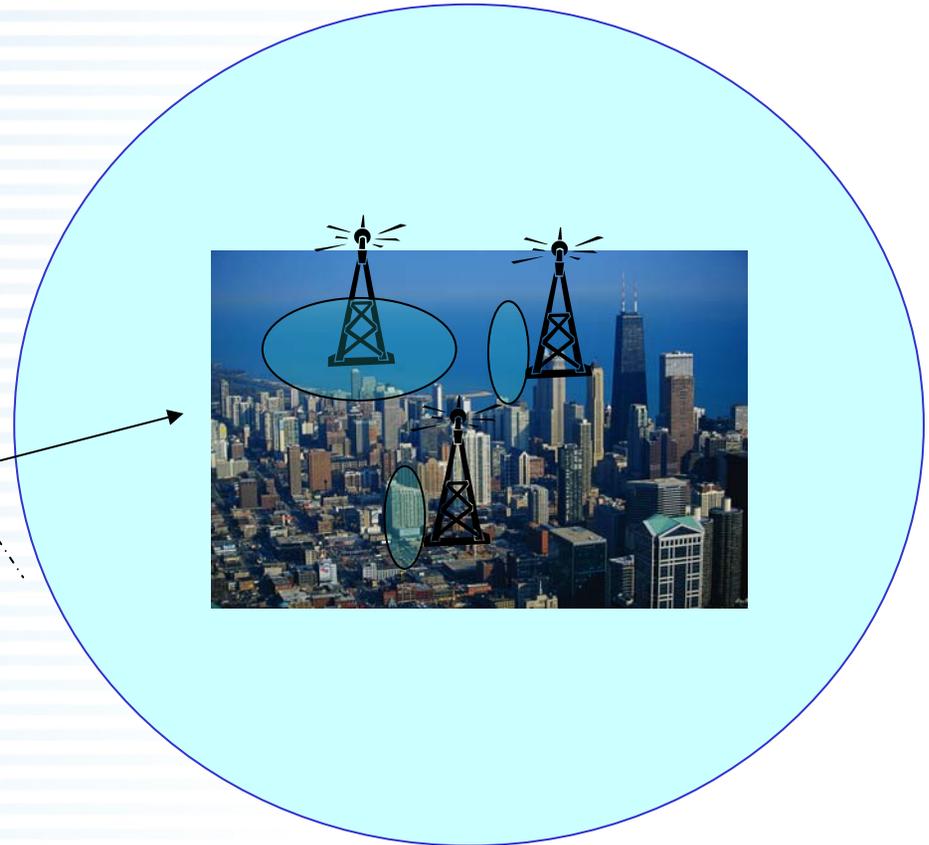


# Mobile Satellite Service Ancillary Terrestrial Component



*Satellite provides ubiquitous coverage, including rural areas*

*Terrestrial base Stations provide coverage in areas where satellite signals may be weak*





# Fixed Wireless Services - Licensed

- Traditional fixed point-to-point service: Microwave signals are aimed along a narrow path using high-gain antennas.
- Requires line-of-sight
- Applications: Communications backbones; studio-transmitter links; cable relay



Signals can be carried over great distances by relaying them over multiple “hops”.





# Fixed Wireless Services - Licensed

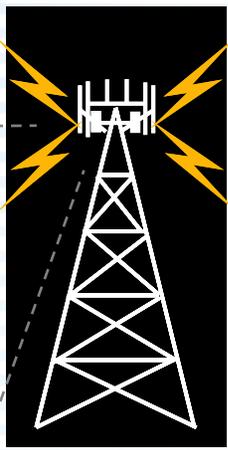
*Examples:*

*Broadband Radio Service/  
Educational Broadband Service*

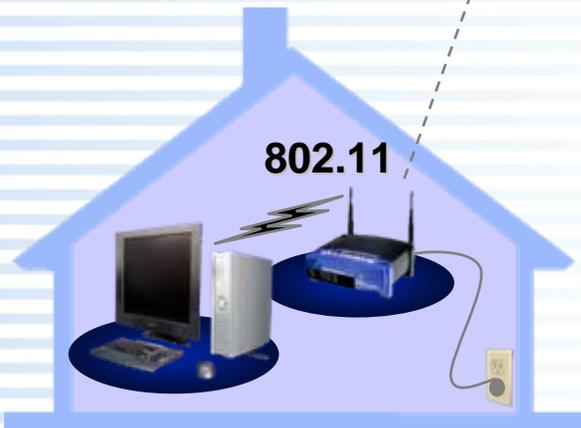
*Local Multipoint  
Distribution Service*



Business  
Access &  
Backhaul



W-Fi



Directly to  
Indoor Modem



Wi-Fi  
Backhaul



# Mobile Wireless Broadband Service

- The FCC has created multiple mobile radio services suitable for broadband:
  - Cellular Service
  - Specialized Mobile Radio Service (SMRs)
  - Personal Communications Service (PCS)
  - Advanced Wireless Service (AWS)
  - 700 MHz (Recently Auctioned)
- Technologies: GSM family; CDMA family; planned WiMAX
- Various types of service, with data speeds of up to 2 Mbps
- Actual speed depends on several factors
- All of the major technologies have developed evolutionary paths to faster data rates





# Wireless Internet Service Providers (WISPs) - Unlicensed

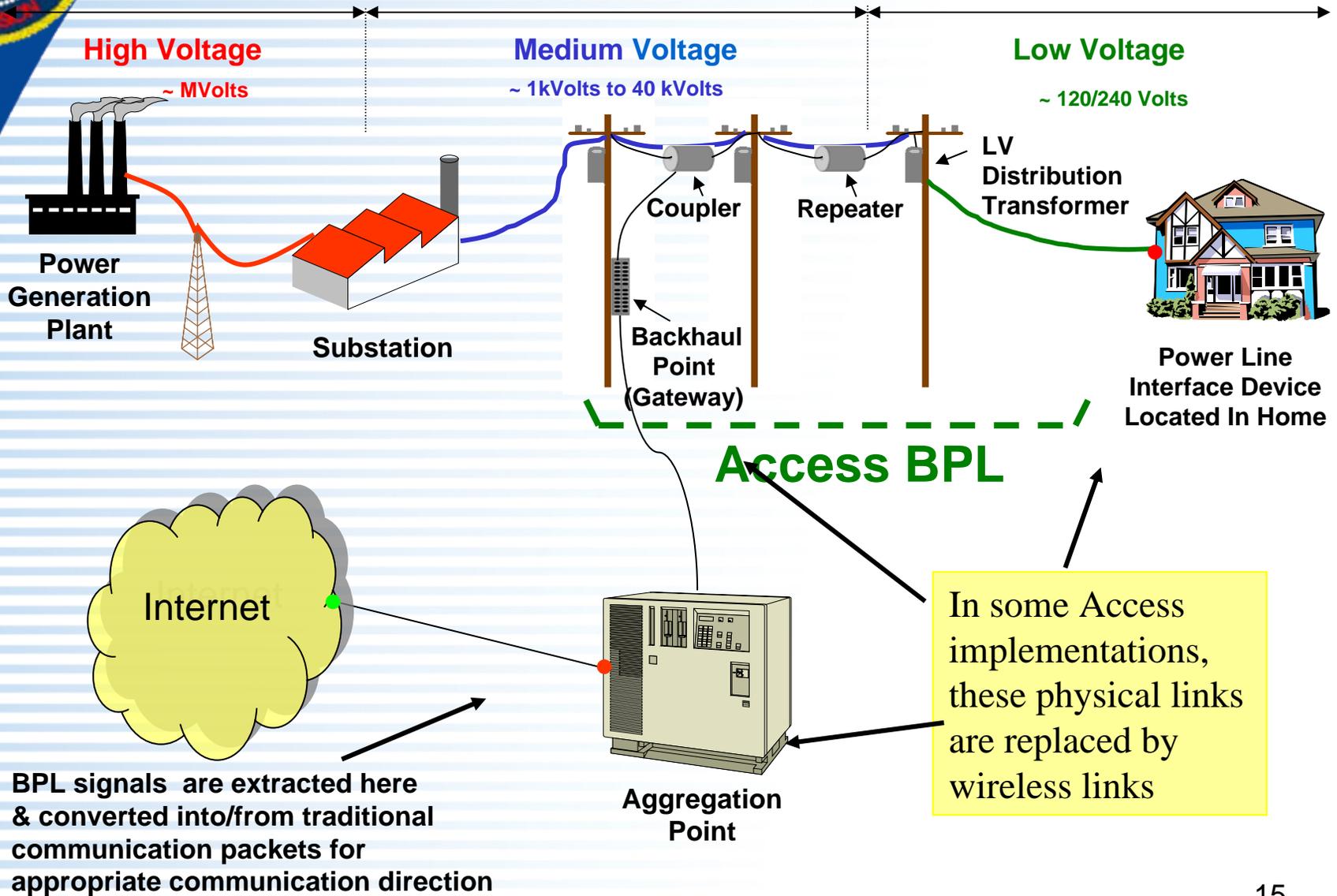
- Part 15 of the FCC rules provides for operation of unlicensed devices
- Many kinds of devices operate under these low power rules - Wi-Fi
- Various techniques are used to enable broadband service in rural areas
- Data speeds vary
- There are thousands of WISPs operating on an unlicensed basis around the U.S.



**Metropolitan, Rural & Community Networks**

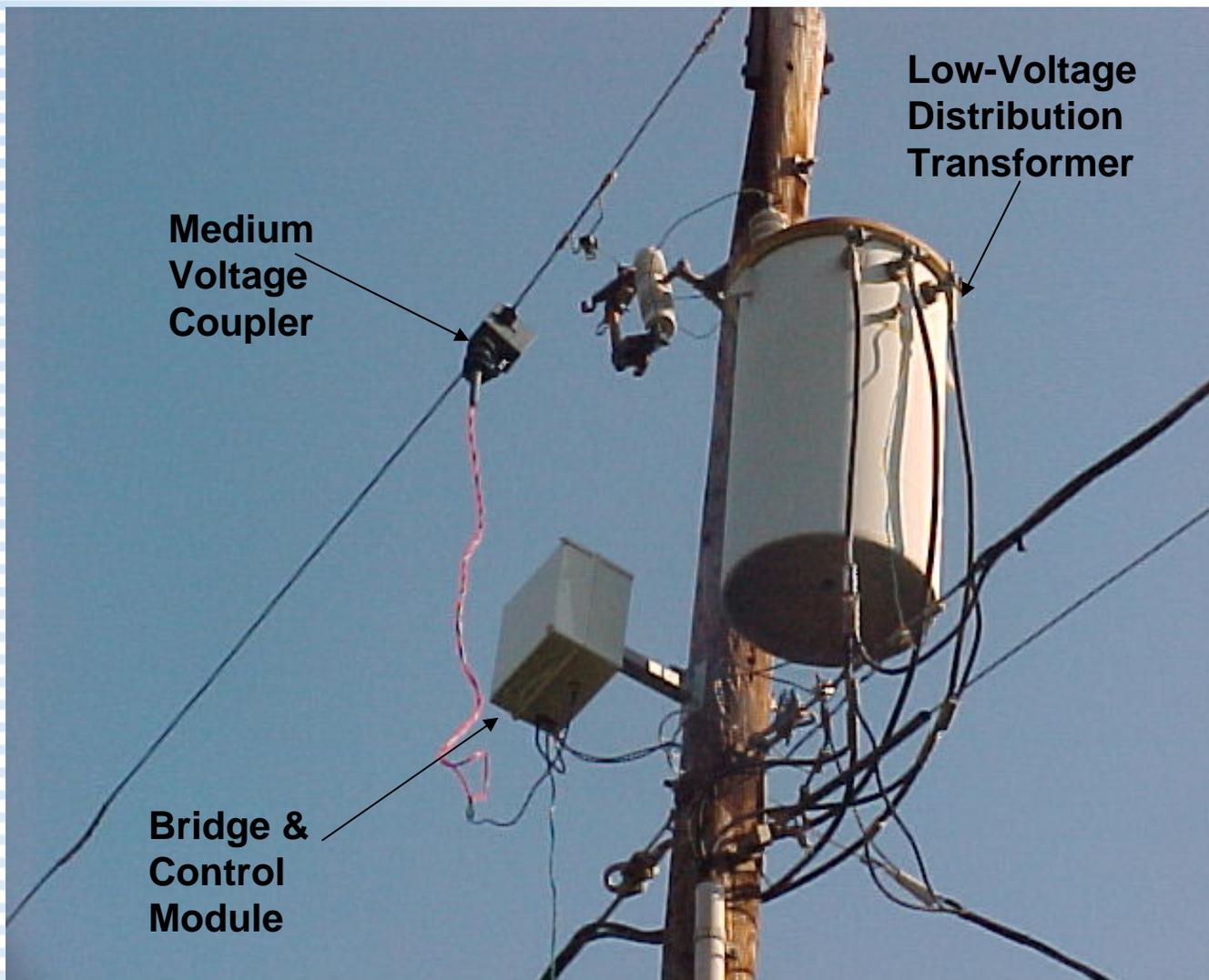


# Broadband Over Power Lines





# BPL : Bypassing the Transformer





# Conclusion

Thank you!