

# General Comments on STBs and the TV Ecosystem for Cal Plug

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# TV Ecosystem

- Not just the TV but:
  - Pay TV set top box ( DVR, basic box, thin clients, etc.)
  - Over the top box (Apple TV, Roku, etc.)
  - Video game console
  - Surround sound/speaker bar
  - DVD player
  - Satellite dish, optical network terminal
  - Hi-speed internet connection (modem) and router
  - Other screens like tablets and off-site viewing

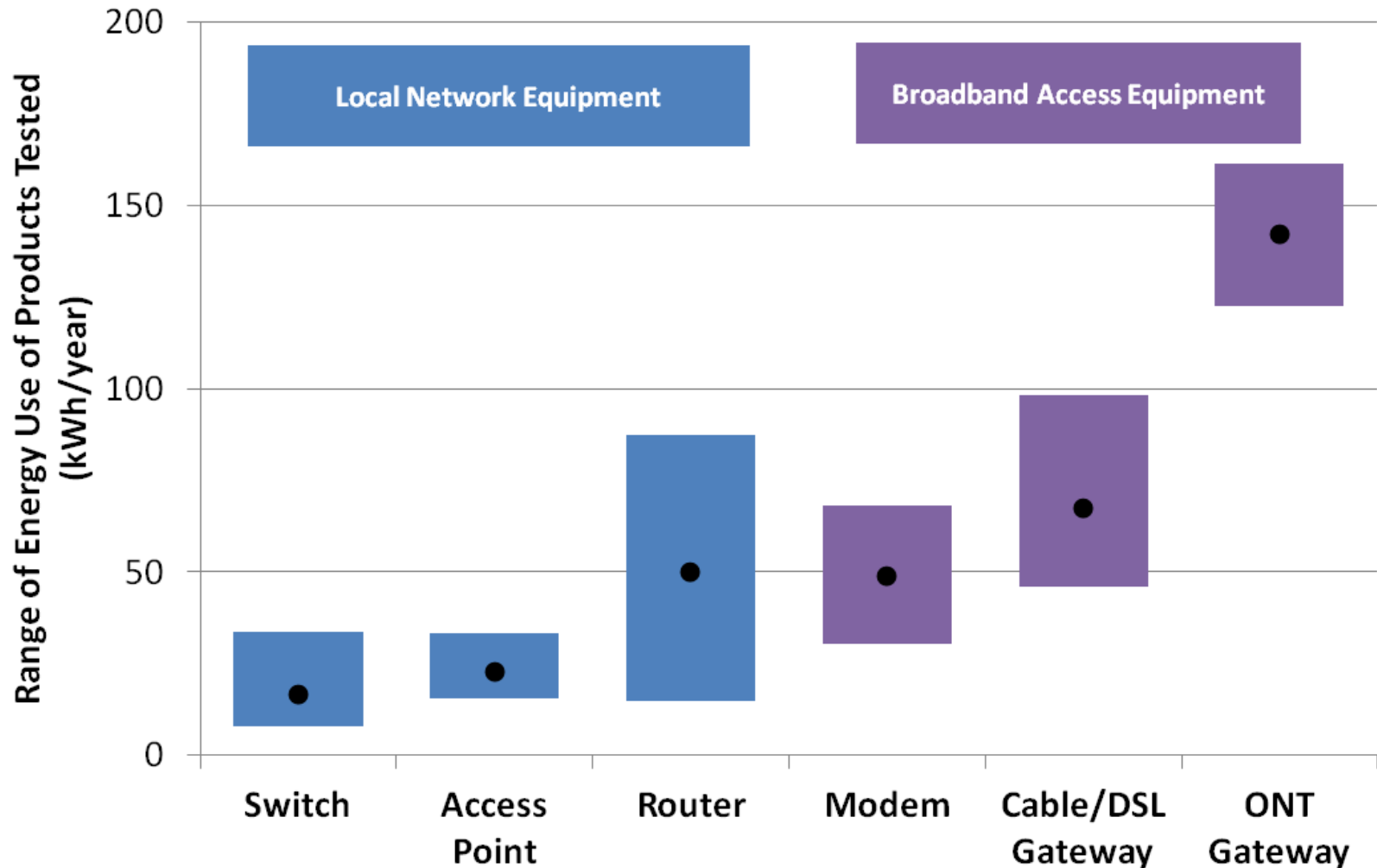
# STB Energy Use Going Down But....

- How will new features/trends impact things in the future?
- Integration of modems, routing and telephony into STB (net energy saver?)
- Still no clear path toward true “deep sleep” - low power sleep with quick resume

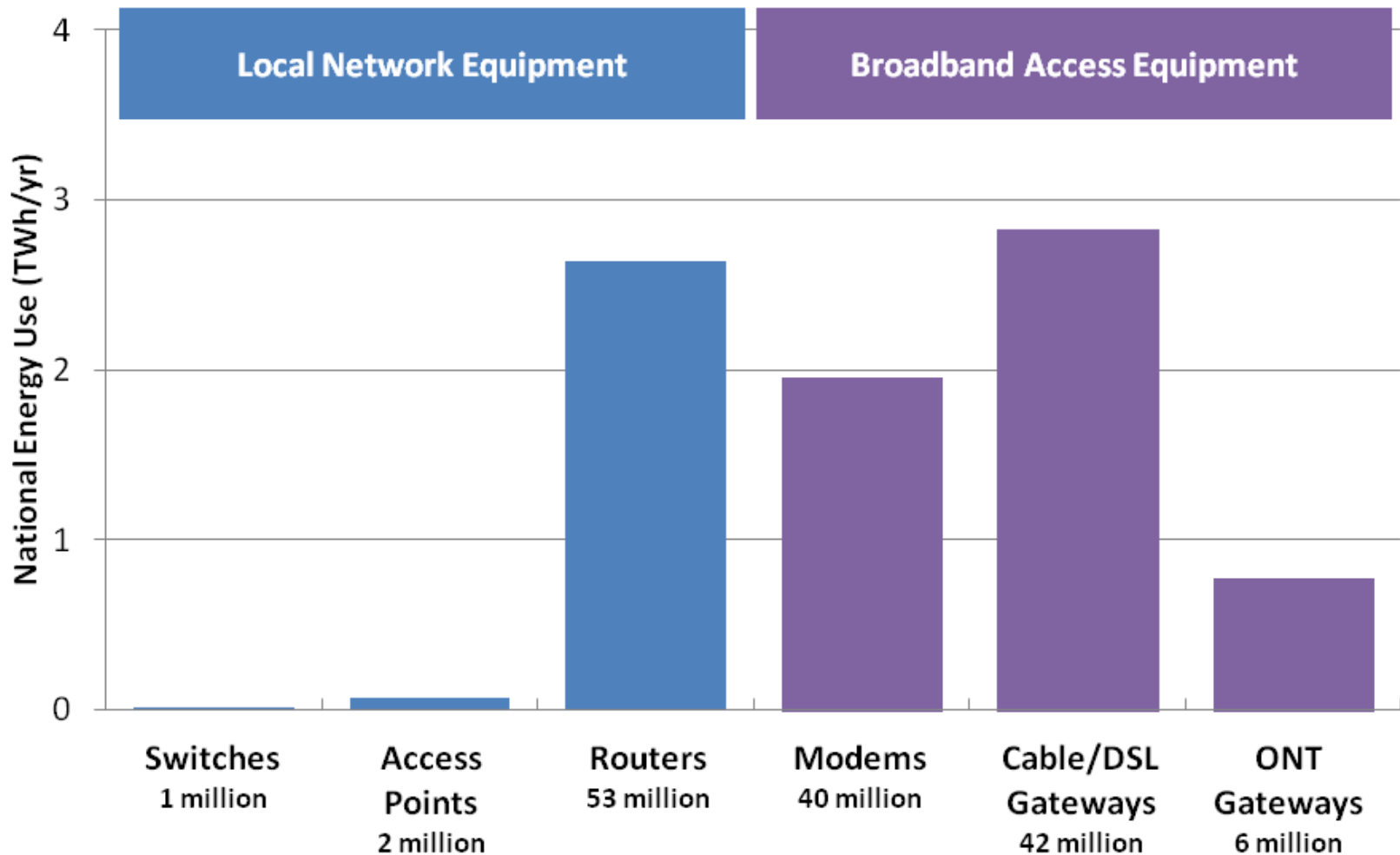
# The big picture

- Many of the devices will be connected/networked to each other
- All in one boxes vs self standing specialized boxes.
- Will the content be stored/received from the cloud (no more DVR hard drives?)

# Range of energy use and average (shown as black dot) of each product group tested



# U.S. residential small network equipment energy use - \$1 billion/yr



# What is the cost of being able to watch on multiple TVs and anywhere?

- Extra cable card?
- DOCSIS 8x4 or more bonded channels?
- More routing capability and power use built into STB?

Challenge/Opportunity: *How to minimize standby power use when not watching multiple channels or streaming to clients, while still being ready to do so when user requests it.*

# Another Big Unknown – Ultra HD

- Ultra HD – 4 times as much data. Requires more processing power, bigger pipes, etc.
- What impact will this have on:
  - TV power use
  - Modem and router
  - Game console
  - STB
  - Upstream equipment.
- How can we get ahead of it?



## Convergence – Good or Bad? It Depends

- Game console offers streaming and DVD playback – uses 60'ish Watts in PS3 and Xbox 360; 10X higher than Roku or Apple TV
- Battle to be media hub – what if you use both the STB and the Xbox 360 game console to watch TV. (20-30W for main DVR plus 60ishW for game console in media play, plus the TV itself).