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USER FREEDOM TO ATTACH DEVICES

tech + policy

goal: “Internet of Things”

- user ability to connect devices
- interconnection + interoperability
- shared control between ISPs and users

telecom law

telecom economics

networking
technology

current status: wired telephone networks

- **legal right** of users to attach non-harmful devices (Part 68 regulations)
- competitive market for devices
 - phones
 - answering machines
 - modems

current status: cable & satellite

- cable set-top boxes
 - **legal right** of users to attach non-harmful devices (CableCARD)
 - but hasn't kept up with technology
- satellite set-top boxes
 - **no such legal right**
- competitive market for devices?
- user ability to run apps?
 - **fights over control** of “desktop”, search, ...

current status: wired broadband Internet

- Open Internet Order
- includes “any device” rule
 - legal, non-harmful devices (but doesn’t define “harm”)
 - unless “required for network management” (but doesn’t delineate what is required)
- includes “any app” rule
 - unless “required for network management” (but doesn’t delineate what is required)
- DSL & cable modems
 - competitive market

current status: cellular

- devices:
 - no legal right of users to attach non-harmful devices
 - users obtain almost all devices from service provider
 - locking
 - competitive market for devices?
 - device subsidies
- apps:
 - Open Internet Order only prohibits blocking competing voice & video apps
 - providers often cripple device functionality

convergence



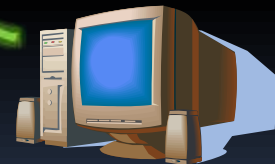
Telephone network



Cell phone networks



Cable tv networks



Internet

current status: converged networks

- residential gateways
 - Verizon FIOS offers gateway, but user can substitute with own
 - AT&T U-Verse requires use of their gateway, includes mandatory use of firewall, DHCP, NAT for residential network
- set-top boxes
 - confusion at FCC ...
- smartphones
 - confusion at FCC ...

proposal: user rights

1. connect any legal non-harmful device
2. run apps of their choice
3. choose a communications provider in a competitive marketplace

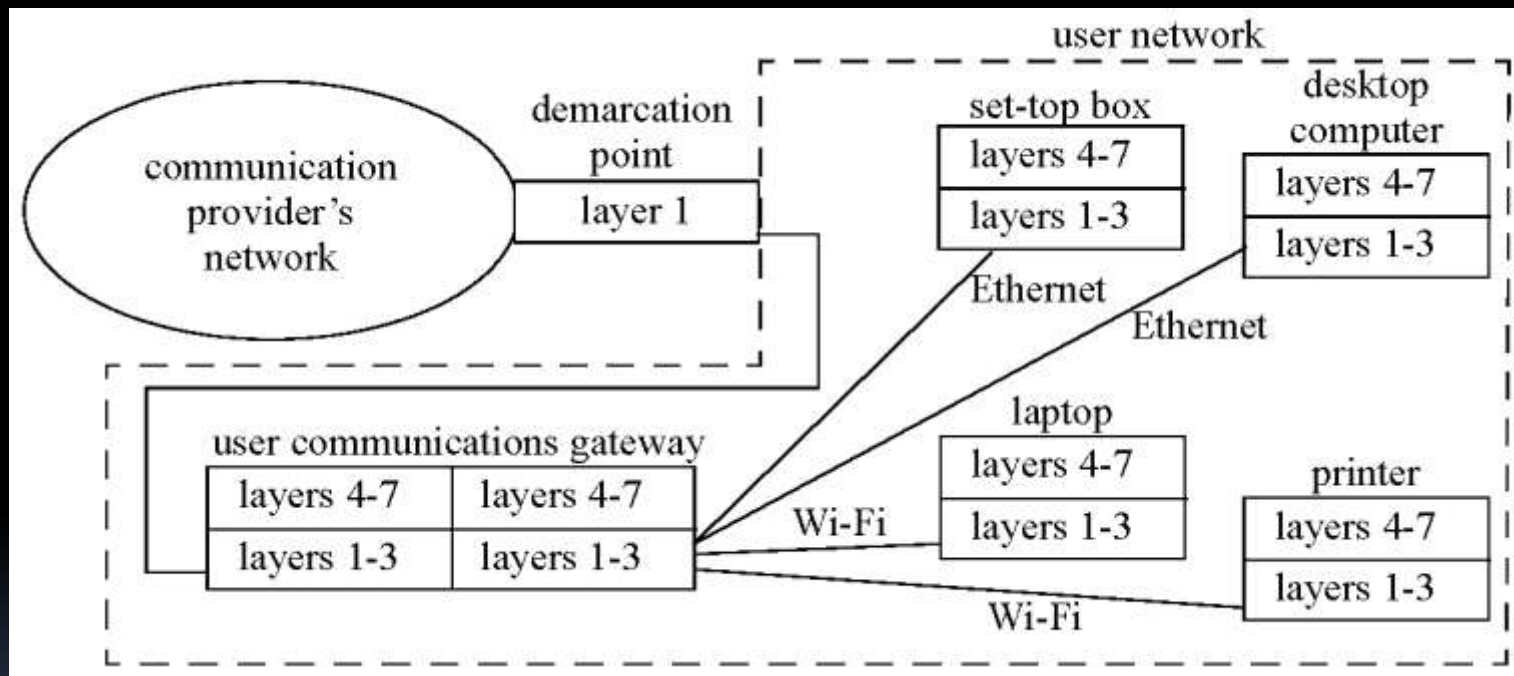
proposal: provider rights

1. charge for communication services
2. use reasonable network management
3. forbearance when regulation is not necessary to ensure user rights

proposal: demarcation point

- where do the provider and user networks interconnect?
- proposal: require a standardized interface
 - examples: RJ11 jack, coax cable junction, RJ45 Ethernet jack, GSM, CDMA, LTE, Wi-Fi

proposal: demarcation point



proposal: any device

- what devices should the user be able to put on their side of the demarcation point?
- proposal: any legal non-harmful device
- two options:
 - non-harm verified by independent body
 - connect through protective circuitry
- implications:
 - user would be able to choose residential gateway
 - user would be able to choose satellite set-top box
 - user would be able to choose smartphone

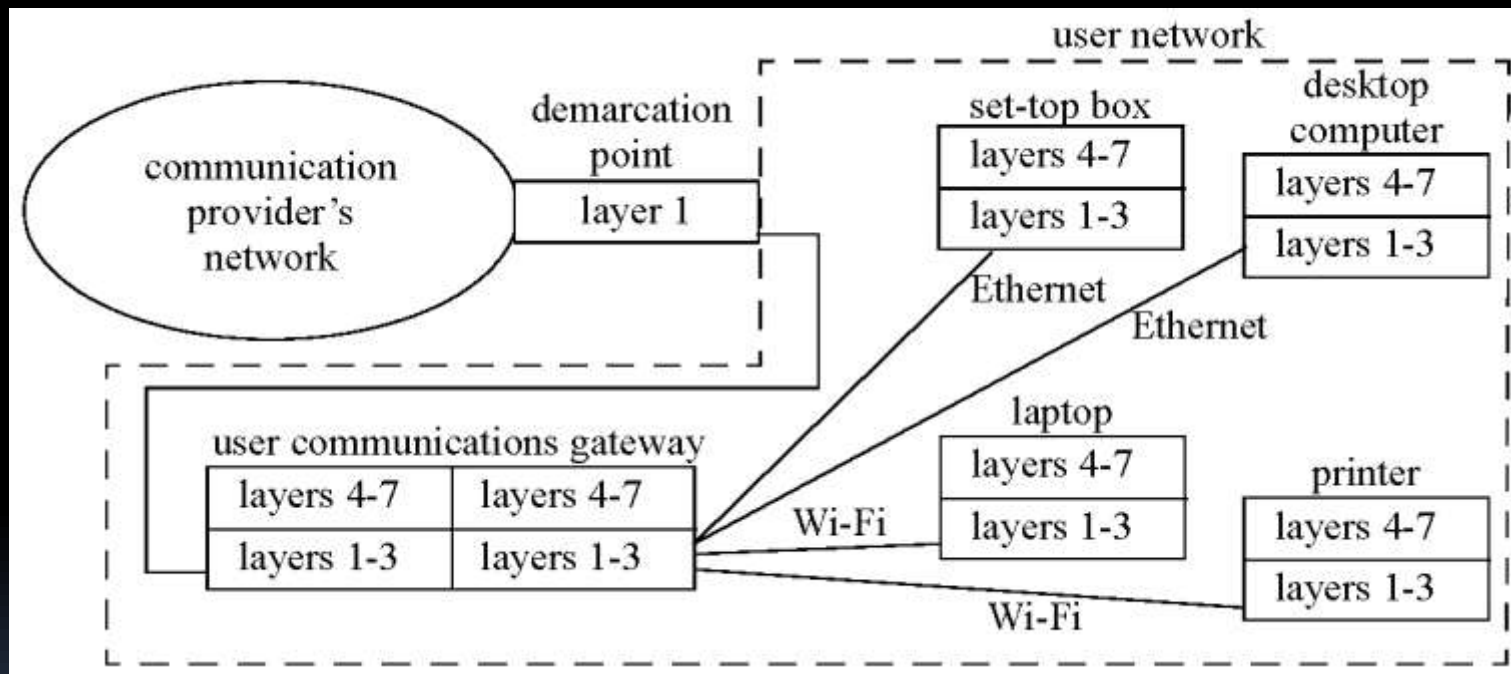
current status: device management

- which functions on which devices should the service provider be able to control?
- cable & DSL modems: provider controls layers 1-3 plus selected layer 4-7 functions of provider interface
- set-top boxes: provider controls layers 1-3 of provider interface, plus menus & navigation
- smartphones: provider controls layers 1-3 of air interface, plus may cripple apps

proposal: gateway

- which functions on which devices should the service provider be able to control?
- proposal: define “gateway” as first layer 3 device into user’s network
- proposal: service provider may **only** control
 - layers 1-3
 - + layer 4-7 functions required for network management
 - of devices in between demarcation point and provider’s interface of gateway
 - unless user gives consent

proposal: gateway



proposal: reasonable network management

- proposal: a network management practice in a user's network is **reasonable** iff:
 - the user has control over the use of the practice, or
 - practice controls QoS on the basis of reasonable payment
 - (see other papers on traffic management re practices used in ISP's network)

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parting advice:

- don't just consider technology
- consider law
- and economic motivation