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Software Defined Networking



In this course, you will learn about software defined networking and how it is changing the way communications networks are managed, maintained, and secured.

Module 7.4: SDN In the Wild

- ⦿ Three Lessons
 - Data Centers
 - Wide-Area Backbone Networks
 - SDX: A Software-Defined Internet Exchange
 - B4: Google's Wide-Area Backbone Network
 - **Home Networks**
- ⦿ Programming Assignment
- ⦿ Quiz

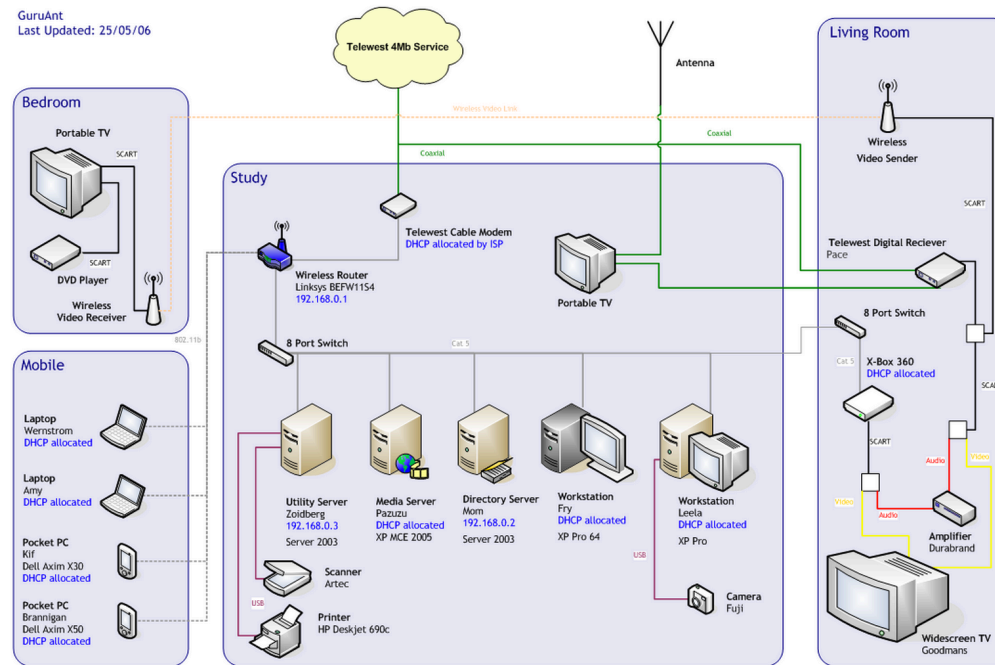
Home Networking: Two Challenges

- ⦿ Providing users with **visibility** into usage and problems in the network.
- ⦿ Providing **controls** to help users better manage resources, usage caps, etc.

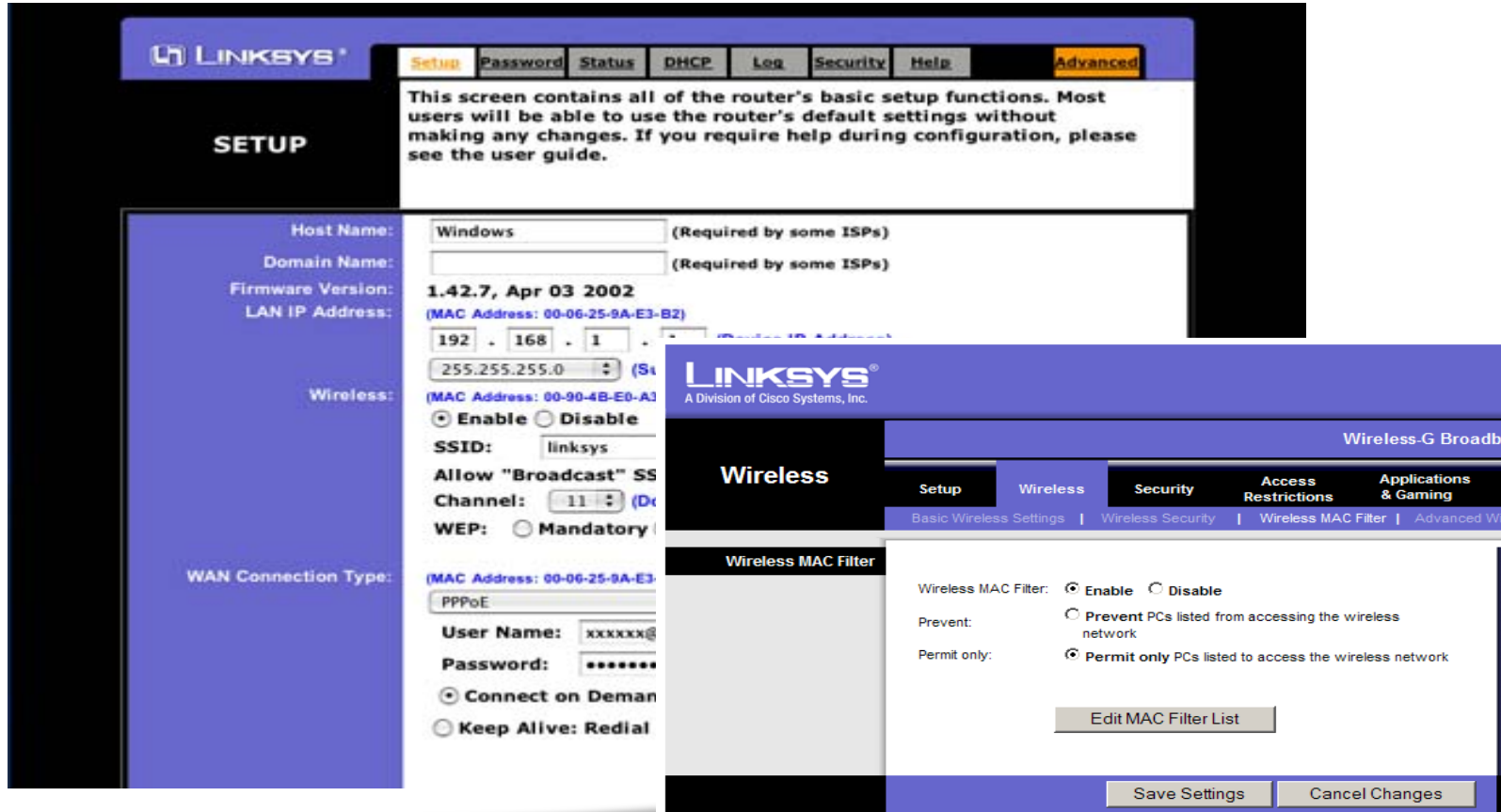
Configuration is Complex, Low-Level

Home Network - Showing Computers, and Media Devices

GuruAnt
Last Updated: 25/05/06



Too Much Complexity is Exposed



Lack of Visibility and Control

⊙ Invisible usage quotas

- How much do I have left?
- When will I run out?

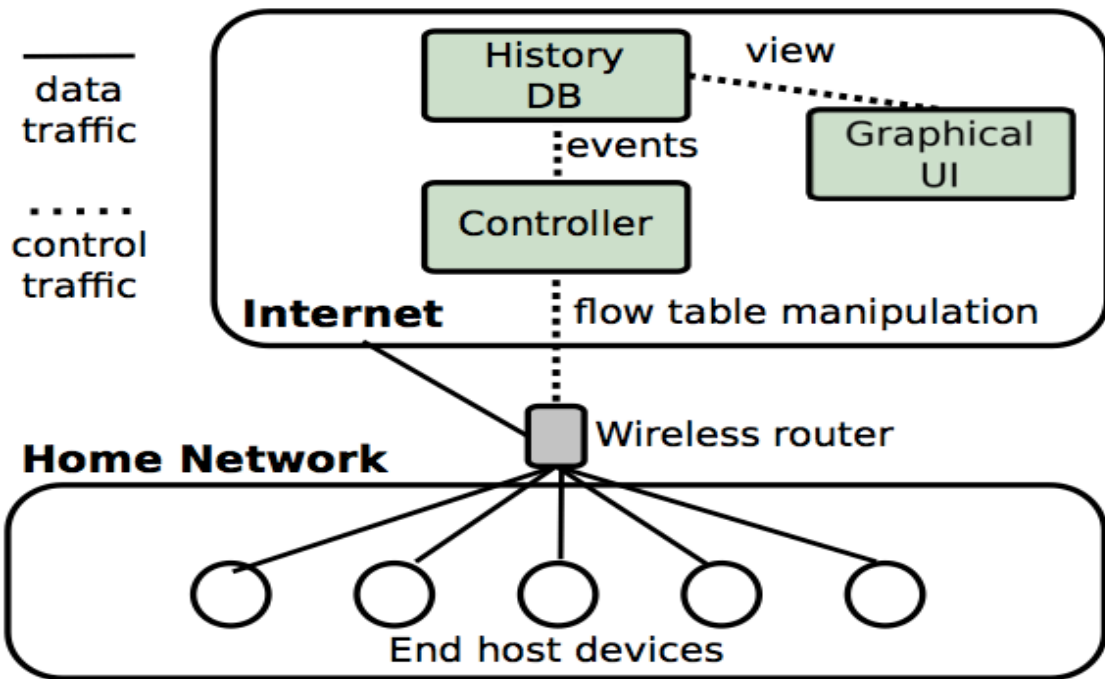
⊙ Mysterious processes

- What applications are getting us capped?
- Can I limit these?

⊙ Multiple users

- Who is getting us capped?
- Share out bandwidth?

SDN: Centralized, Outsourced Control



- User monitors behavior and sets policies with UI
- Resonance controller manages policies and router behavior

Two Applications of SDN Control

- ⦿ Home network management
 - Example of “outsourced” home network management
 - Enables remote control, better UI
- ⦿ Slicing home networks
 - Virtualizing network infrastructure to allow service providers direct access

Key Problem: Usage Control



It's official: Comcast starts 250GB bandwidth caps October 1

By Jacqui Cheng | Published 3 years ago

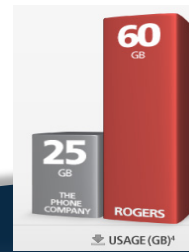
Comcast has announced that it will in fact be introducing bandwidth caps to all residential customers. The cap, which will go into effect as of October 1, will be 250GB per month. Comcast justifies the decision by saying that it's "an extremely large amount of data," and that a very large majority of customers will never cross it.



at&t

Is AT&T's new 150GB DSL data cap justified?

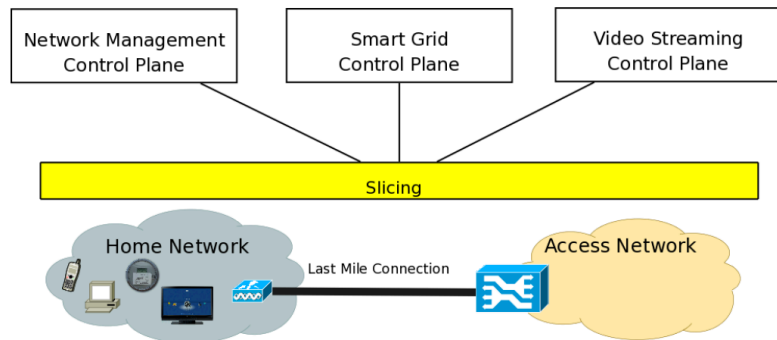
By Nate Anderson | Published 7 months ago



Usage Cap Management

The screenshot shows the uCap Project Home Page. At the top left is the 'ucap alpha' logo. At the top right, it says 'Welcome Nick Feamster!' with a 'Sign Out' link. Below the logo are three tabs: 'Network', 'History & Status', and 'Settings'. The 'Network' tab is active, showing a 'NETWORK' section with a globe icon. On the left is a sidebar with 'Overview', 'Manager', and 'Devices'. Under 'Devices', there is a list of devices, each with a small yellow cat icon and a name: 'Random machin...', 'Random machine', 'Joon's Netbook', and '7c6d62d4c12f'. The main content area shows the settings for the selected device, 'Random machine'. It includes fields for 'DEVICE NAME' (Random machine), 'DEVICE DESCRIPTION' (Some kind of machine), and 'DEVICE MAC ADDRESS' (C43DC7D622C2). Below these is a 'DEVICE USAGE' section with a progress bar showing 6 MB or 60% of 10MB Used. There is also a 'NOTIFICATION' section with a checkbox for 'Notify me when I approach my usage quota.' and a 'Save' button.

Slicing Home Networks



- ⊙ **Problem:** Many service providers want to offer services to home users.
- ⊙ **Solution:** Each provider controls a different slice of the infrastructure/resources (flowspace).

Summary

- ⦿ Home networks can be difficult to manage
 - Users have limited visibility and control
 - Service providers have limited access
- ⦿ Two applications of SDN in home networks
 - Usage cap management
 - Slicing home networks