



Software Defined Networking

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

This Module: 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

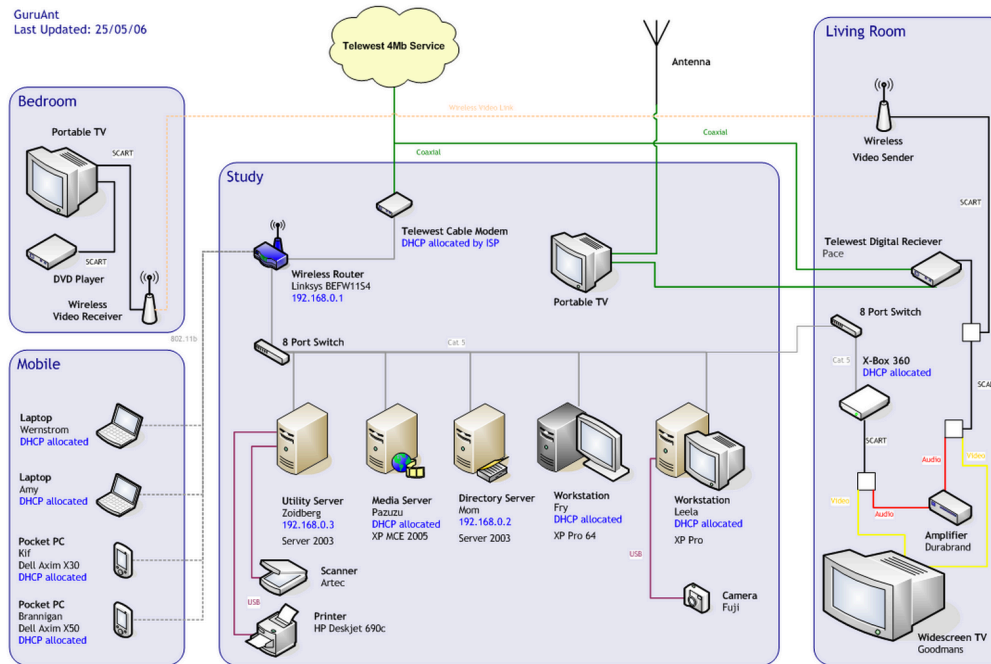
- ⦿ Providing users with **visibility** into usage and problems in the network.
- ⦿ Providing **controls** to help users better manage resources, usage caps, etc.

Software Defined Networking

Configuration is Complex, Low-Level

Home Network - Showing Computers, and Media Devices

GuruAnt
Last Updated: 25/05/06



Software Defined Networking

Too Much Complexity is Exposed

LINKSYS®

Setup Password Status DHCP Log Security Help **Advanced**

SETUP

This screen contains all of the router's basic setup functions. Most users will be able to use the router's default settings without making any changes. If you require help during configuration, please see the user guide.

Host Name: Windows (Required by some ISPs)

Domain Name: (Required by some ISPs)

Firmware Version: 1.42.7, Apr 03 2002

LAN IP Address: (MAC Address: 00-06-25-9A-E3-B2)

192 . 168 . 1 . 255.255.255.0 (Static IP Address)

Wireless: (MAC Address: 00-90-4B-E0-A3)

☒ Enable ☐ Disable

SSID: linksys

Allow "Broadcast" SSID: ☒ Yes ☐ No

Channel: 11 (Default)

WEP: ☐ Mandatory ☒ Disable

WAN Connection Type: (MAC Address: 00-06-25-9A-E3-B2)

PPPoE

User Name: xxxxxxxx@

Password: xxxxxxxx

☒ Connect on Demand ☐ Keep Alive: Redial

LINKSYS®
A Division of Cisco Systems, Inc.

Wireless

Setup Wireless Security Access Restrictions Applications & Gaming

Basic Wireless Settings | Wireless Security | Wireless MAC Filter | Advanced Wireless

Wireless MAC Filter

Wireless MAC Filter: ☒ Enable ☐ Disable

Prevent: ☐ Prevent PCs listed from accessing the wireless network

Permit only: ☒ Permit only PCs listed to access the wireless network

Edit MAC Filter List

Save Settings Cancel Changes

Lack of Visibility and Control

⊙ Invisible usage quotas

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

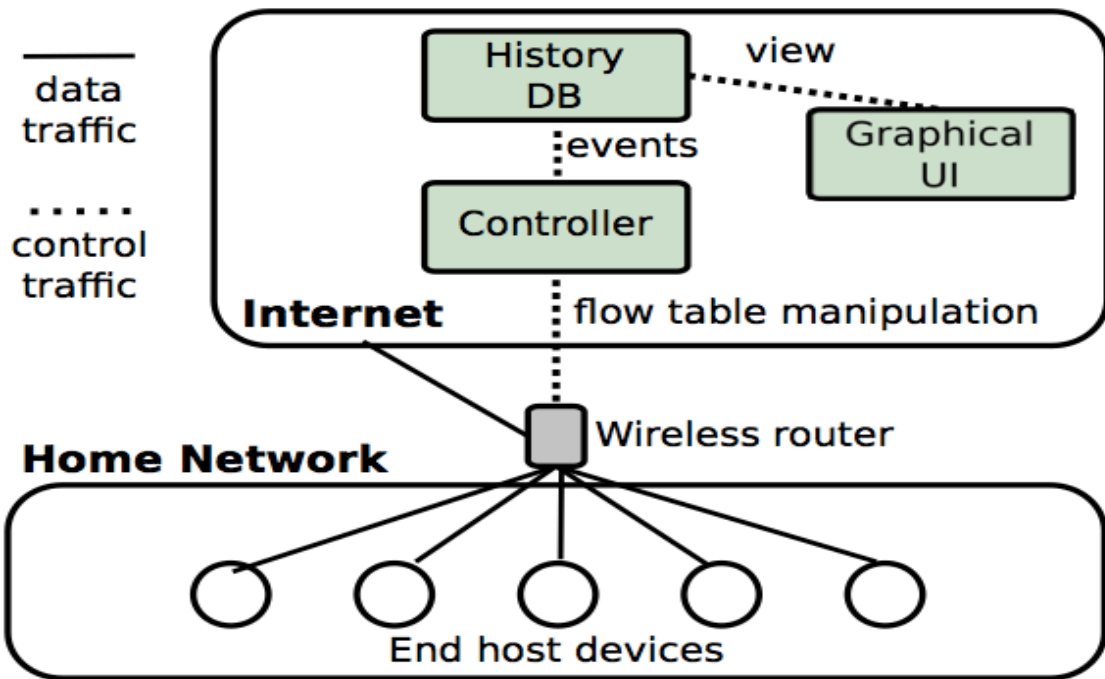
⊙ Mysterious processes

- 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.




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

By Nate Anderson | Published 7 months ago




Usage Cap Management



Welcome **Nick Feamster!**
[Sign Out](#)


NetworkHistory & StatusSettings

 NETWORK


Overview


Manager


Devices



Random machin...
Some kind of machine

 Random machine

 Joon's Netbook

 7c6d62d4c12f

DEVICE NAME:

Random machine

DEVICE DESCRIPTION:

Some kind of machine

DEVICE MAC ADDRESS: C43DC7D622C2


DEVICE USAGE:

6 MB or 60% of 10MB Used

NOTIFICATION:

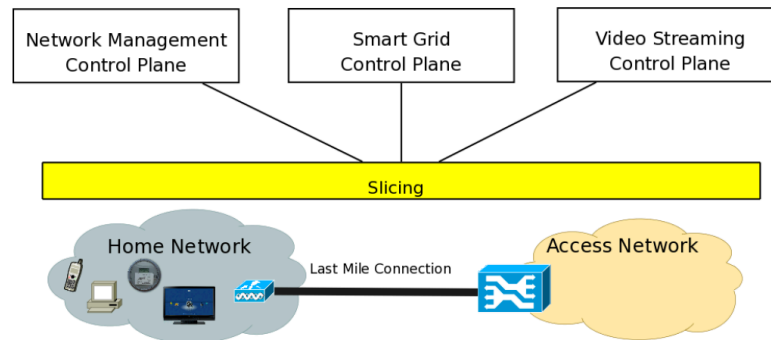
☐ Notify me when I approach my usage quota.

Save



Change Picture

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