

What are the sources of home network complexity and how can we help home users to deal with them?

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**visibility & control**

The *right* type of information is not visible enough

## 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:  (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)

.  .  .  (Device IP Address)

(Subnet Mask)

Wireless: (MAC Address: 00-90-4B-E0-A3-2E)

Enable  Disable

SSID:

Allow "Broadcast" SSID to associate?  Yes  No

Channel:  (Domain: USA)

WEP:  Mandatory  Disable

WAN Connection Type: (MAC Address: 00-06-25-9A-E3-B3)

User Name:

Password:

Connect on Demand: Max Idle Time  Min.

Keep Alive: Redial Period  Sec.

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# 3 aspects of home networking

- **Infrastructure** – devices and connections that comprise the home network
- **Performance** – how the network is performing over time
- **Policies** – how the network resources are allocated

# *visibility* in infrastructure

Tool

- |

**Wireless Client MAC List** Refresh

**Active PC**

Client Host Name	IP Address	MAC Address	Enable MAC Filter
Computer03	192.168.1.101	00:00:00:00:00:00	<input type="checkbox"/>

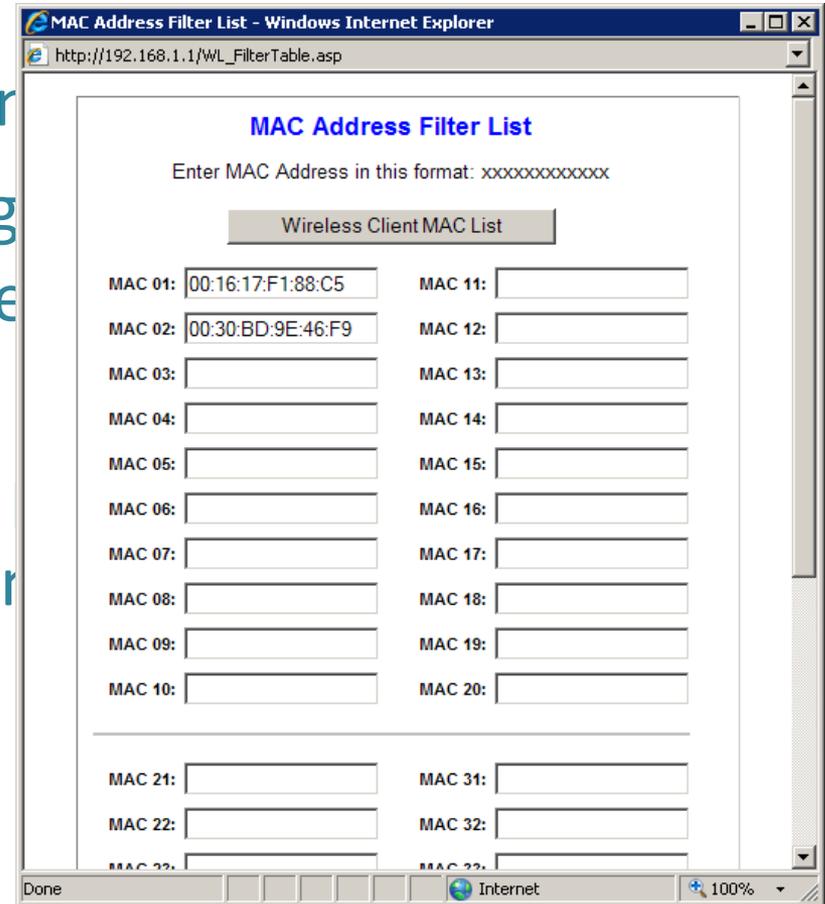
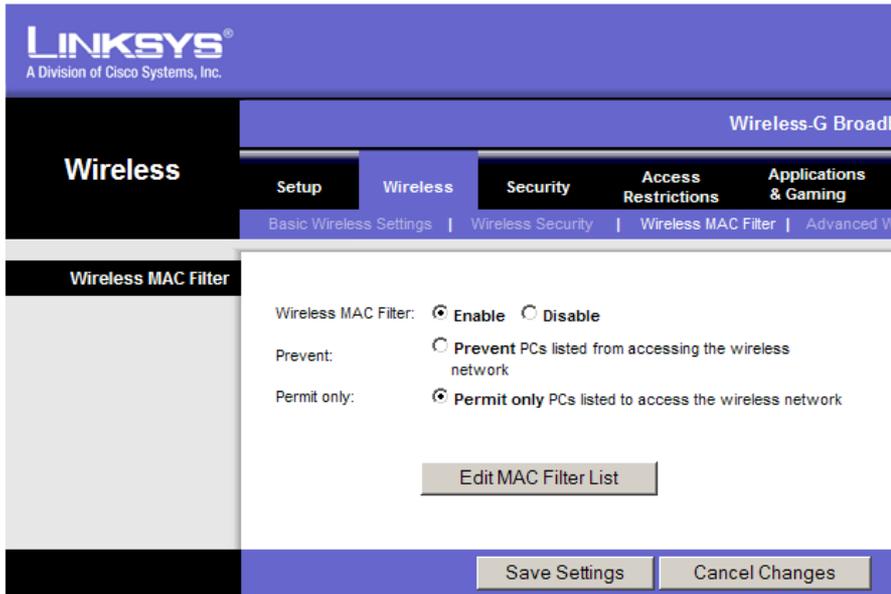
**Inactive PC**

Client Host Name	IP Address	MAC Address	Enable MAC Filter
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Update Filter List Close

Click **Update Filter List**.

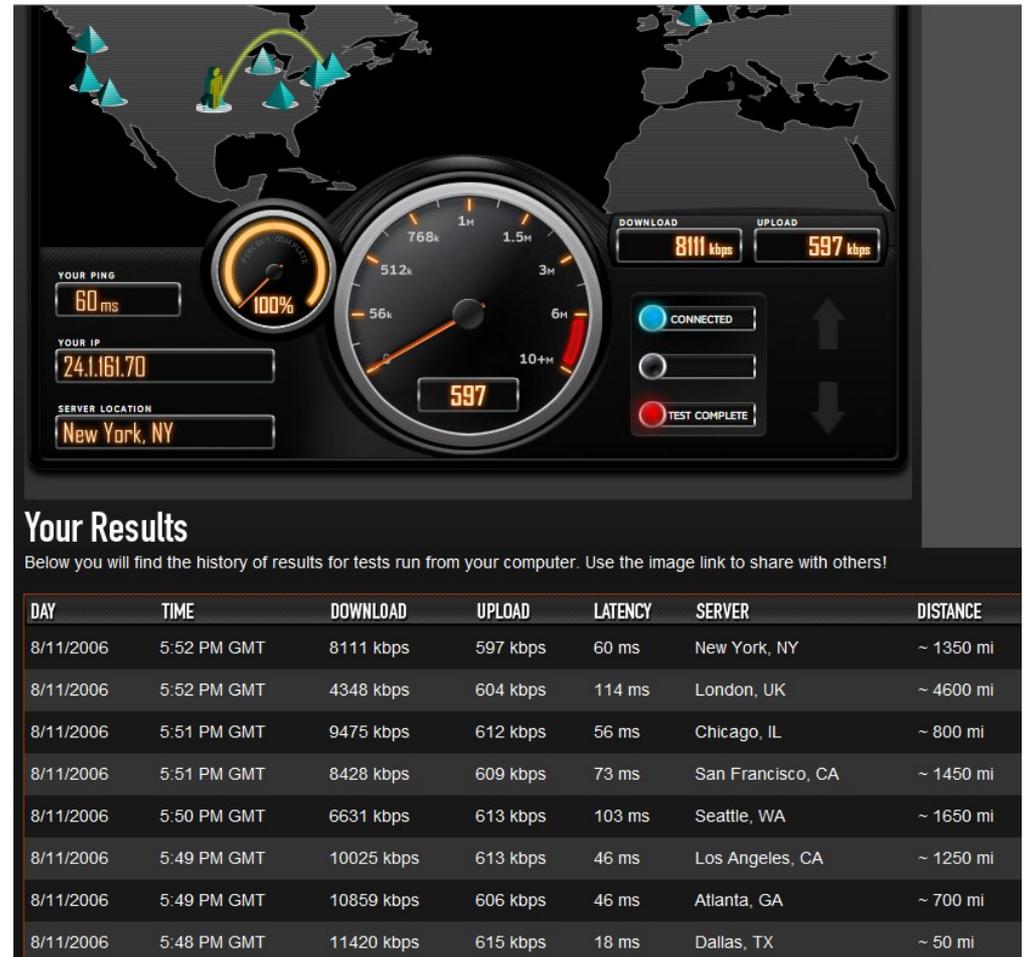
# control in infrastructure



misconfigured something

# *visibility* in performance

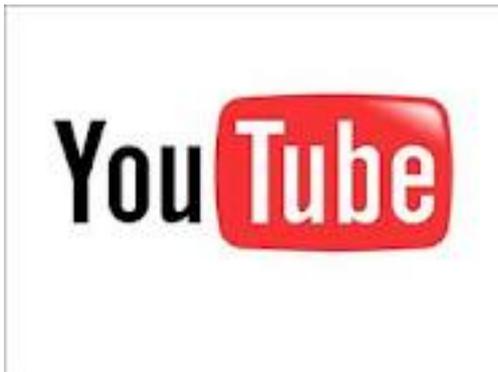
- Too little visibility
  - What speeds am I getting?



[Chetty 2010, Chetty 2011]

# *control* in performance

- How can I ensure that the right people and machines have the best network speeds at the right times?
  - E.g. if I have work, wife and husband pair
  - E.g. if I have a streaming video and don't want a backup to interfere with it?



# *visibility* in policies

- Not enough visibility into ISP policies
  - e.g.  **comcast** throttling BitTorrent traffic case in 2007
- Not enough visibility into internal home network policies
  - Who has access to what files and services?
  - Who has access to the network and at what times?



# *control* in policies

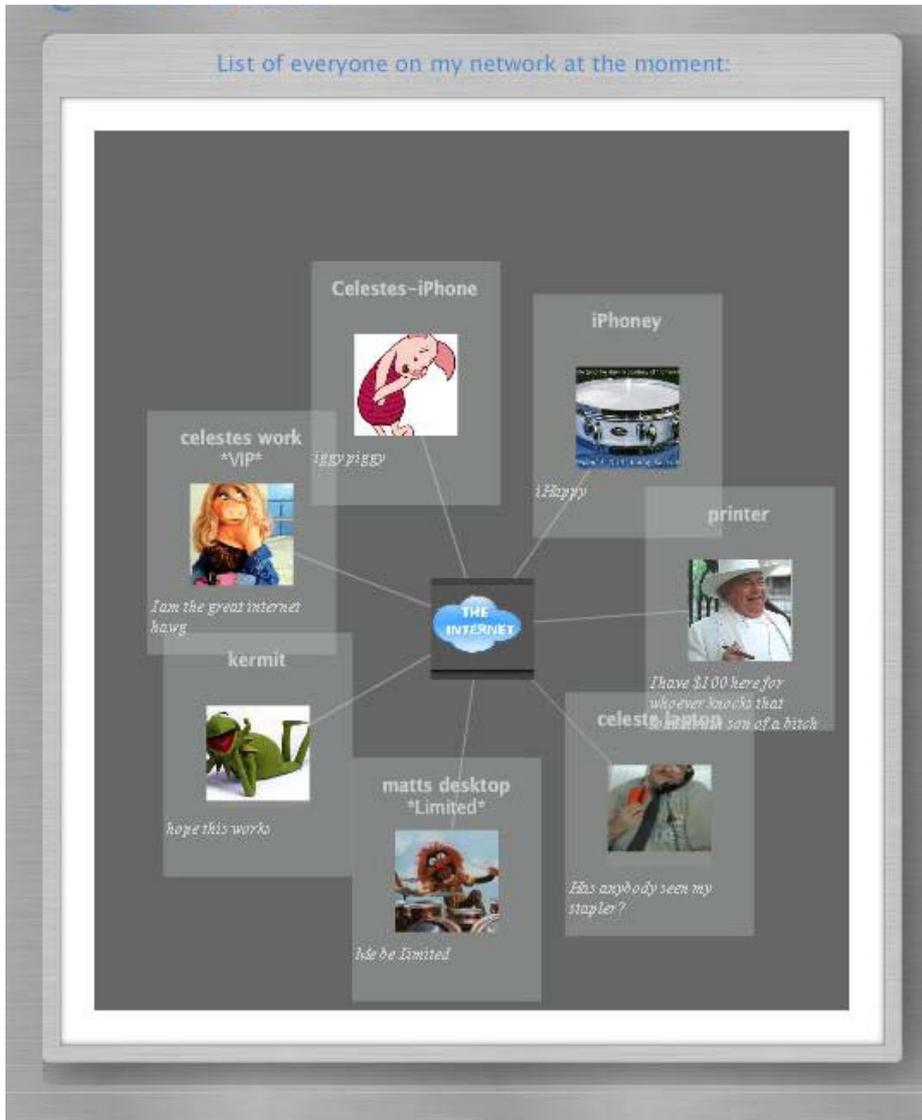
- How can I easily set up policies for household members
  - e.g. how do I prevent my kids accessing the internet at certain times?
  - How do I time my back-ups for late at night?



How can we help home network users deal with the lack of *visibility* and *controls* in terms they want?

- Combined approach requiring both Human Computer Interaction and Networking
- Need to redesign infrastructure to support better monitoring/visibility and user-centered controls
- This will allow us to develop *human-centered home networking*

# Examples



## Infrastructure

[Chetty 2011, Mortier et al. 2011]

# Performance

- continuous monitoring, using OpenWRT
- Support interfaces that show users in real time what speeds are



**Welcome to Project  
BISmark**



# Policy

– Using programmable networks such as OpenFlow to support interfaces with better access controls

The screenshot displays the uCap Network Overview interface. At the top, there is a navigation bar with 'Home', 'Account Settings', 'History', and 'Network Overview'. The main content area is titled 'Network Overview' and features a sidebar on the left with expandable sections for 'Joanna' (containing Desktop, iPhone, and Offline Devices), 'Mike', 'Gaming', and 'Guests'. The right side of the interface shows a pie chart representing network usage: Joanna (38%), Gaming (30%), Guests (22%), and Mike (11%). Below the chart is a table of user quotas:

User	Quota
Joanna	5.5 GB
Mike	2.5 GB
Gaming	5.0 GB
Guests	3.0 GB
Available	0.0 GB

At the bottom, there are settings for 'Monthly Household Cap: 20 GB' and 'Start Measuring on the 1st of the Month', with a 'Save' button.

Home network users need better *visibility* and more *control* to do the things they want to do and fix problems as they arise

# Get in touch.



[marshini.net](http://marshini.net)