

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 ☐ DisableSSID: Allow "Broadcast" SSID to associate? ☒ Yes ☐ NoChannel: (Domain: USA)WEP: ☐ Mandatory ☒ Disable

WAN Connection Type:

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

 Select the Internet connection type you wish to useUser Name: Password: ☒ Connect on Demand: Max Idle Time Min.☐ Keep Alive: Redial Period Sec.

There is ***not enough control*** of the kind users
want

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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

- 1

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"/>

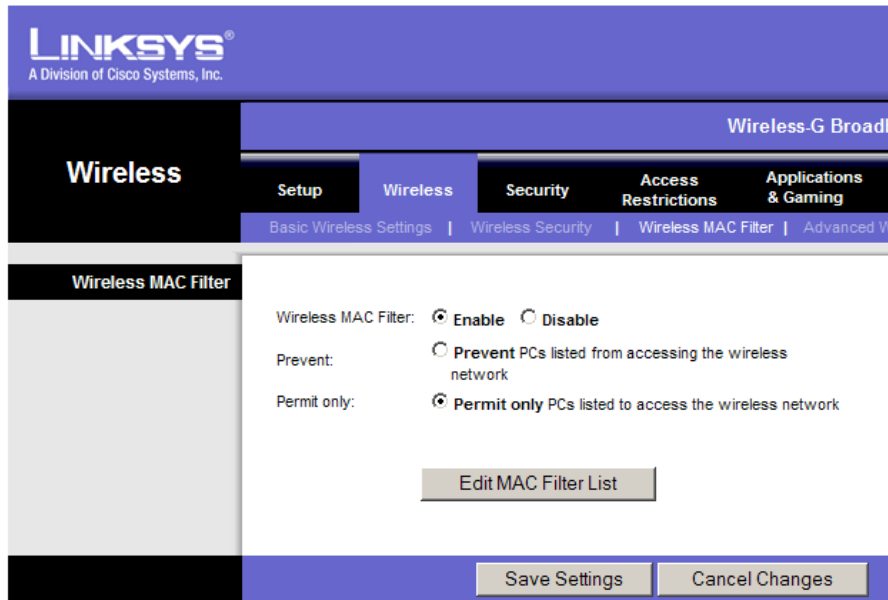
Inactive PC

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



LINKSYS®
A Division of Cisco Systems, Inc.

Wireless-G Broadband Router

Wireless

Setup | **Wireless** | Security | Access Restrictions | Applications & Gaming

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

Wireless MAC Filter

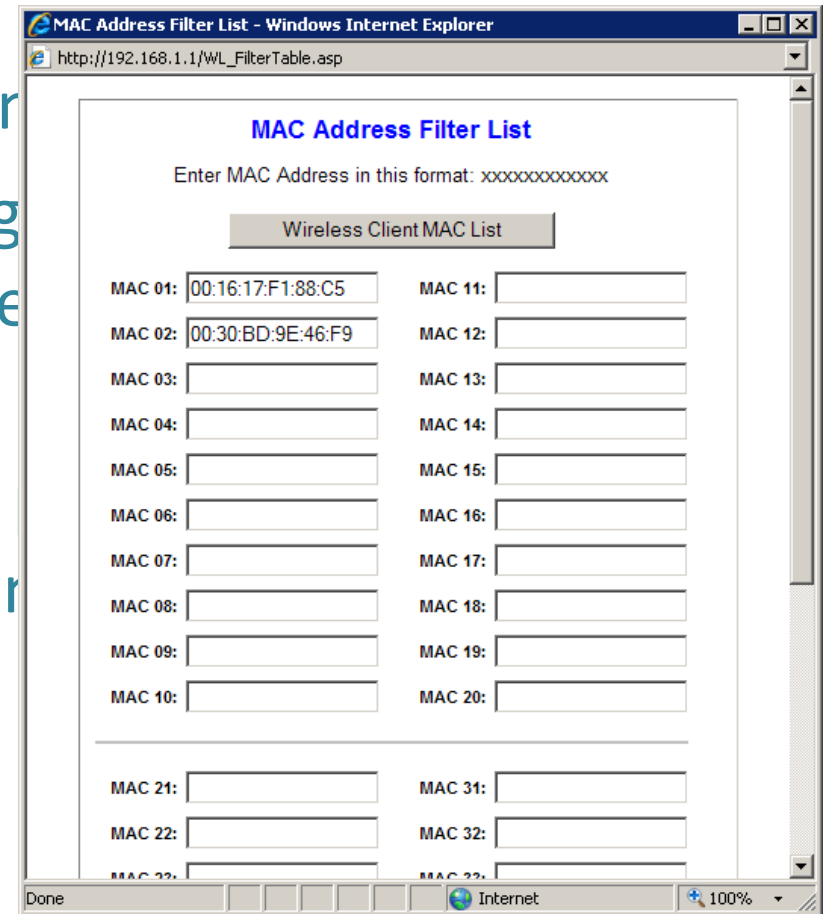
Wireless MAC Filter: ☒ Enable ☐ Disable

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



MAC Address Filter List - Windows Internet Explorer

http://192.168.1.1/WL_FilterTable.asp

MAC Address Filter List

Enter MAC Address in this format: xxxxxxxxxx

Wireless Client MAC List

MAC 01:	00:16:17:F1:88:C5	MAC 11:	
MAC 02:	00:30:BD:9E:46:F9	MAC 12:	
MAC 03:		MAC 13:	
MAC 04:		MAC 14:	
MAC 05:		MAC 15:	
MAC 06:		MAC 16:	
MAC 07:		MAC 17:	
MAC 08:		MAC 18:	
MAC 09:		MAC 19:	
MAC 10:		MAC 20:	
MAC 21:		MAC 31:	
MAC 22:		MAC 32:	
MAC 23:		MAC 33:	

Done Internet 100%

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

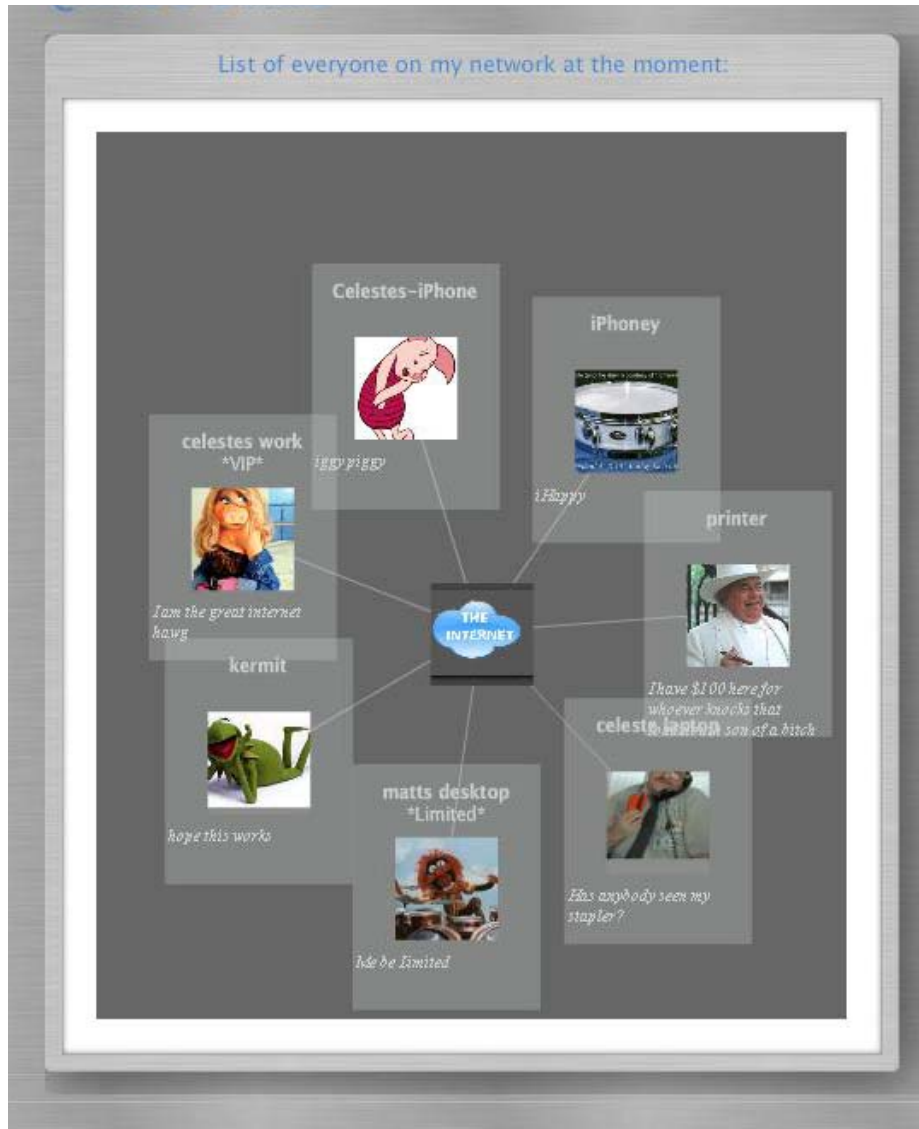
- How can I easily set up policies for household members
 - e.g. how do I prevent my kids accessing the internet at certain times?
 - How do I time my back-ups for late at night?



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

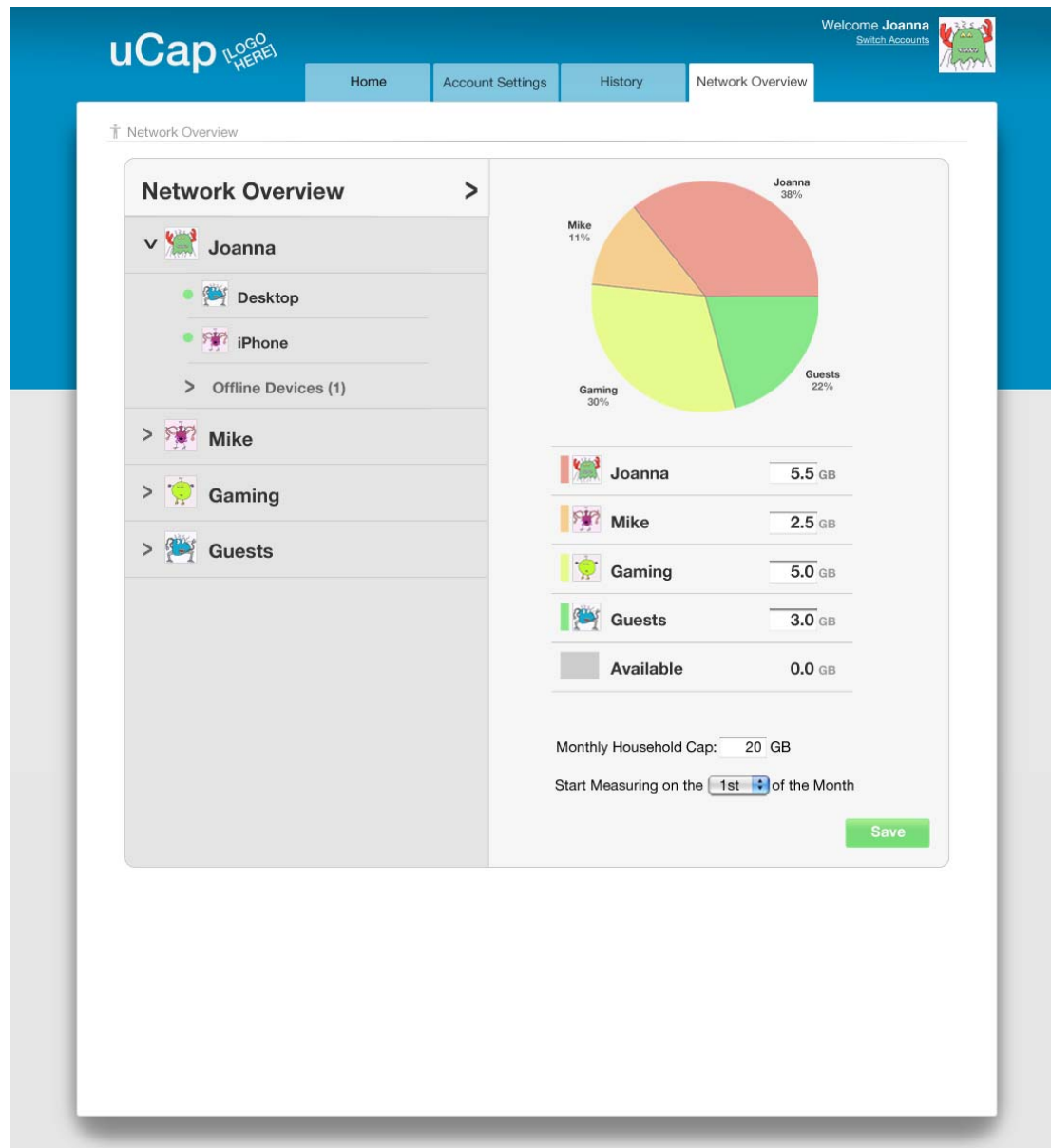


**Welcome to Project
BISmark**



Policy

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



[Kim et al. 2011, Yiakoumis et al. 2011]

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.



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