

A Study on Network Management Tools of Householders

Jeonghwa Yang, W. Keith Edwards

Georgia Tech
9/3/2010

Context

- Developing new tools for visual management of home networks
- Need to understand
 - What sorts of tasks they do
 - What tools they use, and what the weaknesses of those tools are
 - How these correlate with network proficiency
- Get insights into possible desirable features for new tools

Study Method: Qualitative Interview

1. In-home interviews with users

Queried about network management practices: what they do and don't do

Queried about tool use

Queried about deficiencies/problem areas

2. Interviews transcribed and coded for common themes, categories

(This talk only includes a subset of the results)

3. Grouped tasks into four categories for analysis:

- Connectivity configuration
- Security and access control
- Network monitoring
- Troubleshooting

Study Participants

25 users with some home network management experiences



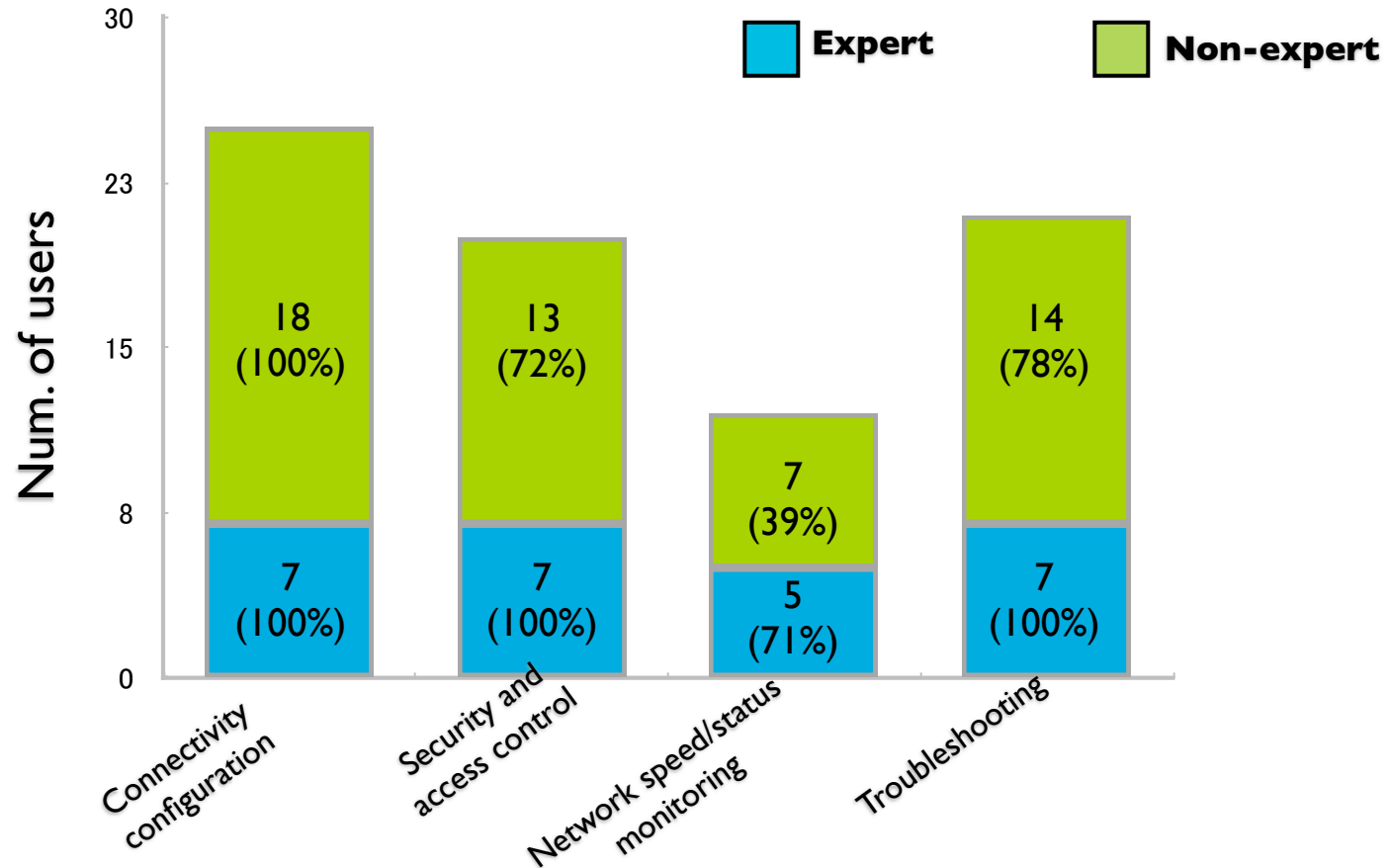
* Self-declared

- **Non-expert users:** users having just informal knowledge of networking to perform some small set of management tasks
- **Expert users:** users who had obtained technical knowledge from some form of formal training

Word of mouth/emails to local organizations/on-site recruiting in public places

Who Does What?

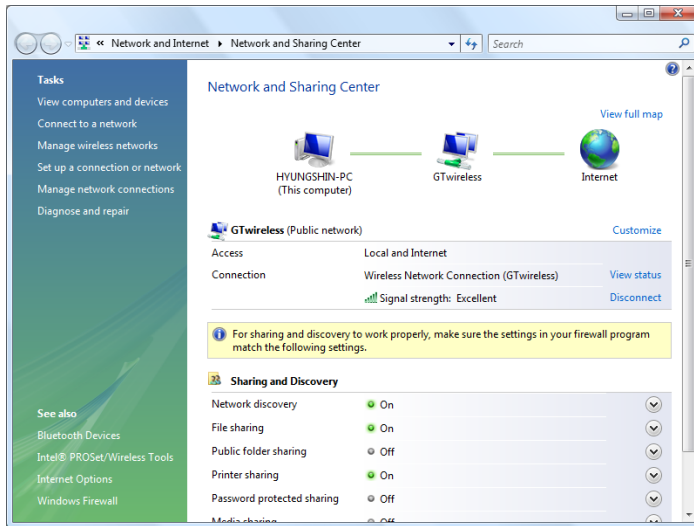
Management Experiences of Participants



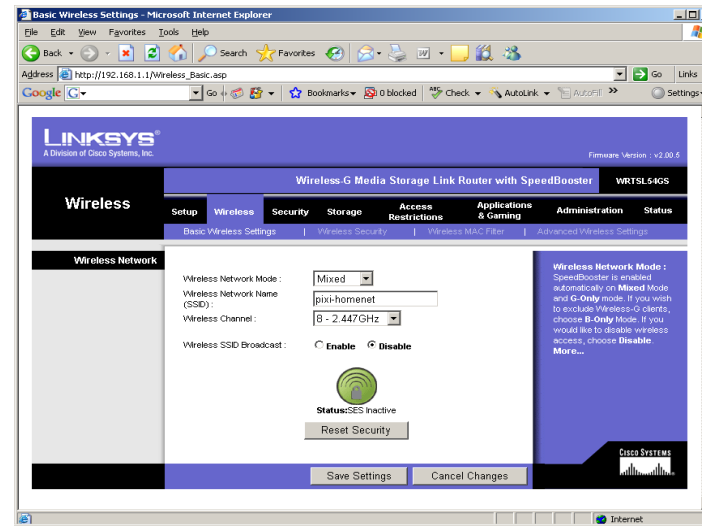
Take-home message: Lots of "self-service" network management going on, even for non-experts

Tool Use

Unsurprisingly, users rely mainly on the tools built in OS and routers



Windows Network Control Panel

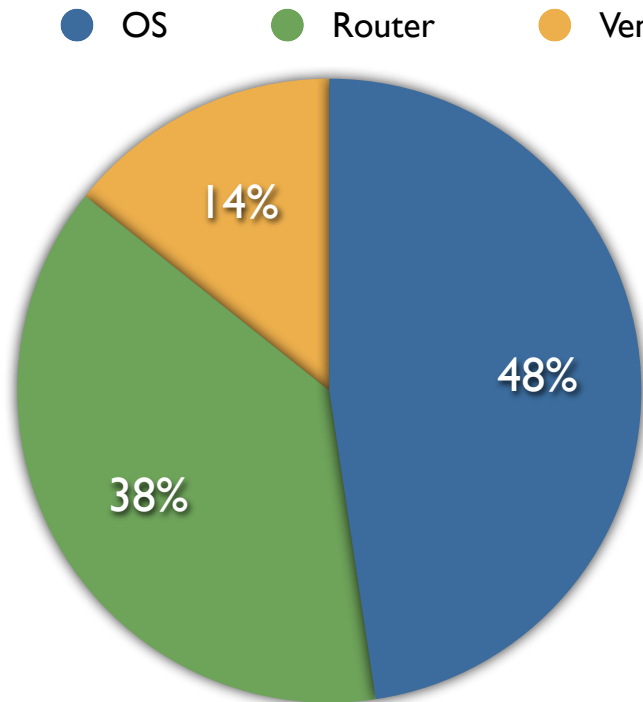


Common Router Control Panel

Reasons:

- Distaste for installing additional software
- Lack of knowledge of the existence of other management tools
- Lack of desire to pay extra for *just* a management tool

Basic Connectivity



Breakdown by Proficiency

Tool	Expert	Non-Expert
OS	6 (86%)	14 (78%)
Router	6 (86%)	10 (56%)
Vendor Utility	1 (14%)	5 (28%)

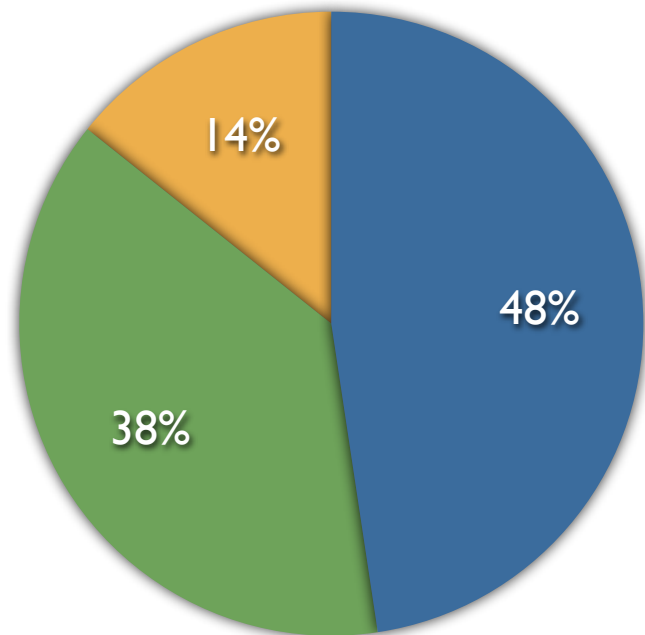
- Most relied on built-in tools, used multiple tools (so don't total to 100%)
- Small number used specific vendor-supplied configuration utilities
- Common complaint: too many unused, low-level options, terminology unfamiliar even to self-described expert users

Security & Access Control

● Vendor Firewall

● OS Firewall

● Router



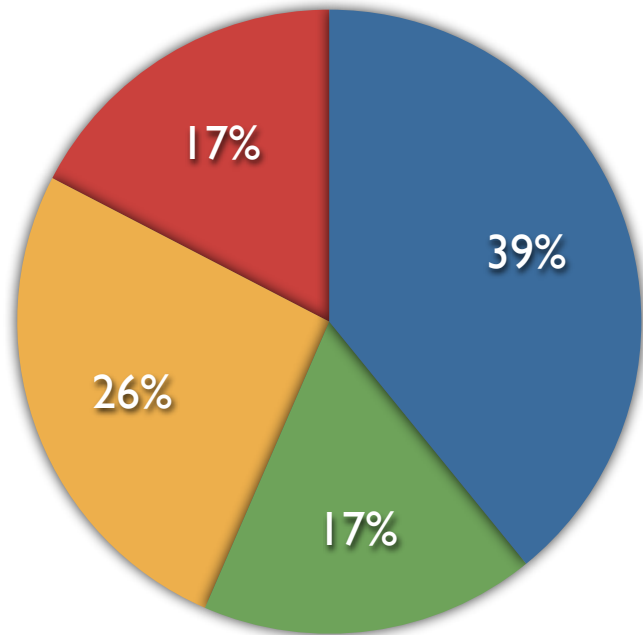
Breakdown by Proficiency

Tool	Expert	Non-Expert
Vendor Firewall	3	8
OS Firewall	3	3
Router	5	1

- Non-expert users relied on firewall software to protect their PCs from external attacks and unwanted access
- However, many non-expert users had concerns related to access control (e.g. parental control, guest machines), but could not actively enable access control because of lack of knowledge about how to do so

Network Monitoring

● OS ● Websites ● Router ● Application S/W



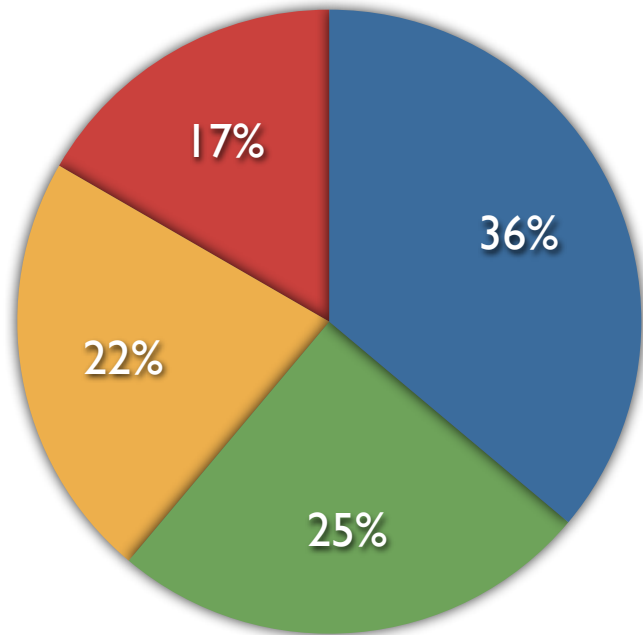
Breakdown by Proficiency

Tool	Expert	Non-Expert
OS	2	7
Websites	2	2
Router	2	4
Application Software	1	3

- Most non-expert users complained that there was no explicit way to monitor the whole network performance or to detect where network speed bottlenecks come from
- Application s/w: file downloading and video streaming apps

Troubleshooting

● OS ● Reset/Replug ● Router ● Application S/W



Breakdown by Proficiency

Tool	Expert	Non-Expert
OS	5	8
Reset/Replug	0	9
Router	2	6
Application Software	1	5

- Householders complained that it was hard to detect what caused a problem at first glance with the tools
- Websites: e.g., speedtest.net

Common Complaints Across All Tools

- Hard-to-understand and hard-to-use tools
 - Jargon, low-level concepts, poor match of exposed mechanisms to desired policy
- Hard-to-find tools: lack of discoverability
- Inconsistent user interface of management tools
 - Every vendor does it differently
 - Piecemeal: single tools for single devices
- No visual map of the home network
 - Text-heavy, no support for building conceptual models
- Unusable manual or instructions of tools

Desirable Features

Universal accessibility (most mentioned)

- ☒ Accessibility from any computing device in the home network
- ☒ (versus host-based tools, which are installed and running on individual PCs)

Holistic management environment for all management tasks (versus requiring separate tools per task)

- ☒ Simplifying management tasks by using one program in one place
- ☒ Providing a consistent look and interface, thus requiring less time to learn than those of multiple management tools with different looks and interfaces
- ☒ Allowing users to see network state, as well as all available network settings and options at a glance

No extra software installation or cost for network management system

- ☒ E.g. a tool built-into a networking device; revealing of user desires about the network “just working?”

Concluding Remarks

Householders currently rely mainly on the tools built into the OS and the router to perform management tasks in their home, despite the widely perceived usability problems of these tools

- High barriers, low "ceiling"

Participants want to self-manage their home networks (as opposed to going externally for help), but the tools are not yet available that can support their needs.

We need to investigate more easy-to-use network management tools for householders

Thank You