Problem Solving Probes: Uncovering Conceptual Disconnects with Networked Ensembles

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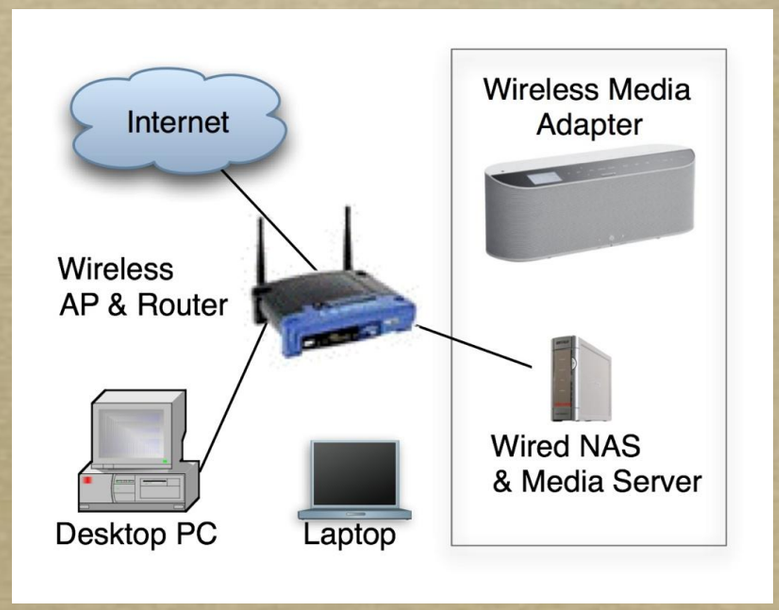
Motivation

- *Ensemble Computing*
  - *Collections of networked devices for information access anywhere anytime*
- *Networked devices are difficult to install and manage*
  - *Studies of home networking have illustrated difficulties*
- *The home as a "controlled" environment for exploring ensemble computing*



Data Collection Methods

- *Two approaches to data collection*
  - *Focused Interviews*
    - *12 participants, "large" networks, ~2 hour interview, transcribed*
  - *Problem Solving Probes (Field Deployment)*
    - *14 participants, "small" networks, 3 week equipment deployment, deployment interview, mid-study phone interview, closing interview.*

OTS Equipment Deployed

NAS / Media Servers

- *Buffalo Technologies – LinkStation Live (250GB)*

- *LaCie – Ethernet Disk Mini (500GB)*

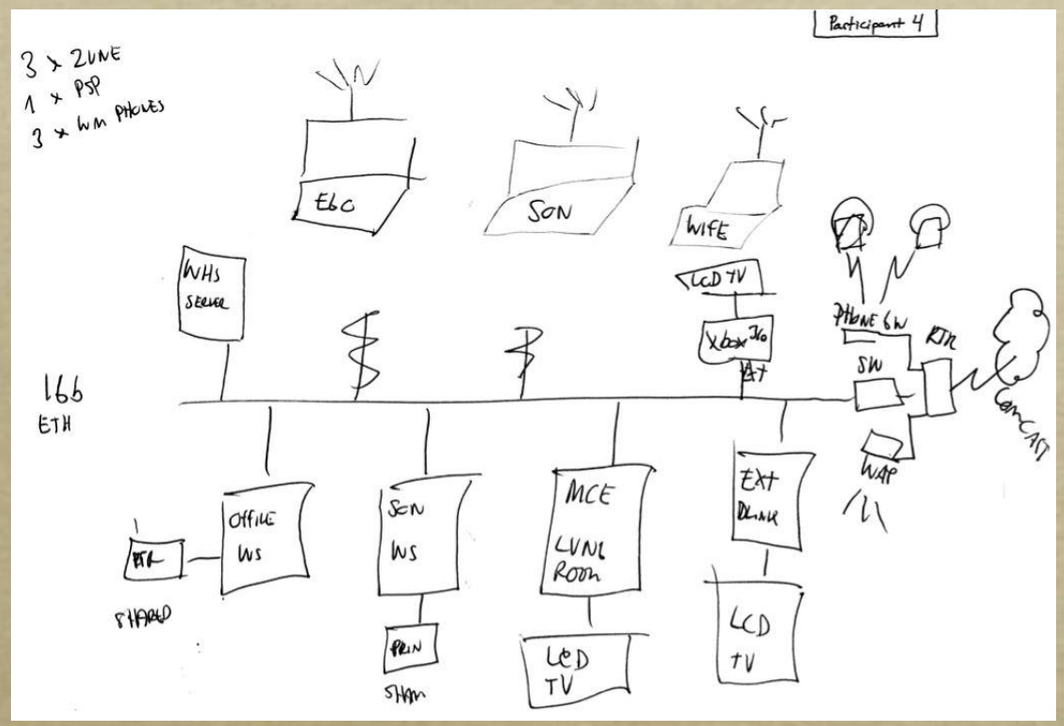
Media Players / Renderers

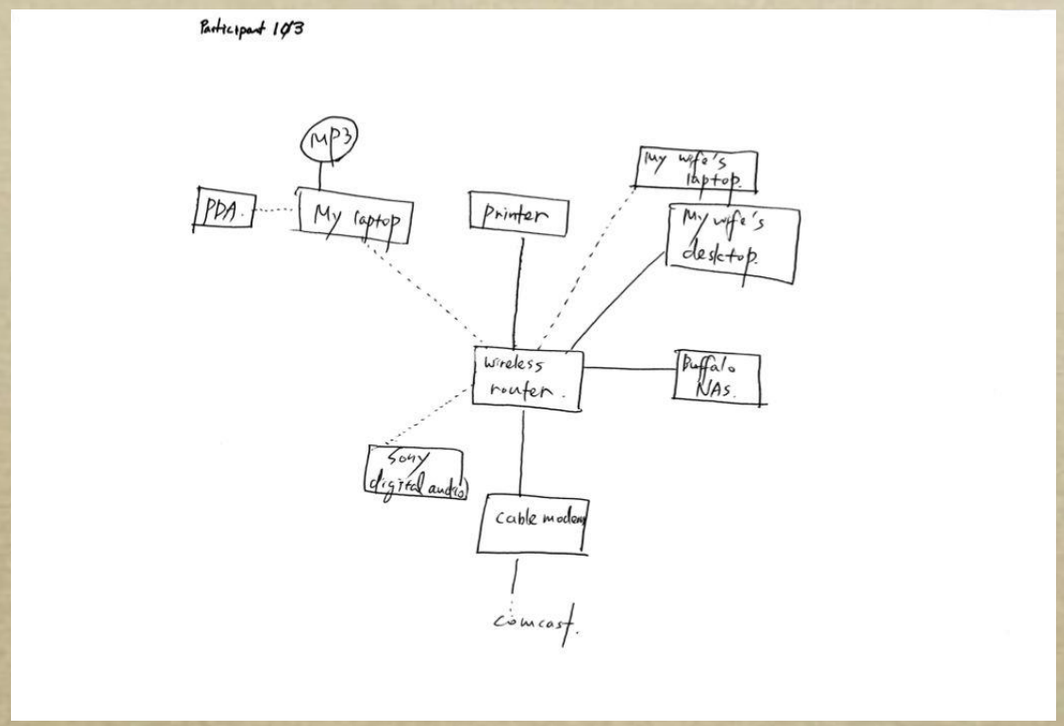
- *Sony – VGF-WA1*

- *Roku Labs – Sound Bridge M1001*

- *Netgear – EVA 700*

Network Sketching





- *10 Wireless*
- *7 Wired*
- *3 Infrastructure*
- *No loaned equipment*

- *2 Wireless*
- *2 Wired*
- *2 Infrastructure*
- *2 loaned (wired/wireless)*

Example Problem 1

- *Eventually I found on a forum, yeah, there were some forum posts. There was a thread where someone suggested that it should just work. And they themselves had struggled for a couple of hours before noticing that there was in fact a slash-slash ed mini share already appearing on their network places.*

- *... Well, I guess I was expecting it to pop up under My Computer, you know along with the hard drives and all this. I expected it to show up kind of the same place a usb key would. I guess I wouldn't check My Network Places since I guess I didn't have any other analogous devices on there. ... – P101*

- *Is it a "Disk" device or is it a "Network" device?*

Example Problem 2

- *And one of the issues that I have with it is the --- a stereo, usually, I'll watch tv with it. We don't have an iPod. We could use an iPod, but if you're just getting into CDs. If you've got the CD upstairs, now all our computers are down in our office, or the laptop. The stereo has speakers on it. It would make more sense to just --- The computers you could put a hundred CDs on and play all you want. And with the network, with Buffalo, I could put all my music on the Buffalo and play it anywhere in the house. ... But with this, you could just play one CD and play it on the computer, which doesn't make sense to me. – P105*

- *Client device or server device?*

Example Problem 3

- *All the music I had had DRM on it, so I had to basically strip that DRM, and I was doing that anyway. Used a program called TuneBite that I purchased and I'd been referred to. Everything was great, but — [browses for example song] I wasn't sure if this was one of them, cause I went through on some of the songs and basically what TuneBite did while it was doing what it needed to do, it actually pulled the wrong audio for the song. So I would see the title in the same size mp3, but there was like garbled up music… – P104*

- *What to do about a dead DRM scheme?*

Preliminary Results

- *Problem Solving*
  - *Set of rich problems and solution approaches*
  - *What happens when a "power cycle" doesn't work?*
- *Step Back - consider conceptual problems*
  - *Conceptual problem Stack*
  - *Layers*
  - *Difficulty at one layer may mask problems at another layer*
  - *Resolving one problem reveals yet another problem*

Content Control *How do these devices handle restrictions on content?*
Content Format *What content can these devices exchange?*
Communication *How do these devices/services communicate?*
Connections *How does the device get on the network?*
Device *What does this device do?*

Questions & Discussion

- *Implications*
  - *How do systems help users resolve networking problems?*
    - *Addressing the problem or the root cause (conceptual issue)?*
  - *The home is a relatively 'trusted' environment. How will ensemble computing (networking) be managed in the wilds outside the home?*
- *Methods Issues*
  - *How best to conduct deployment studies?*
    - *Numbers of participants, which data to collect*
  - *Early prototypes versus product or near product*

Questions & Discussion

- *Thank you*
- *Acknowledgements*
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- *Related Paper*
  - *McDonald, D. W., K. A. Smith, and N. Karlova (2008) Problem Solving Probes: A Method for Discovering Conceptual Disconnects with Digital Living Technologies. Presented at the "Designing for Families" Workshop at the 2008 ACM Conference on Computer Supported Cooperative Work (CSCW'08).*