Devices in the Home from an Industry Perspective: Shared or Personal Resources?

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INTRODUCTION

Technologies in the home can generally be categorized as a centralized (shared) resource or as a personal resource. The toaster, refrigerator, and other kitchen appliances are all centralized resources, shared by all in the family. All family members share the device and the "rules" for their use. Personal devices are those that are allocated to, or used exclusively by one individual. Examples of personal resources include; portable audio players, cellular phones, and, increasingly, personal computers. Now Internet devices are part of the equation.

An observation can be made that many technologies began as centralized resources, and have evolved over time to become personal resources. TV's in every room, cell phones for the kids and parents, and "personal" computers have evolved to be more personal for this generation of users. A personal device differs from a centralized one in that an individual, and not the family, controls their use. As new technologies enter the home, they too will follow the centralized or personal model. A refrigerator with a barcode scanner for food re-ordering is a shared resource. But, MP3 players and digital cameras that connect directly to the Internet to exchange information and use services, are personal services. These will require more complex management services. Maintaining a play list of hot songs, keeping photo galleries, and sharing this information are just a few of the services that personal devices will need to handle. These "networked" devices will take their lead from a pioneer in networked services; the almost ubiquitous cellular phone.

Background Example

When first deployed, cell phones were typically hardwired into automobiles – a shared resource for anyone in the car. As they developed into portable devices, it became feasible to use them as a shared resource in the home. And as the infrastructure expanded, and competition among service providers increased, their operating costs decreased to the point where a significant number of families have multiple cell phones. Furthermore, many features on cell phones have been designed to allow the user to customize its operation to the preferences of the individual – making it a truly personal resource. We expect new devices and services to follow a similar path. As new services are deployed, consumers and the service providers will need resolution on how to best manage these services. In the home, parents want control, kids want autonomy. Some day "go to your room" will become "I am deactivating your Internet services". This won't mean unplugging one device; it will have to mean locking out the kid from all services. This would be difficult to enforce with today's technology.

The increasing waves of innovative devices entering the home seem to converge on information and networking. Home digital VCR's, MP3 players, cellular personal digital assistants, digital cameras, smart kitchen appliances, and home control systems all require networking and information to be useful. How these devices are managed, used, shared, and controlled will become important to their acceptance in the home.

MANAGING NEW DEVICES IN THE HOME

As devices become more network enabled and information dependent, how will we handle their *management*? Management involves more than programming or configuring devices. With a networked device it involves a service provider who will likely monitor and control an entire system of such devices among many customers.

This being the case, the wide acceptance of devices in the home will depend on the ease and transparency (from the user's perspective) with which these devices are deployed, used, and managed. How do we deal with creating an open playing field for many service providers to compete for the user's eyes and ears? We must allow competition between service providers. Competition will lead to innovation and better user interfaces. Table 1 outlines how enabling devices for Internet services could affect both management (via service providers) and control (for the customer).

Table 1. Enabling Devices for Services

Device	Resource	Current Services?	User Controlled?
Phone, Cell Phone, Pagers	Personal	Yes, Services based on "subscription"	Usually post-hoc by looking at the bill
Computer	Shared and Personal	Yes, an ISP provides Internet connectivity	Limited: Web Access (i.e., block harmful sites), Login Control
Washer & Dryer	Shared	No, but Sears could "test" and diagnose remotely; Utilities could turn off power, as needed.	
PDA	Personal	No, but services could enable features via user control	Software and content subscriptions (some are available using proprietary service models)
MP3 Player	Personal	No, but services could enable features via user control	Subscription to a "library" and to new songs
Camera	Personal	No	
Digital Camera	Personal	No, but services could enable features via user control	Upload to a photo gallery, order prints, authorize gallery access, remote capture
Refrigerator	Shared	No, but useful for food re-ordering and barcode scanning.	It would be difficult. Do you want your refrigerator telling you not to eat something?
Home Security	Shared	Optional, but can provide Alerts	Via the web or a home control panel

Issues For Managing Devices

For families there will be tradeoffs between personal freedom and privacy. Do the kids get access to the same services as the parents? Do the parents see reports on their activity? How is costs-per-use and subscription registration handled? How do we allow each family member to make his or her own service decisions while providing a generic solution? How do we make it easy for solution providers to gain access to customers without overwhelming customers?

What We Do

Embrace Networks is answering these questions and solving the complexities of device-to-service relationship management, while providing the framework for deploying network-enabled devices and the infrastructure to host services. In fact, we have developed the technology to network-enable just about any electronic device. Service providers will want to provide registration for services and be able to manage the relationship between themselves and the device owner. Other service providers might want to provide competitive services for the same device. It should be possible to provide both services to the same device, even at the same time. This is a key problem for universal deployment of personal Internet resources. Embrace wants to make it a "point and click" world for networked devices.

Example: Photo Upload

Providing the right services to the right device at the right time is a complexity that needs to be simplified. For example, we can network-enable a digital camera to directly link (via wireless, Ethernet, or modem) to a web site. No computer is needed! The device tries all possible ways to connect (reducing the need for user configuration), and can do so from nearly any location (since the device might be at home, in a hotel, at school, or at work). The user simply selects the service (from a variety of service providers), and the device uploads the pictures from the memory card to a designated Internet web site. Then working directly with the camera's user interface, they can organize their photo gallery web site, send alerts to people to tell them that new pictures are in the gallery, send pictures directly to individuals, and order prints. User control and service management are critical to the success of this product.

DEMONSTRATION

We will demonstrate a personal gateway (Figure 1), which can be used with many devices to provide network connectivity and access to web services. Gateway functionality will eventually be built directly into home devices. We believe that there are many uses for personal gateways, and that a generic way of deploying and managing devices connected to the network will provide new functionality to previously un-networked devices in the home. This technology will truly change the way we live and work.

Figure 1.
A Personal Gateway

CONCLUSIONS

In the future, there will be a complex array of devices in the home with access to a large array of services. Thus, the management of personal devices will be a challenge. Permanent or instant-on connection for devices will change interpersonal relationships and our relationship with services to further complicate matters. A string and two cans was the old way a kid would talk to the next-door neighbor. Now portable instant messenger devices will have kids typing under the sheets. Networked devices will remove the computer as a bottleneck, resulting in an efficiency improvement that will extend the influence of devices in the home. Our goal is to overcome the complexity of device management for personal services with the right mix of technology, and an understanding of user's needs, wants and desires.