Personal Networking in the Home: Opportunities and Challenges

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ABSTRACT

The New World network will combine Internet data, phone and video services over a single cable line, fundamentally changing the way communication, entertainment/news, education and commerce services, as well as many other services we are only beginning to imagine, are delivered to consumers. At the same time, many new types of Internet-enabled consumer appliances will be used in and out of the home. These will range from web -phones to handheld and counter-top devices based on highly customizable thin and very-thin client architectures where the client's intelligence is derived from the network.

Thus, this New World network build-out represents the first major deployment of phone services over an Internet protocol (IP)-based infrastructure, using cable lines as the transmission vehicle.

At same time, this build-out will also need to be able to host a new type of 'personalized network' for the home, a sort of a plug-and-play local area network, connecting PCs, web-phones, TVs and other consumer Internet appliances. These personal networks begin to lay the groundwork for turning the Internet into the next mass medium, eventually connecting anyone to anything.

This paper will describe the potential revenue opportunities, survey the home area network connectivity options, and discuss what the technical and operational challenges will be for the service provider.

WHERE IS THE REVENUE?

The funding, estimated in the billions, for this New World network build out will primarily come from Technically Advanced Families (TAF) and Near TAF households as profiled in Figure 1.

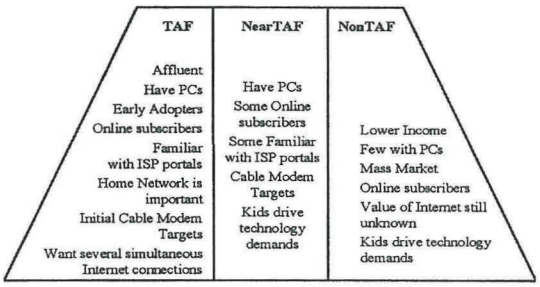


Figure 1: Profile of Families

At a meta-level, the revenue achieved from these households can be broken down into four categories; listed in no particular order below.

Work-at-Home Subsidies

First, work-at-home, or telecommuting, applications that are paid for or subsidized by a household member's employer or government will account for much of the early revenue. Businesses paid for some high-tech consumer products in the past, such as personal computers, fax machines, pagers, and ISDN, used by their employees at home.

This funding benefits product development by reducing the risk of consumer acceptance as it transfers cost

away from the consumer. Stimulated by work-at-home subsidies, a market might become large enough to drive manufacturing volume to the point where prices are reduced for purely consumer applications. This way the work-at-home employee will use the New World services for business purposes where the company defrays the expense. After hours, the employee will use the same services for personal use. The opportunity for the service provider is to offer extra services that the employee will want to subscribe to purely for consumer purposes.

Subscription Revenues

Second, we will see subscription fees for value -added communications or entertainment features. Subscription revenue refers to the periodic income received from consumers in exchange for an ongoing service. Subscriptions for most consumer services--such as newspapers, magazines, cable TV service, and basic telephone--are in the relatively tight range of $10-20.

Transaction Fees

Third, add transaction fees for commerce or commerce helpers. In most media today, subscription revenues alone do not generate a profit. Whether it is newspapers, magazines, Internet access, or monthly cable charges, subscription revenues must be augmented with transaction or advertising revenue to make the business profitable. The same is likely to be true for the New World residential network.

Transaction fees are charges paid per specific event or transaction, such as payments for pay-per-view (PPV) screening. But revenue from PPV systems has not come close to living up to expectations. Thus, operators will need to look for ways to charge fees paid to receive information from a consumer's home network while elsewhere on the web (such as viewing baby/nanny cams). Perhaps operators will be able to extract transaction surcharges paid by home shopping where the transaction would be more much difficult without the having the home network outfitted with commerce-helpers connected to the Internet. One example of a commerce helper might be a web pad integrated into a kitchen appliance that reads SIC bar codes on grocery products. In short, transaction fees represent a potentially enormous source of revenue to content and service providers, especially considering that it could cost the consumer nothing to initialize.

Advertising Revenue

Television advertising is a $47 billion a year business in the United States alone. Total U.S. advertising (newspapers, magazines, and broadcast) is increasing at five percent per year. Even newspapers, thought by many to be obsolete in the digital age, still collect upward of $37 billion in the nation for print advertising and classified ads. Home networks and residential Internet access should eventually command a large enough audience to generate advertising revenue on the level of television advertising.

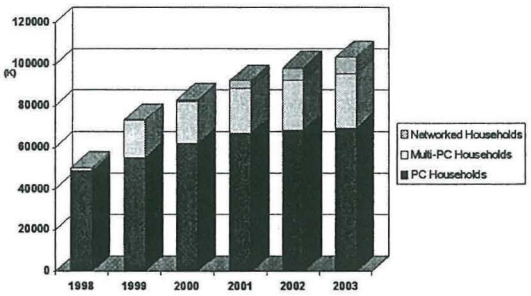
WHY A HOME NETWORK?

Consumers worldwide have high utilization of telephone and television services over existing telephone, over-the-air, and cable networks. For the most part, the services are of acceptable quality with a reasonable price (except perhaps long-distance phone charges). To justify the multibillion-dollar rollout of a New World network to the home, new services will be required to stimulate consumers or advertisers to underwrite the costs.

Aside from work-at-home connectivity and raw high-speed access, the ability to purchase all the communications services

from one vendor, such as local and long distance phone services, unified messaging, data, and video will drive consumers to be interested in paying for broadband networking to their home. Voice-enabled cable modems will allow consumers to get phone service from their cable company, in addition to high-speed Internet access and television service.

The real boost in revenues will come from new services and advertising opportunities that will become available when the consumer can network multiple devices within the house, with each other and with the Internet. This is much more than just sharing the Internet access pipe. Even without the introduction of many new consumer Internet appliances, there is already strong growth in multi-PC homes. See figure 2.



Source: Dataquest, Jan 99

However, these PC will eventually get out numbered by many different types of consumer Internet / web appliances. See figure 3.

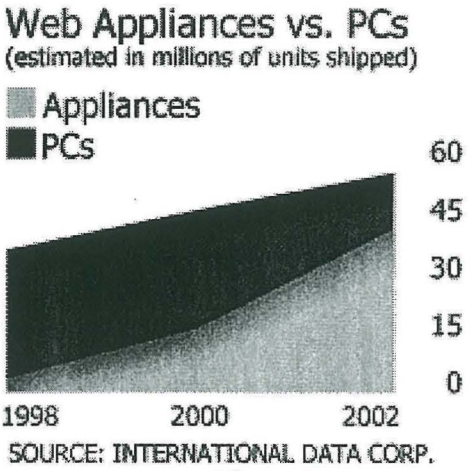


Figure 3

New Application Specific Appliances

As new services become available from the New World network, new devices will be created to make applications and interacting wit the web easier and more widely available (i.e., not requiring a full personal computer). Several of these new devices can be generically described as thin, and very-thin clients, where the client's intelligence is derived from the network. The intelligence can come from the cable operators network, the residential gateway, or home area network hub, in the home.

Some of the new devices we anticipate:

Web Terminals / Web Pads: Small terminals or pads, which may use an integrated LCD screen, or utilize the TV as a monitor. These may be connected to the operators network directly via an integrated cable modem, or be connected via an in-home residential gateway.

Video Telephony Terminals: Small terminals with a camera and microphone that allow telephony or video telephony applications. Again, these may use an integrated LCD screen, or utilize the TV as a monitor.

Gaming consoles: Nintendo, Sony, Sega, and similar devices that could allow opponents to interact over the network.

Home sensors, burglar alarms, baby/nanny cams: These devices will benefit from an "always -on" packet network which allows them to be continuously monitored (even from work), rather than waiting for an alarm signal.

Energy management and telemetry devices: With the advent of an always connected network to the home, new opportunities for more intelligence heavy-duty (high-energy consuming) devices is created. For example, electrical companies today are generally willing to offer preferred rates to businesses and homeowners who promise to reduce their electrical consumption during peak hours. This demand -shaping saves electrical companies money because it prevents them from having to build in extra capacity to handles the peak. As a home area network becomes pervasive, this could enable heavy-duty appliances to be monitored and re-scheduled to operate at off-peak hours whenever possible.

Connectivity within the Home

The primary requirement from the market is "no new wires!" There are primarily three high-speed technologies (generally around 10 Mbps today), or means, developing that can meet this requirement. Solutions are quickly coming to market that connect devices within the home via short-range, multimedia wireless, home -phone -wiring and power/electrical wiring. The standards bodies that defined the USB and IEEE 1394 ("Firewire") technologies are talking about making updates to their specifications for both higher-speed and longer distances. For now, their distance limitations restrict them primarily to peripheral area networking (USB) and entertainment area networking (IEEE 1394).

OPERATIONAL SERVICES AND CHALLENGES

First and foremost, simplicity or "Plug & Play" services are needed, especially for low cost, mass deployment of these new thin-client appliances and home PCs. Some of the functional means to that end will need to include directory services and user authentication.

A universal directory service is a critical middleware function that should reside in the New World broadband network or in the residential gateway, or some combination of both. The most common application of directory are similar to white-pages found in the phone book. Directories can be used to store information about anything, including infrastructure components, services, user preferences, etc. One example of a directory service specification is the Lightweight Directory Access Protocol (LDAP). User information could be stored on in an LDAP compliant server, so that it can be accessed by multiple applications or devices. LDAP provides rich security facilities which should be able to support sophisticated access rules to personalized data.

Universal authentication can be provided using a combination of directory service and password/digital certificate technologies. Collections of certificates technologies giving access to services could be encrypted and stored on a directory server for ready access from anywhere on a network. Applications requiring a higher degree of security could use digital certificates that are issued and stored on a "smart card" that the user can carry and use a with a wide variety of devices. For the work-at-home employee, security features for their employer's Virtual Private Network (VPN) will be extremely important.

Finally, another pair of very important technical challenge exists in the integration of the home network to the service providers network. Each of these interactions need to be transparent to the consumer in the home

and will likely be one of the primary functions of the residential gateway. One challenge is properly handling the dynamic allocation of IP addresses in the home, all while using one-to-many private address plan. The other is integrating the quality of service (QoS) attributes of the home networking technologies to that of the service provider's network and the Internet.

CONCLUSION

Home Nets are an extension of Internet! IP is the unifying protocol in the Internet, for business, and now its coming into the home, enabling the convergence of data, voice and video, as well as anywhere and anytime personal communication devices

The challenge for service providers is to adapt their backbone and distribution technologies as well as enable new revenue generating services to be tightly coupled to those home networks and their new thin client appliances, service needs and E-commerce demands!

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