

# Discovering Devices and Services In Home Networks

Useful systems from information appliances

An IBM White Paper

June, 1999

## Executive Summary

The emergence of information appliances and new types of connectivity is spurring a new form of networking: unmanaged, dynamic networks of consumer devices that spontaneously and unpredictably join and leave the network. Consumers will expect these ad hoc, peer to peer networks to automatically form within the home, in very small businesses and in networked vehicles.

Home networking, or systems of information appliances, have some unique requirements beyond traditional local area networking. For this technology to be accepted by consumers, it must be very easy to use. A key aspect of making these networks easy to use is making them self-configuring, rendering them virtually transparent to the consumer.

This white paper discusses:

- the unique requirements for successful home networking, in particular, the ease of use requirement;
- the role of self-configuration to address the ease of use requirement;
- how service discovery and service discovery protocols enable self configuration;
- the challenges presented by the growing number of service discovery protocols in the industry and interoperability solutions that overcome these challenges.

Over the course of the next five years, multiple discovery protocols will exist. These protocols must interoperate to meet the needs of the marketplace. IBM is working on technology and solutions to enable interoperability of devices and services that participate in heterogeneous service discovery protocols.

The authors have used their best efforts in the preparation of this report. International Business Machines Corporation and the authors make no representation or warranties with respect to the accuracy or completeness of the contents of this report.

The following terms, denoted by ® or ™, used in this report are registered trademarks or trademarks of International Business Machines Corporation in the United States and other countries.

IBM  
Home Director

The following terms, denoted by ® or ™, used in this report are registered trademarks or trademarks of the listed holder. All other brand names and product names used in this report are trademarks, registered trademarks, or trade names of their respective holders.

Bluetooth	Bluetooth Special Interest Group
HAVi	Member companies of the HAVi consortium
Java	Sun Microsystems, Inc.
Jini	Sun Microsystems, Inc.
Salutation	Salutation Consortium
Universal Plug and Play	Microsoft Corp

© Copyright 1999 by International Business Machines Corporation. All rights reserved

## Introduction

A wide range of phenomena is driving the emergence of home networks. Among these phenomena are:

1. New forms of connectivity within the home
  - Phone line networking technology like Home Phonenumber Networking Alliance<sup>1</sup>
  - Wireless radio frequency-based technologies like HomeRF<sup>2</sup> and Bluetooth<sup>3</sup>
  - Power line networking technology, such as Intellon<sup>4</sup>'s recently-announced high-speed power line networking technology
  - Messaging and interoperability standards such as CEBus<sup>5</sup>
  - Structured wiring<sup>6</sup> in new construction
2. More multiple PC households
  - Second (or third) desktop systems, driven by the emergence of \$599-\$999 systems
  - Notebook computers that are brought home from the office each night

This trend is described in a CNNFN<sup>7</sup> article dated February 23, 1999:

“A survey published earlier this year by Boston-based market research firm Yankee Group showed that 30.5 percent of U.S. households with PCs are interested in a way to connect electronic devices in their homes. Dataquest projects 350,000 U.S. households with more than one PC will be networked this year. The firm expects that number to jump to 1 million households by 2000 and 3.3 million in 2001.”

- These PCs need to share resources such as printers and Internet access.
3. The continuing emergence of *smart* consumer devices
    - home controllers
    - network printers
    - PDAs and other information appliances
    - Networked vehicles or *smart cars*
    - *WebCams* (surveillance cameras with built-in Web servers)
    - in general, whole new generation of network-enabled consumer electronics available or under development, like home security systems, home entertainment systems, and smart appliances

### The Rise of Information Appliances

Computer chips are being embedded into the next generation of everyday devices. Our cars have had them for years – now our children's toys, our kitchen appliances, and our living room entertainment systems have computing power that rivals previous desktop computers.

In addition, the emergence of *no new wires* networking technology has allowed these computer-enabled devices to become network connected. The result is very powerful and useful systems of these devices cooperating to simplify everyday activities and provide new functionality.

Donald Norman<sup>8</sup> lists three critical design principles for the viability of information appliances:

- Simplicity
- Versatility
- Pleasurability.

<sup>1</sup> <http://www.homepna.org>

<sup>2</sup> <http://www.homerf.org>

<sup>3</sup> <http://www.bluetooth.com>

<sup>4</sup> <http://www.intellon.com>

<sup>5</sup> <http://www.cebus.org>

<sup>6</sup> For example, see <http://www.ibm.com/homedirector>

<sup>7</sup> [http://cnnfn.com/digitaljam/9902/23/feature\\_networking/index.htm](http://cnnfn.com/digitaljam/9902/23/feature_networking/index.htm)

<sup>8</sup> *The Invisible Computer*, Donald A. Norman, ©1998 Donald A. Norman