



Intel® Networked Media Product Requirements Enables Digital Home Interoperability

Overview: Comprehensive Requirements

The digital media revolution is captivating the imagination of consumers. Digital cameras, personal video recorders, MP3 audio players, HDTV displays, IP-digital set top boxes, and new generations of mobile devices and entertainment PCs are just a few of the products generating buzz in the world of consumer electronics (CE). The potential effect of increasingly popular IP home networks and broadband connections creates a vast opportunity for PC and CE device manufacturers, application developers, and content creators to deliver new uses and value for consumers.

As consumers acquire and store a growing variety of digital media content, they should be able to share and enjoy their music, photos, and video on a variety of connected devices from anywhere in the home. This is the heart of the Intel digital home vision, and its ultimate success depends on a single word: interoperability. But interoperability requires standards.

Common Framework Needed

The problem today is that there are more than 40 separate industry standards and protocols, ranging from Universal Plug and Play (UPnP), to MP3, 802.11x, MPEG and more. The use of standards is important, and implementing them can be even more crucial to ensuring interoperability. Going with a proprietary implementation involves a high degree of risk, not only now, but also going forward.

In June 2003 Intel, Sony,* and Microsoft* founded the Digital Home Working Group (DHWG) to promote the development of a common interoperability framework for use by CE and PC vendors. In addition to the founders, the DHWG now includes more than 100 member companies working together to develop DHWG implementation guidelines.

The initial rollout of these guidelines is expected in mid-2004, but the digital media revolution is happening now and being early to market can be the key to maximizing profitability. The question is what can developers do about interoperability in the short term?

The answer can be found in a new document titled Intel® Networked Media Product Requirements (Intel NMPR). Intel NMPR is a comprehensive set of requirements for network media interoperability at the protocol level. Designing products to be Intel NMPR conformant enables baseline functionality based on existing industry standards while providing the freedom to add higher-level functionality needed to differentiate products.

Benefits of Interoperability

It is almost impossible to understate the importance and value of interoperability for connected digital home devices.

Consumers increasingly want to access digital media files from a variety of devices throughout the home. For example, users may want to distribute HDTV content from a set top box or personal video recorder (PVR) to TVs in different rooms, or access JPEG photos, MPEG-4 videos or MP3 audio files that have been cataloged and stored on an entertainment PC.

The ability of CE devices and PCs to interoperate smoothly and simply is obviously one of the fundamental keys to a positive user experience. The failure of connected devices to work together as advertised can lead to support calls, product returns, and lost business for retailers, manufacturers, and content providers alike.

While the industry has gone to great lengths to develop UPnP guidelines, networking protocols, and data compression standards, actually implementing them remains the challenge. Going with a proprietary implementation can involve a great deal of time-consuming effort and also involves the substantial risk that the product may not work with another solution from a third-party vendor.

At the same time, Intel recognizes that the digital media revolution makes being early to market with differentiated CE products more important than ever. In today's market, time-to-market advantage is incredibly important. Intel NMPR was written to enable early development for baseline interoperability, leave room for product differentiation and help developers get innovative digital home products to market as fast as possible.

Advantages of Intel® NMPR

The current document, Intel NMPR v1.0, covers personal media usage requirements between home networked platforms, including CE devices and PCs. The requirements focus entirely on network interoperability and reference more than 40 industry standards. The introductory section focuses on network media framework, target platforms and their roles, and user control issues. The second section includes layer-by-layer mandatory, recommended, and optional requirements.

Intel NMPR does not provide hardware designs, form factors, application programming interfaces (APIs), or user interface specifications, nor does it deal with digital rights management and content protection issues.

Intel NMPR is a complete capability stack, comprising a framework of technologies needed to deliver an end-user experience:

- **User control**—How the user controls the experience.
- **Media formats**—How content is encoded.
- **Media transports**—How content is transported.
- **Media distribution and control**—How content is discovered, distributed, and controlled.
- **Device discovery and control**—How devices discover each other.
- **Network protocol**—How data is moved on the network.
- **Physical network**—How devices connect.

Intel NMPR identifies the standard technologies needed to assist a developer in developing interoperability and recommends specific versions and implementations.

Designing to Intel NMPR now means a product can be designed with interoperability in mind in preparation for the DHWG guidelines coming later in 2004. When the DHWG guidelines are available, early adopters may bring their Intel NMPR-conformant products into DHWG compliance with a simple firmware upgrade. The Intel NMPR v1.0 comprehends the work being developed in the DHWG, and Intel NMPR v2.0 will align with the DHWG guidelines.

Achieving Intel NMPR validation now has additional benefits:

- Intel NMPR validation is a preparatory step for having a solution listed in the Intel® Recommended Materials List, Intel's comprehensive guide for the industry listing validated interoperable products.
- Intel NMPR validation is preparatory for qualifying a solution for listing in the Intel® Platform Vision Guide, a compilation of features, functions and technologies for advanced computing.
- Companies that develop Intel NMPR-validated products may also qualify for the Intel® Innovation Alliance, a select group of companies invited to showcase their solutions by joining Intel senior executives during keynote presentations at high-profile industry events.

Intel® NMPR Development/Test Tools

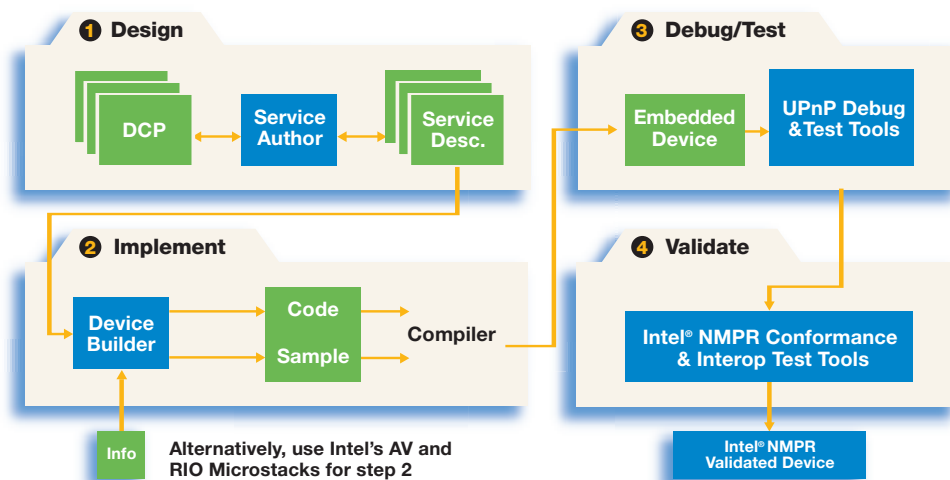


Figure 1. Intel® Networked Media Product Requirements development and test tools provide more than 20 tools for a comprehensive solution for building Intel® NMPR-validated products.

Tools to Get You There

Developing a product for Intel NMPR validation is a matter of following four basic steps: design, implementation, debug/test, and validation (Figure 1). Joining the Intel® Developer Network for the digital home is the place to start. Members can download Intel NMPR at no cost.

To speed the implementation of industry specifications such as UPnP, UPnP Audio Visual (AV), and UPnP-based Remote I/O, Intel provides a comprehensive suite of development authoring tools consisting of ready-to-use object code that has been pretested for Intel NMPR conformance. Available tools include Intel® Device Builder, AV Microstacks, MediaRenderer, Media Server, Control Points, and Device Validator.

The following tools are available for download at no cost:

- Intel® Authoring Tools for UPnP Technologies—based on the Microsoft .NET* Framework v1.1, and including the Intel Device Builder Tool for quickly building device and control point stacks for Linux*, Microsoft Windows*, and Microsoft Pocket PC* platforms.
- Intel® Remote I/O for UPnP Technologies—demonstrates how Intel Remote I/O for UPnP enables a PC user interface to interact remotely with a UPnP-enabled device, such as a TV or Microsoft Pocket PC device. This package includes sample source code.
- Intel® Tools for UPnP Technologies—this Intel® evaluation toolkit is based on the Microsoft* .NET Framework v1.1 and is designed to accelerate the development, testing and deployment of UPnP-compliant devices.

Transcoding is the process of converting one media format into another, enabling digital media adapters (DMAs) located around the home to consume images, audio and video stored on a PC in a variety of formats. DMAs are limited in the number of media formats they can directly support. Intel® Software for Media Transcoding enables the PC to convert media formats to make them playable by DMAs.

Support for network members also includes 10 hours of tutorial videos on UPnP technology and available Intel tools, prepared by the Intel senior development engineering team. Members of the Intel Developer Network for the digital home also have access to a dedicated e-mail support hotline.

The Intel Developer Network for the digital home also provides access to two other important tools:

- The Intel® Conformance Test Tool (CTT) measures the ability of products to function according to Intel NMPR guidelines and includes an easy-to-use, automated, scripted, simple pass/fail reporting structure.
- The Intel® Interoperability Test Tool (ITT) measures the ability of a product under test to function with other conforming products in real-world user scenarios against reference Intel NMPR conformant components.

Both Intel® CTT and ITT test tools (Figure 2) generate a log file. Once sent to Intel, the log file qualifies a solution for an optional listing in the online solutions catalog.

Intel® NMPR Validation/Test Tools

Intel® Conformance Test Tool (CTT)

Measures ability of products to act according to Intel® NMPR guidelines. Easy to use, automated, scripted, simple pass/fail reporting structure.

Intel® Interoperability Test Tool (ITT)

Measures ability of products to function with other conforming products. Real world user scenarios against reference Intel® NMPR conformant components (e.g. a Media Server).

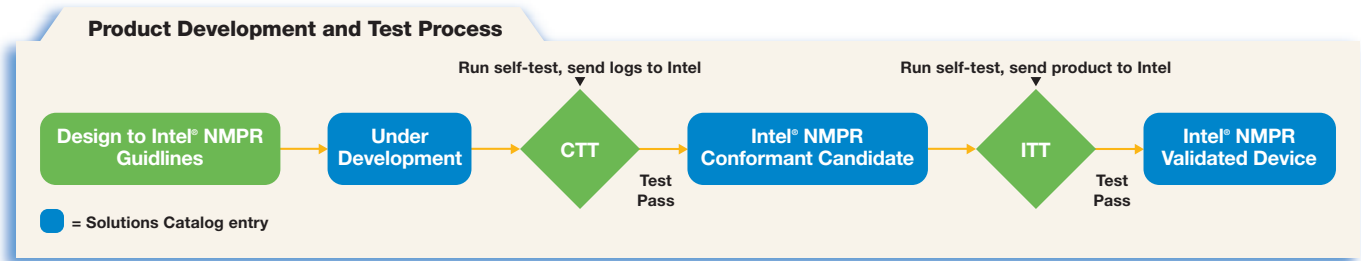


Figure 2. Two Intel tools from the Intel® Developer Network for the Digital Home.

Achieving Intel NMPR validation is a matter of following the steps and using the tools, and the results can be dramatic. Using the tools enabled one device manufacturer to go from a purely proprietary solution to an Intel NMPR-validated solution in only three days.

Summary

Solid baseline interoperability between networked devices is vital to the success of innovative products and solutions designed for the digital home, and so is time-to-market. Confronted by the variety of industry standards, network protocols and media file formats that exist today, developers need industry standards for implementation to ensure that CE devices work together and meet consumer expectations.

Intel recognizes that time-to-market is also extremely important in the CE world, where delivering a product early often translates into market share and profitability. The Digital Home Working Group interoperability guidelines are coming in 2004, but the good news is there is no need for developers to wait.

Designing and validating a digital home product to Intel NMPR conformance today puts developers a step ahead. Intel NMPR conformance enables companies to meet their time-to-market goals while taking advantage of industry standards such as UPnP technology. Since Intel NMPR v1.0 comprehends the standards under development by the DHWG, the products built today can be designed to conform to DHWG guidelines through simple firmware updates.

More Info

Visit the Intel Developer Network for the digital home Web site at <http://developer.intel.com/technology/dhdevnet/> to learn more about the benefits of membership, including where to download the Intel NMPR and a variety of development, test, and validation tools, white papers, a discussion forum, and other time-to-market benefits available at no cost. By following a series of simple steps, developers can achieve interoperability while meeting time-to-market goals.

Intel announced the first building block products validated for Intel NMPR at the Spring 2004 Intel® Developer Forum.

For more information, visit the Intel Consumer Electronics home page at:
www.intel.com/go/consumerelectronics



Intel Corporation may have patents or pending patent applications, trademarks, copyrights, or other intellectual property rights that relate to the presented subject matter. The furnishing of documents and other materials and information does not provide any license, express or implied, by estoppel or otherwise, to any such patents, trademarks, copyrights, or other intellectual property rights.

Copyright © 2004 Intel Corporation. All rights reserved. Intel and the Intel logo are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

*Other names and brands may be claimed as the property of others. Printed in USA/0704/4K/RN/MD/IL Order Number: 301773-002