Microsoft
Broadcast Technologies White Paper

Broadcast-Enabled Computer Hardware Requirements

This paper describes the hardware requirements of a broadcast-enabled computer.

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Hardware Requirements

This section explains the minimum and recommended hardware and operating system requirements for the platform, and states the Microsoft hardware manufacturing policy.

Minimum Hardware Configuration

The *minimum* requirements for a broadcast-enabled computer are:

- Intel Pentium-120 MHz processor or compatible
- High-speed buswith adequate slots to accommodate high-speed broadcast network and video card
- 16MB RAM
- 1 GB hard disk
- 27" SVGA display capable of 640x480 resolution with 60Hz non-interlaced refresh rate
- 3.5" 1.44 MB floppy disk drive
- Quad-speed CD-ROM drive
- 14,400-bps internal or external modem (TAPI compatible)
- Standard computer keyboard
- Pointing device with two buttons

For details on the minimum requirements for the Video and Display subsystem, broadcast network receiver card, access card reader, and other components in the system, see the following sections for each component.

Recommended Hardware Configuration

The recommended configuration for a broadcast-enabled computer is:

- Intel Pentium 150 MHz processor
- PCI bus with at least four slots available
- Consumer-electronics-style case with low-noise fan or noiseless cooling system(OnNow-capable)

Note: User should not perceive system noise from a distance of 6 feet in a quiet living room environment.

- Support for SIPC (Simply Interactive PC) initiatives such as OnNow, Drive Bay, 1394, and USB to provide a more consumer-friendly appearance
- 16 MB RAM or more
- 2 GB or larger hard disk with fast data transfer rate
- 3.5" 1.44MB floppy drive
- 6x-speed CD-ROM drive or DVD-ROM
- 31" display capable of 800x600 resolution with 60 Hz non-interlaced refresh rate
- 28,800 bps or higher internal fax modem (AT command set compatible).

Note: Modem functionality can be incorporated on expansion cards for the broadcast-enabled computer and so may not be a separate peripheral.

- Wireless (RF or IR), battery-operated keyboard with built-in pointing device

- Wireless TV-style remote control
- Battery-operated, combination remote control/wireless mouse with power/sleep button, TV buttons (channel up/down, volume up/down, mute, TV)
- Sound system expansion card with digital audio (wave) support, a MIDI port, a MIDI-controlled wave-table synthesizer, multiple analog and digital audio inputs, software-controllable low-noise audio mixer/preamplifier, and multiple audio outputs

Note: Sound-card functionality can be incorporated on motherboard or expansion cards for the broadcast-enabled computer and so may not be a separate peripheral.

- A built-in microphone or a front-mounted microphone jack suitable for teleconferencing, education, karaoke, and other applications requiring sound input.
- AC-3 audio decoding for DVD compatibility
- IR blaster capable of controlling consumer electronic devices

For details on the minimum requirements for the Video and Display subsystem, broadcast network receiver card, access card reader, and other components in the system, see the specific sections for each component.

Windows 95 Requirements

Because the Broadcast Architecture uses Microsoft ® Windows® 95 as its general purpose operating system, hardware designed for it must conform to the Plug and Play architecture. For detailed information on designing Plug and Play compliant hardware, refer to the documents listed at the end of this paper.

Manufacturing Hardware

Microsoft will not sell Broadcast Architecture platform components directly to the end user (exceptions may exist for keyboards or pointing devices). Rather, OEMs and hardware vendors will license the technology from a network provider (where applicable), and will license Microsoft Broadcast Data Network (MSBDN) designs and services from Microsoft. OEMs and hardware vendors may build, sell, install, and service their own products. By making hardware designs and software components available to numerous OEMs, Microsoft expects competition to drive the development of many feature enhancements, and create distinct price points from which the end user can choose.

Initially, Microsoft will work with OEMs to develop the first Broadcast Architecture platform. From this work will come different kits, including Device Driver Kits (DDKs), and Software Development Kits (SDKs), that will be provided to OEMs who wish to become Broadcast Architecture licensees.

Broadcast Network Receiver Card

This section describes the functions of a broadcast network receiver card and the requirements it must meet to support a Broadcast Architecture platform.

Functionality

Because the Broadcast Architecture works with many different types of broadcast digital networks, the exact details of the broadcast receiver card are dependent on the broadcast network and network-specific access-control mechanisms. Broadcast Architecture software expects specific software drivers for each network card to be supplied by the card vendor or network provider.

Network Interface Connector or Antenna

For a digital broadcast satellite network, the antenna is typically referred to as an Outdoor Unit (ODU). For a cable network interface, the connector is likely a typical F connector. For a Multichannel Multipoint Distributed System (MMDS) configuration for a wireless cable system, a microwave antenna is required.

Signal Paths

The broadcast receiver card must be able to receive both normal broadcast-network-related broadcast information and data stream information, as defined by the MSBDN/MPT IP data transmission format, as defined in the *MSBDN Receiver Board Specification* section. Because data streams are statistically likely to be on separate channels (cable and MMDS) or transponders (DBS) from the video and audio streams, the receiver card requires two paths and signal lines. In this specification, we refer to these paths as the "digital audio/video signal path" and the "digital data signal path." These signal paths are described separately to clarify their differences.

Microsoft anticipates that hardware vendors will eventually combine both signal paths (including two separate tuners) on the same PCI-bus card, to share control, interface, bus mastering, power, and antenna connector resources. However, it is expected that early versions of the broadcast receiver card will include only one tuner. Microsoft requires that one-tuner versions of the receiver receive both data and audio/video signals without user intervention (though not simultaneously, unless the signals are broadcast on the same channel or transponder). This functionality requires the receiver to include both network access control circuitry and MSBDN circuitry and a smart card as appropriate.

Digital Audio/Video Signal Path

The digital audio/video signal path contains the network-specific (and perhaps licensed) technology for tuning, demodulation, decoding, error-correcting, demultiplexing, decrypting, and controlling access to the digital audio and video signals.

The digital audio/video signal path typically must be capable of receiving at least five substreams simultaneously (such as access control, video, audio, data, and program guide). The design of the receiver card must allow transfer of these streams to computer-memory with very low CPU utilization (less than 10 percent), so that the transfer doesn't interfere with the performance of applications running on the computer. This requirement implies that the card will use bus mastering or other direct memory access techniques.

Certain network designs mandate particular access control functionality (for interactions with the consumer) to be resident in hardware. In the broadcast computer system, the particular network "verifier software" is divided into a number of parts. Security functions typically run on a microprocessor on the receiver card. The user interface and any modem interface functions are implemented in the computer. The different portions communicate with each other through Broadcast Architecture driver interfaces that manage communication with the user and network authorization center.

Digital audio/video data is tuned, demodulated, and error corrected (generally referred to as "transport"), then routed to circuitry that selects portions of the total stream (SCIDs or packet identifiers (PIDs)) of interest. Information of interest can be passed through MSBDN DES decryption circuitry, after which it is bus-mastered into CPU memory. Note that some data will not need to be decrypted, since it is sent in the clear. It is possible to take selected data directly from the error correction circuitry and bus-master it into memory.

Digital Data Signal Path

The signal path that receives digital data is similar to the existing audio/video path, but includes several extra requirements. First, the digital data signal path must demultiplex a packet stream from

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