



## Q & A / Backgrounder

Hughes Network Systems,  
Hewlett-Packard, and  
Starlight Networks

Introduce the Industry's First InterMedia Solution for  
New Media and Internet Applications



**Q:What is this announcement, and what is its significance?**

- A:** Hughes, Starlight, and Hewlett-Packard are working together to deliver the industry's first solution for the InterMedia market. This solution is based on Hughes' DirecPC™ satellite service that, using Starlight's software, allows companies to:
- Affordably deliver dynamic multimedia applications across the enterprise, including local area networks, wide area links, and intranets, to users at their desktops.
  - Make their intranet an integral part of the corporate network — enabling existing groupware and collaborative applications, growing mixed media applications, and new corporate intranets.
  - Take advantage of the popular Netscape browser to bring dynamic video content from the Internet directly and instantaneously to their audiences — either on the corporate intranet or to external customers. (without the long wait associated with downloading video from the Internet).
  - Conduct confidential electronic commerce transactions over their own secure, private network using popular worldwide web interfaces.

**DirecPC turbocharges the Internet and brings it alive with multimedia**

Instantaneously view high-quality MPEG multimedia from the worldwide web at your desktop using DirecPC. Use your Netscape browser, as usual, to view web graphics or video, or listen to speeches and concerts — and you'll immediately see and hear it all, in high quality MPEG video. You don't have to wait hours for it to download through your modem connection.

Currently, browsing is the greatest use of the Internet. Now, Internet content can come alive at the desktop. The ability to immediately play multimedia content from the Internet will expand corporate development of Internet applications using video, audio, graphics, and animation.

**Your Internet browser will become your Internet viewer.**

First we had text.

Then we had dynamic multimedia, and it was exciting.

But in the Internet world, we couldn't play multimedia, so we browsed.

Browsing was good, but we dreamed of the day we could have multimedia there, too.

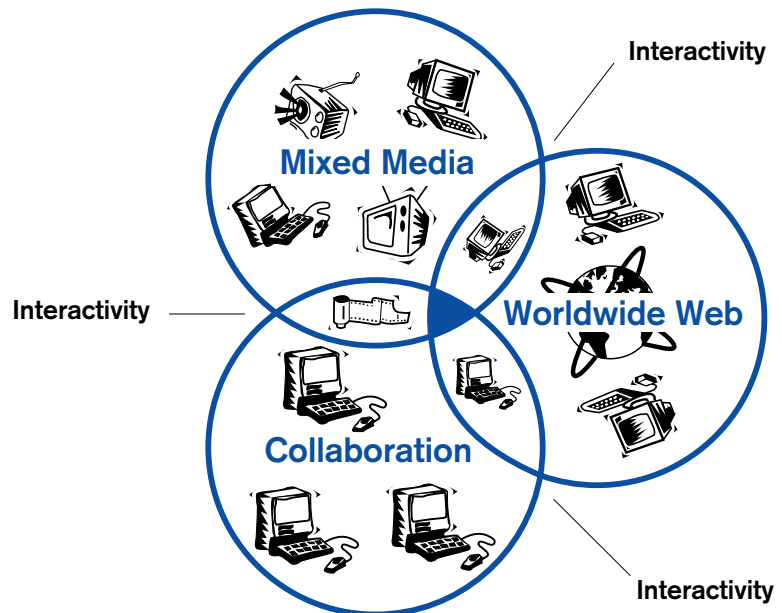
Now the Internet has come alive at our desks with multimedia, and it will revolutionize how we use the Internet.

**What can DirecPC's intermedia service do for you? Let your imagination run...**

- Use your browser to run in-line videos and movie clips instantaneously on your computer screen — you don't have to wait!
- Welcome new employees to your company with a personal videotaped greeting from your CEO that users, even at remote offices, can bring up on their computer screen immediately through their browser.
- Watch a videotaped fashion show and feel secure in ordering your favorite designs.
- Easily and cost-effectively update your in-store customer information kiosks with video of the products you represent, broadcast directly to the kiosks' computers.
- Enliven your online quarterly report with a videotaped address from your company CEO.

**The InterMedia Market**

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## MixedMedia:

- **AUDIO**
- **VIDEO**
- **IMAGES**
- **GRAPHIC**
- **ANIMATION**
- **TEXT**

### Significance for Multimedia — Intranet, Internet, and the corporate network

- DirecPC makes multimedia-based new media, Internet and electronic commerce applications truly viable for widespread corporate use. It is affordable and instantaneous, and therefore makes it feasible as an enterprise solution for companies to distribute documents, images, multimedia, video, etc., electronically to thousands of users at remote sites.
- For the first time, users at their desks can use their web browsers to instantaneously run multimedia content (high-quality MPEG video and audio) — without having to wait hours for it to download from the Internet through their modems. Finally, web-based video becomes viable, and viewable in real time. The potential for exciting, dynamic web content can be realized.
- DirecPC provides a secure network for the delivery of dynamic, video-based web content.
- DirecPC delivers multimedia across the corporate network and to remote sites throughout the enterprise.
- DirecPC allows mixed media applications and Internet content to become an integral, collaborative part of the IT infrastructure for the first time.
- Information service providers now have an entirely new area of opportunity to create and deliver new interactive applications and services based on a new cohesive, collaborative InterMedia environment.
- Information service providers have an opportunity to maximize use of multimedia content on worldwide web sites, and create new dynamic applications for the Internet.
- This solution gives users the ability to interact directly with the vendor, bypassing the usual intermediaries, or middlemen, that have been in place to help reach an intended audience. Content providers now have a direct route to reach their ultimate audience.



### What About ISDN?

Just as families crowded around their new televisions in the evening, enraptured by Charlie McCarthy, Jack Benny, and their favorite entertainers in the early years of this exciting new visual medium, so do web junkies eagerly feast their eyes on the new animated images on their computer screens. Early TV watchers put up with static and wavy lines. The old vacuum technology just didn't deliver the crystal clear reception we're used to now with digital electronics and cable.

It's not so different for Web users. We put up with poor video quality — only a few jerky frames per second, without synced audio — and long waits because of the limitations of the 'old' technology. We do this for the privilege of participating in an exciting new experience, and with the promise in the future that it will improve.

Just as ISDN promises better video quality to our computers, so did antennas to our televisions. ISDN carries more bandwidth than do basic leased telephone lines, but at a maximum 128 kb using ISDN, it still takes 10 hours to download a one-hour MPEG-1 video file. It's like trying to connect a fire hose to a little garden hose. You're going to lose a lot of water (or, in this case, video content).

The connect time gets costly, and then hope you have enough hard disk space available to store the entire file. Try to view a live concert off the Internet, and you're lucky to get five frames per second.

The 'new' technology that brings the high broadcast video quality to our computers that we have come to expect on our televisions is satellite delivery. Although satellites have been used for quite awhile for broadcast purposes, it is now affordable for widespread use to deliver multimedia to our computers, including video and audio from the Internet. DirecPC uses a 12 megabit/sec (Mbps) broadcast channel — equivalent to several fire hoses, and more than enough to carry multiple video broadcasts simultaneously.

**Q: What are the major benefits of being able to distribute video across the enterprise via satellite? How does this compare with other solutions/approaches (leased lines, other satellite services, etc.)?**

**A: ISDN.** High-bandwidth data (multimedia, documentation) can be (and is) transmitted over leased lines, but the time it takes and associated cost is prohibitive. Transferring a one-hour MPEG-1 video file over leased lines at 56 kb would take 56 hours. ISDN is faster, at 128 kb, but still doesn't approach satellite's real-time delivery (at least 10 times faster than ISDN). Via satellite, a video file of any length can be broadcast to any number of sites, and received by users instantaneously. DirecPC's cost is equivalent, if not less, than that of ISDN, for equipment and delivery service. Also, DirecPC can support multiple data streams, for example, delivering both live video and web content simultaneously (which ISDN can't do).

**Commercial satellite.** Companies can currently contract for transponder space on commercial satellites, but the charge to broadcast occasional video is prohibitively high.

**ATM** will provide a solution for high-bandwidth distribution in the future, but it is still a one-to-one approach (as compared to DirecPC's one-to-many approach). ATM will only be viable when everyone has it. DirecPC's satellite service provides that solution now everywhere in the U.S.

**DirecPC's** multimedia service delivered via satellite makes it affordable, and therefore feasible, for companies to incorporate multimedia into their existing applications, as well as to develop new multimedia applications that can be delivered to users throughout the enterprise. Once received at a remote site, the broadcast can then be made available immediately to users on the network or intranet, or stored for later retrieval. Equipment (antennas, video cards for the PC clients) and broadcast time are inexpensive. Typically, only one antenna is required per receiving site (feeding multiple PCs); the total cost per user decreases as the number of users increases.

**Internet video.** Some companies have announced solutions for delivering video content from the Internet, but these require that the incoming video be stored to a hard drive first, or the video received (after waiting) is still jerky and unsynced, and the solutions are proprietary. DirecPC provides an open solution for delivery of Internet content, and can play high-quality MPEG-1 web-based video in real time.

Using satellite transmission, it is now possible to access mixed media applications in real time from the corporate server or the Internet, for electronic commerce, documentation, retail and customer support,

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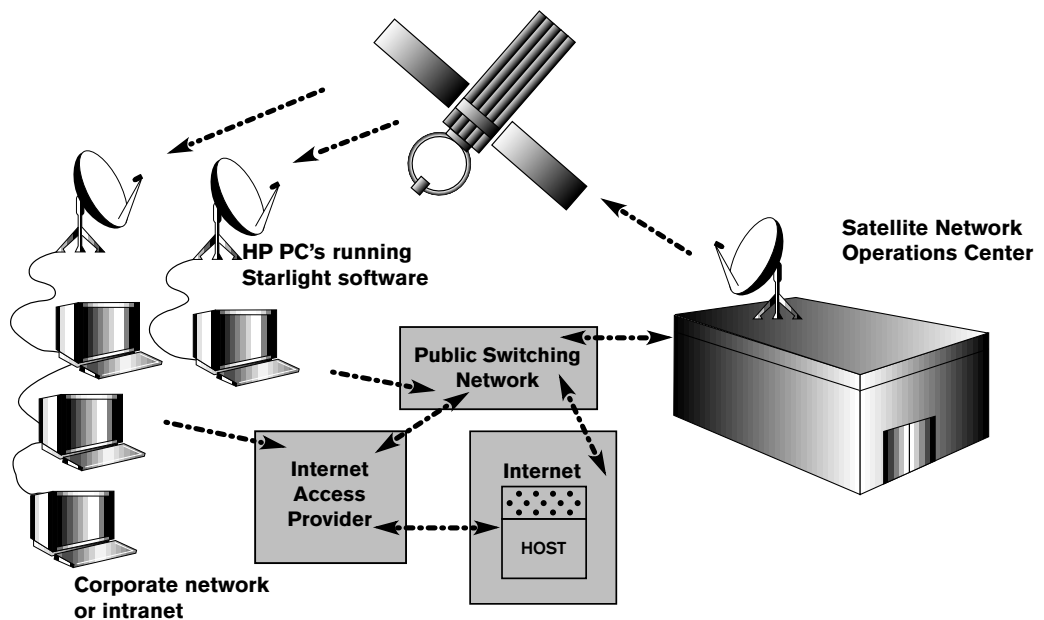
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**Q:How are you able to support multimedia so affordably and in real time using satellite technology?**

**A:** Hughes is announcing availability of the multimedia data delivery service it indicated would be forthcoming when it announced DirecPC, as well as making multimedia and Turbo Internet services available to networked users. Starlight's multimedia networking software technology enables the transmission of high-bandwidth applications via satellite, as well as the distribution of that data across the network.

Starlight has adapted some of its multimedia networking software features to support satellite transmission. The software technology used with DirecPC is derived from StarWorks-TV™, a feature of Starlight's StarWorks software that manages the distribution of live multimedia content over networks. Installed as part of DirecPC, the software transmits and synchronizes audio and video broadcasts to the desktop via satellite, assuring that transmission quality is maintained.

StarWorks-TV on a local area network consists of a broadcaster that manages the distribution of live video from the server, and a viewer installed at each client that receives the image. For DirecPC's satellite transmission, Starlight has separated the broadcaster and viewer so that they do not both reside on the LAN. The broadcaster is installed at Hughes' transmission site, where it manages the distribution of the live video content. The viewer component (StarCast™) is installed on the DirecPC receiving computer, where it manages the reception of the data and rebroadcasts it across the network. Starlight client software is installed on each networked PC. To store the incoming broadcast and rebroadcast it across the network, Starlight's StarWorks® software is installed on the DirecPC computer, turning it into a multimedia server.



**Q: How does DirecPC work?**

**A:** DirecPC delivers its transmissions via satellite to a 24 inch satellite antenna connected to a DirecPC computer (an off-the-shelf PC) installed with Starlight software. DirecPC uses a full Ku-band transponder on a Galaxy satellite to provide a 12 Mbps broadcast channel. The transmission can be a live corporate broadcast, or a multimedia application stored on a server at corporate headquarters. The broadcast may be scheduled any time, from weeks in advance to urgent, immediate corporate messages. Delivery to Hughes is through terrestrial connections or via satellite.



**Direct communications  
with DirecPC**

Companies can now use multimedia to present their products and services directly to customers through common Internet browsers/viewers.

- Educate
- Advertise
- Publish
- Merchandise
- Support
- Collaborate
- Communicate

The transmission coming in to the DirecPC platform can be rebroadcast immediately to users connected to it on a network; or, it can be turned into a server using Starlight's StarWorks multimedia networking software and stored for later retrieval. The DirecPC computer can be networked using standard network connections. Company's can use their existing networking technologies, including Ethernet, but may need to examine the ability of the network to handle their bandwidth load, choosing to upgrade to higher bandwidth options, such as FDDI, 100VG, 100BaseT, etc.

The DirecPC system is equipped with a DirecPC board and cable connection to the receiving dish, and it can receive multiple addressed channels (to a maximum of 99).

The Starlight-based mixed media server not only receives transmissions from the DirecPC service (including its Turbo Internet service), but it manages the delivery of InterMedia information to users on the network from other sources as well, for example, from a Notes server, Internet server, multimedia server, etc.

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**Q: How does the Internet connection work to instantaneously deliver high-quality (MPEG) multimedia content?**

**A:** With DirecPC, users can make a request as usual through their web browser and immediately hear audio or see high-quality MPEG video or other graphical Internet content. Satellite delivery makes it possible to bypass the limited bandwidth capability of communications devices, such as modems and phone lines, which take hours to download multimedia data before users can open up and view the file. Other providers talking about solutions providing access to interactive content on the Internet are still restricted by these limitations (they first have to store incoming video to a server, or the image is jerky and unsynced). DirecPC delivers high-quality MPEG video-based Internet content instantaneously and affordably.

You can use your current Internet connection to play Internet multimedia from the desktop. A user identifies a URL from the web browser to initiate a search, in the usual way. The request is made via modem to the DirecPC Turbo Internet service, which downlinks the requested information, delivering it via satellite to the DirecPC computer.

From there, delivery of the multimedia file is managed over the network to the client requesting it by Starlight's software. The file can be delivered over the network as it is being transmitted or it can be stored to the server for later retrieval.

DirecPC is unprecedented in its ability to immediately deliver Internet multimedia (high-quality MPEG) applications to the desktop. In making the request, the user is asking the source Internet server to 'stream' the particular file to their desktop, which allows them to open and play the file immediately. You see and hear interactive Internet content as soon as you request it.

DirecPC's satellite transmission makes it possible for companies to cost-effectively use interactive content to educate, advertise, publish, merchandise, support, collaborate and communicate with their targeted audiences. It provides a secure, private network for confidential electronic commerce transactions using popular WorldWide Web interfaces. In addition, information providers can use Hughes' Turbo Internet service to make their multimedia Web sites available to users to browse and play content located on Turbo Internet on an ad hoc basis.

The mixed media server hardware and InterMedia network clients are provided by HP. The HP/UX™ or NetServer™ running Starlight's StarWorks multimedia networking software provides the mixed media server to store and manage multimedia data broadcast over Hughes' DirecPC service, and HP's Vectra™ PCs provide the InterMedia network clients (and can also act as servers).

"We are now making it feasible for companies to cost-effectively deliver high-bandwidth, high-quality MPEG multimedia and large document files to all of their locations. DirecPC provides a framework to integrate Internet content on company intranets with new media and existing applications, and create a unified, collaborative computing environment. Multimedia can now be an integral element of the corporate infrastructure, making existing applications come alive and opening the door to new, interactive possibilities."

— Tom McPherson, vice president and general manager, Satellite Broadcast Products and Services

"We have entered a new chapter in the ability of content providers to present their products directly and in a timely manner to their customers. This will change the way that business will be conducted on the Internet."

— Dan Abouav, managing director of Interactive Media Solutions, Hewlett-Packard Company

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### Q:What multimedia support services are currently provided by DirecPC?

A: All of the services discussed previously are currently available:

- **DirecPC's multimedia delivery service.** Information service providers can use DirecPC to deliver customized digital video broadcasts (Indeo or MPEG) via satellite to a DirecPC system at the end-user site running Starlight software.
- **LAN distribution.** The DirecPC computer becomes a mixed media server when installed with Starlight's StarWorks software, managing the delivery, bandwidth reservation and server storage functions required to distribute the incoming multimedia data over the network. The PCs on the LAN do not need to be installed with a DirecPC board and do not need a direct cable connection to the satellite antenna. The LAN can use existing networking technology, such as 10BaseT, or 100BaseT, 100VG, FDDI, etc.
- **Video server services.** With the addition of a StarWorks-based mixed media server on the LAN at the local site, video broadcasts can be stored for on-demand access by users on the network. This is advantageous where files do not need to be delivered in real time. Instead, information can be transmitted at a lower bandwidth over a longer time at non-peak times for less cost.
- **Intranet services using web browsers.** Internet graphics and video files, distributed by DirecPC's Turbo Internet service to the StarWorks mixed media server, can be accessed in real time by users from their web browsers. Hughes Network Systems currently delivers their Turbo Internet service, and with the availability of LAN distribution, users can access worldwide web content available via Turbo Internet and instantly play graphical information over their corporate network or intranet.
- **Support for low-cost MPEG decoder.** Starlight's StarCast viewer software currently supports an OptiVision card, which has an NTSC output (for television connections). Using this card, organizations that currently have a private analog system can easily switch to DirecPC and digital video, and continue to use existing television equipment for viewing. StarCast will also support a RealMAGIC multimedia card at a lower cost for those organizations not needing the NTSC output.
- **Ease-of-use enhancements and automation with support for OLE 2.0.** StarWorks-TV's support for OLE 2.0 will allow users to write API's to control StarWorks-TV applications for automating their broadcasting and viewing.

"The ad hoc growth of corporate intranets, along with new multimedia-based applications, has created a new problem for corporate IS — how to integrate Internet services with all of these other, disparate corporate applications and create a unified, collaborative environment? This is the new InterMedia market. DirecPC provides a feasible solution for an integrated, interactive, InterMedia environment. Information providers have an opportunity to create a whole new class of interactive applications for corporate networks, intranets, and the Internet."

— Jim Long, president of Starlight Networks

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**How does DirecPC differ from other desktop broadcast services (such as Intel's CNN to the desktop)?**

Other services, such as Intel's CNN to the desktop, deliver only one information service; DirecPC can deliver multiple services, including CNN and other commercial and private, custom broadcasts. Intel's CNN to the desktop is not delivered via satellite, and it supports Indeo only. Starlight's software supports both Indeo and MPEG, giving DirecPC the ability to support both. MPEG delivers much higher quality video with the same bandwidth.



**Q: What technical concerns/bottlenecks need to be addressed to enable video distribution to PCs via satellite?**

**A:** Perhaps one of the most difficult and most important obstacles to overcome is retaining transmission quality in the face of inevitable data loss. Transferring files between computer systems via typical networking protocols is a one-to-one situation where the receiving station can request that a particular block of data be sent again if some of it is not received. In a broadcast (a one-to-many situation), the data is transmitted in a continuous stream to all receiving stations, without interruption. The broadcast won't stop to resend to those stations that missed part of it. The loss of frames would normally result in a scrambled transmission. Starlight's software takes care of those lost frames (gracefully dropping any that are necessary and synchronizing the audio with the video) to maintain high-quality transmission.

DirecPC's delivery service for multimedia files ensures the integrity of the transmitted file.

**Q: What equipment will customers need to implement this solution?**

**A: For information providers:** DirecPC service total bandwidth is 12 Mbps, which will broadcast multiple channels up to 2.5 Mbps each.

**At the receiving end:** customers need a DirecPC receiving platform running Starlight's StarCast software. This platform can also run Starlight's StarWorks multimedia networking software, turning into a mixed media server which, when connected to the corporate network, distributes the incoming broadcast data to users. This information can be made available in real time, or stored to the server where it can be accessed by users at any time. The server is connected using the company's choice of standard network connections.

**Q: How is this solution going to be sold?**

**A:** Hughes Network Systems, Starlight Networks, and Hewlett-Packard have entered into a worldwide sales and marketing agreement to jointly support sales of the DirecPC broadcast solution. It will be sold through the sales forces of all three companies. Customers can call 1-800-637-7740 for more information.

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