

The illustration features a central cutaway of a house showing a living area with a television and a kitchen. To the left, a coiled cable with a connector is shown. To the right, a power outlet is depicted with a cable plugged into it. The background consists of overlapping circles in shades of blue and green.

Moving Media Around the Digital Home

BY HEATHER KIRKSEY

The trend toward multi-service bundling has been key for broadband service providers planning to defend their presence within the emerging digital home. However, the reality of delivering a combination of voice, data and video services to a customer's residence also poses new financial and operational challenges for providers.

In the past, providers primarily addressed issues related to the installation and support of basic data-centric services. Today, operators must consider the complexities of a multimedia-centric home network, in which audio and video content is delivered, stored and distributed from a variety of sources to multiple locations through-

out the home. Although much of the provider investments in next-generation services will continue to be external to the home, most operators recognize that supporting new media applications requires increased attention to the distribution network within the home itself, specifically, understanding what consumers typically have in place today and what they'll need in place tomorrow.

Early adopters of home networks embraced CAT5 twisted pair media and Ethernet to get connectivity for data-centric applications, but most mainstream consumers waited until Wi-Fi certified 802.11b wireless networking products became available and affordable. Today, wireless access

point users still do not always receive consistent and reliable coverage in all parts of the home. And even though the throughput may be suitable for some media applications, such as streaming audio, the network rarely provides enough bandwidth to support video of a suitable quality for mainstream viewers.

Service providers recognize the limitation of most existing wireless networks and yet must offer a TV viewing experience with at least the same—or better—quality and reliability to which consumers have become accustomed. As a result, most providers have gravitated towards wired solutions for video distribution. Twisted-pair, coax and power

line wiring can provide both consistent and extended coverage to all conceivable areas of a residence, and at the preferred throughput of up to 100Mbps.

Wireless solutions, however, will not necessarily have a diminished role in the evolving digital home. In fact, most providers believe that whole-home networks inherently call for a hybrid approach, where the home network includes both wired and wireless components, and in which several home networking standards coexist.

The market for next-generation home networking infrastructure is clearly diverse, and it accommodates scenarios of new home construction, with associated new wiring, as well as established residences where networking solutions preferably require no new wires. There are also some regional differences within

these two scenarios. As an example, in the U.S., “structured wiring systems” that incorporate both category 5 UTP and quad-shield coaxial cabling have become commonplace in single-family home construction. This is not the case in most other parts of the world.

Most broadband service providers are either currently utilizing or evaluating one or more of the following home networking backbone international standard technologies:

- Ethernet multimedia home networking (Category-5/6 Ethernet cabling)
- Coax-based multimedia networking (MoCA, HPNAv3)
- Phone line-based multimedia home networking (HPNAv3 twisted-pair option)
- Power line-based multimedia home networking (HomePlug AV)

- Wireless multimedia home networking (WiFi 802.11n and MIMO)

According to market research firm Parks Associates, the realm of home networking is moving toward hybrid solutions—where multiple standards are embraced—for two important reasons. First, service providers and consumer electronics manufacturers hope that hybrids will deliver more reliability for high-bandwidth services. Second, hybrid networks offer consumers greater flexibility to enhance their multimedia entertainment applications.

Spencer Behroozi, director of product management for Actiontec Electronics, believes that a single home networking device which incorporates multiple standards is the answer. “Integration of all of these connectivity

IPTV GLOSSARY

CA **Conditional access:** System of encryption and decryption management in which a broadcaster can control a subscriber’s access to content and services.

DRM **Digital rights management:** The protection of intellectual property rights of digital content. Technology is often used to identify digital rights, describe rules for using digital content and enforce those rules.

DVB **Digital video broadcasting:** Harmonized digital TV that covers all media (satellite, cable and terrestrial) and supports Internet services with transfer rates potentially reaching 6Mbps.

Head-end The physical point in the network where all broadband services are aggregated for transmission to the subscriber.

IPTV **Internet protocol television:** The method of delivering pictures, sound and media content on demand over an IP network.

Middleware The command-and-control center of the interactive TV environment which defines and manages the overall TV environment, and subscriber experience.

MPEG-2 The standard for “generic coding of moving pictures and associated audio information.” A variant of the MPEG-1 video and audio compression algorithm and file format, it

uses a bandwidth range of between 4 and 9 Mb/s, so is optimized for broadcast quality video. Digital television set-top boxes and DVDs use MPEG-2.

MPEG-4 The standard that provides technological elements enabling the integration of production, distribution and content access for digital TV, interactive graphics applications and interactive multimedia. MPEG-4 is used for streaming media on the web, CD distribution, videophone and broadcast television.

Multicast The ability of one network node to send identical data to a number of endpoints. Also known as a broadcast.

PPV **Pay-per-view:** A television broadcast that a subscriber can watch at a designated time for a specified cost, instead of subscribing to a whole channel on a full-time basis. Sometimes called Pay TV, PPV is different from video on demand, which allows viewers to choose when to watch a program or access content.

PVR **Personal video recorder:** An interactive TV recording device like the familiar VCR, except that a PVR content on its hard drive using a compressed digital format like MPEG-2. A PVR is also referred to as a digital video recorder (DVR), a personal TV receiver (PTR), a personal video station (PVS), and hard disk recorder (HDR).

standards and technologies into one device will ultimately make the consumer experience better,” says Behroozi. “We’ve already integrated MoCA into our gateway. HPNA is on our roadmap, and we’re considering HomePlug as a possibility.”

According to market research firm Heavy Reading, although reducing service providers’ operating expense is a major objective for next-generation multimedia whole-home networking solutions, the reality of provisioning and managing multiple technologies, even if they are in a single device, may amount to more complexity and more money. For example, the installer benchmark for a multi-service order stubbornly rests at about four hours, or one complex IPTV installation per day. The differing installation models

and security requirements for existing and emerging home networking technologies can leave consumers and even some technicians confused, reducing service provider profits even further.

Andy Melder, senior vice president of strategic business development for Intellon Corporation, believes, “The ultimate solution, for both the consumer and the service provider, is when the whole-home network interface is directly integrated into all appropriate consumer electronics devices—in the same way that Wi-Fi has become a de facto standard in laptop computers.”

Ultimately, consumers are less interested in the multitude of wired and wireless technologies that form the in-home pipe than they are in the services that run over them. And service

providers must find a way to provide a consistent, service-centric user experience that doesn’t require consumers to become technical experts. Hybrid home networking models are not going away, but four-hour IPTV installations must become a thing of the past if service providers are going to realize any profits. Successful providers will find a way to abstract the complexity of home networking technologies so that consumers have zero visibility into the number of interconnections and dependencies that allow IP-based media to seamlessly move from room to room. [26](#)

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<p>NPVR</p>	<p>Network personal video recording: A consumer service/application that captures broadcast television on a network server, allowing the consumer to access recorded programs on their schedule rather than the original broadcast schedule. The content is held on the network server, rather than on a set-top box hard drive on a customer’s premises as with a PVR. Viewers have all the usual features of PVRs or VCRs.</p>	<p>STB</p>	<p>Set-top box: An electronic device that traditionally sat on top of a TV set. With IPTV, the STB is actually a computer that connects a TV to an incoming signal, decoding the signal and allowing it to be viewed on the TV. Depending on the capabilities of the service offering and the type of STB, the incoming signal can deliver Internet content, e-mail, video on demand, broadcast TV, and a variety of other services.</p>
<p>QoS</p>	<p>Quality of service: Refers to giving certain IP traffic a higher priority than other IP traffic. As IPTV services operate in conjunction with other services offered by the service provider, TV signals are given the highest priority—with the exception of operator-offered voice-over-IP (VoIP) service.</p>	<p>Time-shifting</p>	<p>Usually refers to the ability to pause real-time broadcast TV at a certain point and then resume from that point at a later time. Time-shifting requires the use of a recording device (such as a PVR or DVR).</p>
<p>RTP</p>	<p>Real-time transport protocol: A data transfer protocol defined to deliver live media to one or more clients at the same time. It requires an RTP server to capture, compress, packetize, and transmit the data over a network in real time.</p>	<p>Unicast</p>	<p>Network communication that takes place over a network between a single sender and a single receiver.</p>
<p>RTSP</p>	<p>Real-time streaming protocol: The standard used to transmit stored media to one or more clients at the same time. Provides client controls for random access to the content stream. RTSP uses RTP as the transport protocol and requires an RTSP server.</p>	<p>Video multiplexing</p>	<p>The combination of two or more separate video data streams into a single file. (e.g. audio, video, subtitles, etc.) De-multiplexing is the act of splitting them apart.</p>
		<p>VoD</p>	<p>Video-on-demand: A service that allows a subscriber to choose a certain piece of content (such as a movie or program) and have that content begin immediately. VoD is different from PPV in that PPV is an event that happens at a pre-determined time.</p>

Sources: Alcatel, Newton’s Telecom Dictionary, IPTV News & Wikipedia