

# NETWORKING

## Designing Virtual LANs to Bridge Networks

Avoid bandwidth traffic jams while streaming high-def video over a home's computer network by using VLANs. **BY VICTOR PAK**

A MAJOR TREND in the custom integration channel has been the evolution of audio, video, and home controls using an IP-based network infrastructure. The popularity and affordability of IP networking has driven CE pros to use this technology more.

However, a major problem has evolved concerning sharing IP-based computer networks with A/V and home control networks: These devices send out a lot of broadcasts that can clog up bandwidth and hinder performance for all devices on the network.

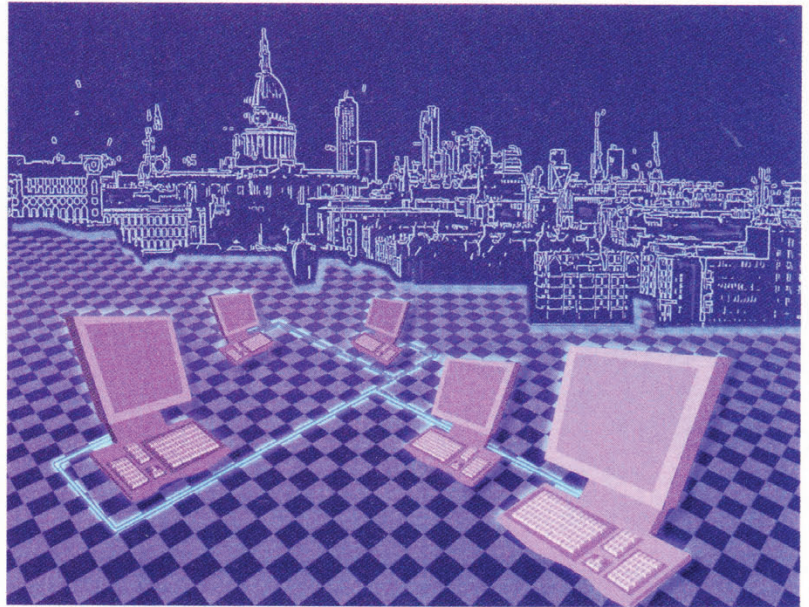
In the past, with only personal computers on the network, insufficient bandwidth didn't necessarily impact the computing experience. The user's satisfaction was not changed if he received a file in 30 seconds or 35 seconds. Unlike computer data networks that can tolerate a certain degree of unpredictable latency, video streaming, audio streaming and control systems cannot. The packets that carry audio and video must arrive on time and in order, and IP-based controls cannot lose critical command packets.

Today's sophisticated home networks require the same robustness as an enterprise network in order to have a positive user experience.

### Network Infrastructure Technology Archaic

Audio and video devices have advanced and are now on the computer network, while IP-based network infrastructure gear (routers, switches, wireless access points) remains the same in features and functionality as if there were only computers on the network.

The routers and switches sold today for the residential and commercial market have the same basic "intended use" limitations as devices sold 10 years ago. The standard, by and large, still assumes that a given network



will only be used for basic computing such as file sharing and Internet access.

This archaic standard also assumes that there is very little broadcast packet traffic — after all, it's only "for the home," right?

One problem is that IP-based A/V streaming and home control devices send out numerous broadcasts to stay in sync. Let's say that all of your devices are connected in a single Local Area Network (LAN) with a switch. Switches — Layer 2 devices — are designed to forward all broadcasts, but that's not always a good thing.

A switch in a typical home might have anywhere from 12 ports to 100-plus with all the devices using the network. By default, all hosts connected to that switch are going to be in the same broadcast domain. Remember, everything is connected in a single LAN.

Let's say there are 100 ports on a network. If

*Continued on page 38*

**Bandwidth over a home network can get pretty clogged these days. VLANs will help you optimize network traffic flow for clients.**



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Continued from page 36

one host connected to that switch sends a broadcast, then, by default, all of the other 99 hosts are going to receive that broadcast. These unnecessary broadcasts will soak up the network's available bandwidth. But it gets worse. For some network services and protocols used today, a broadcast received by a host results in that receiver transmitting a broadcast of its own.

When all of the hosts receive that second broadcast, they respond by transmitting more broadcasts. In moments, these have swelled into a broadcast storm, which can take up a major part of a network's bandwidth. And people are trying to stream video — even 1080p — over this network?

## VLANs Are Breakout Chat Rooms

Just like at my class reunion, home networks need “breakout rooms” or Virtual LANs (VLANs). Essentially, VLANs are segmentations of the entire LAN into services that address issues around broadcast filtering, security and traffic flow management. Otherwise there's potential for trouble.

At the most basic level, a VLAN is nothing more than a broadcast domain. Devices that perform critical communica-

tions must be grouped together, such as:

- Devices that use VoIP
- Devices that stream audio and video from a central server
- Devices that provide home automation

Each of these categories needs to be in its own breakout room where they can perform their critical tasks without being affected by devices they don't communicate with.

The installer's job is to logically construct VLANs to separate out VoIP, audio/video streaming, home controls and computing into broadcast domains. Broadcasts won't be forwarded or “propagated” between VLANs, and a broadcast sent by one host in a VLAN will be forwarded only to other hosts in that same VLAN. By default, there will be no inter-VLAN traffic on the switch.

But what if a computer needs to communicate with a video server? For traffic to go between VLANs, a Layer 3 device or a router with VLAN-aware capabilities, needs to be added. Think of the VLAN-aware router as a dedicated messenger between the smaller breakout rooms. This messenger will only pass necessary communications between the segmented VLANs if necessary.

To finalize this new type of IP-based

network, each newly created VLAN, when accessing shared resources such as the Internet, cannot have equal priority with the others. The VLANs containing devices with digital media assets such as audio, video, camera and voice must be given priority. Remember, a computer downloading a file in 30 seconds or 35 seconds does not affect the user experience, whereas a lost or delayed video packet can completely ruin a new box office thriller.

Designing and implementing a VLAN-with-priority network allows integrators to break up a large, loud network into smaller, separated groups that can communicate effectively while each is still connected to the main LAN. Too bad we didn't have a VLAN-priority structure at my reunion. ■

*Victor Pak is president and co-founder of Pakedge Device & Software.*

## In Brief

### 40% Missing Broadband

Forty percent of Americans still do not have broadband at home, according to the Department of Commerce. The data is prompting the Commerce and Agriculture departments to push \$7.2 billion in federal stimulus funding to communities for broadband expansion. The money has not yet been distributed because the government is waiting for a broadband distribution plan from the FCC in the coming months.

### Wireless 1080p Extension

The now-shipping GefenTV Wireless for HDMI 60Ghz uses multi-antenna technology from SIBEAM that enables HDMI extension supporting full HD resolutions at 1080p. It's the first wireless solution from Gefen that is uncompressed at the 3Ghz bandwidth, making it well suited for in-room applications like gaming, and it provides one-to-one signal transmission of HDMI up to 30 feet.

## Walmart Wraps Up Vudu

The retail giant, which is one of the world's largest DVD sellers but has tried and failed with digital video delivery before, joined the fray again by purchasing Vudu in February.

The acquisition of Vudu, founded in 2007 and based in Santa Clara, Calif., would put Walmart in direct competition with Netflix, Amazon and Apple's iTunes for digital movie dominance. And it instantly puts Walmart at a great advantage in this streaming category, as Vudu features 16,000 on-demand titles to rent or purchase, including a vast amount in 1080p compared with its competitors.

Rumors began swirling about Vudu's demise in 2008 after the developer of IP-based video on demand went through layoffs and CEO Mark Jung left.

In 2009, Vudu stopped making hardware



and began offering its service through Vudu Apps direct to broadband TVs or Blu-ray devices from LG Electronics, Mitsubishi, Samsung, Sanyo, Sharp, Toshiba and Vizio. The Vudu service integrates apps such as Pandora, Facebook, Flickr, Twitter, The New York Times and The Associated Press.

Walmart has been unsuccessful in past attempts to compete in the digital media world. The company introduced a music download service in 2004 that has been overshadowed by iTunes, and it experimented with an online video download service with Hewlett Packard, canceling the service less than one year after it launched. —*Steve Crowe*