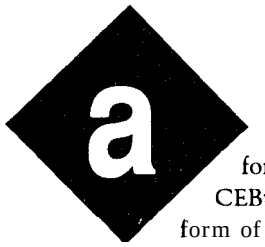
CEBus Goes Coax

Also Visit the Home of the Future

More and more of the CEBus specification is being accepted as an interim standard. Find out the latest on the CEBus front. Also check out another automated home on display.

DOMESTIC AUTOMATION

Ken Davidson



Anyone looking for my regular CEBus update in the form of a full-length feature article is going to be disappointed this time around. It's really nothing to be disappointed about, though. There just isn't as much news to tell you about as there's been in the past. That doesn't mean no work is being done on the CEBus standard; it simply means most of the work is done. Now the waiting begins.

The CEBus specification is being developed and released in stages. It has been broken up into sections including CAL and the upper network layers, each of the physical media, and a number of key pieces such as routers, brouters, and Node 0. [If anything I mention here is at all unclear, I refer you to my previous CEBus articles found in issues #10, #15, and #21 of Circuit Cellar *INK* for more details.)

Once the CEBus core committee has hammered out its best effort on any given piece, it is sent out to the entire membership (and anyone who requests and is willing to pay a copy) for comment. At the end of the comment period, which usually lasts a few months, all suggestions and negative comments are collected and responses are prepared by the committee. All negative comments must be addressed, even if it is to reject them. Any changes the core committee deems worthwhile are submitted to the membership for comment again to make sure nobody has a problem with what was supposedly fixed.

When everybody is happy with the proposed standard, the committee submits it to EIA as an interim standard. This standard is the first time the specifications are fixed enough for someone to design a product. It will remain in place for several years while people produce new designs. Assuming no major problems are discovered with it during that period, the specification finally becomes a real standard.

Right now, most portions of the spec are somewhere between the initial comment phase and acceptance as interim standards. Some have already been dubbed interim standards, while others are having last-minute details worked out before being released for initial comment. Table 1 gives a brief summary of where each of the major portions was as of this past December.

COAX COMES ALONG

One specification that is new since my last article is coax (CXBus). As you can see from the table, the comment period for CXBus ended December 31, so the committee should be up to its ears in comments as you read this.

CXBus is complicated. With the limited space I have back here, I'm going to necessarily simplify the details. My intention is to give you a flavor for how CXBus functions, perhaps only enough to allow you to envision how your house might be wired and how devices interact with each other. For complete specifications, I refer you to EIA where you may obtain a copy of the proposed spec.

CXBus uses a series of RG-6 coax cable pair branches that originate at Node 0. Each branch goes to a different area of the house and terminates in a four-way splitter. Each of the splitter outputs goes to a pair of jacks within the area serviced by the branch. Presumably, one branch would go to, say, the area composed of living room, dining room, and kitchen while another branch would go to, say, the bedrooms. Total cable length between Node 0 and any final tap may not exceed 150 feet.

One of the cables in each pair handles external video while the other handles internal video. External video is anything that originates outside the house such as CATV or an antenna. Internal video is anything generated

in-house such as VCR output, cameras, or computer displays. The internal cable also carries the CEBus control channel.

Older devices that aren't CEBus compatible need only attach to the external cable to receive signals like they always have. CEBus-compatible devices must attach to the internal cable to reach the control channel, and may also connect to the external cable for access to outside sources.

Figure 1 shows the frequency assignment on each of the cables.

The CEBus control channel spans 4-6 MHz on the internal cable. The signal is an amplitude-modulated RF carrier. CEBus devices transmit control signals on 4.5 MHz and receive signals that are retransmitted by Node 0 on 5.5 MHz.

CXBus uses the same superior/inferior signaling scheme for the control channel as the other media. The presence of the carrier denotes a superior state while the absence denotes an inferior state. The four CEBus symbols are represented by one of the two states being asserted for multiples of the Unit Symbol Time (UST). A "one" bit lasts one UST, a "zero" bit lasts two USTs, an "end-of-frame" lasts three USTs, and an "end-of-packet" lasts four USTs. A single UST lasts 100 µs, giving a top speed of 10,000 "one" bits per second.

The frequency band from 54 MHz to 150 MHz on the internal cable is reserved for CEBus devices to transmit data. Within that space, 64 channels, each 1.5MHz wide, are defined. When a device needs more bandwidth, adjacent channels may be requested in groups of 2, 4, 8, 16, or 32 and are combined into a single block. The data is received by Node 0 and is retransmitted on either a low band on the external cable (324–420 MHz) or a high band on either the external or the internal cable (450-546 MHz).

That covers the basics. The complete spec is about forty pages long, so I certainly can't do it justice in only a few paragraphs.

IRBus	Approved as part of interim standard in October, 1990.
TPBus	Approved as part of interim standard in December, 1990.
PLBus	Comments have been addressed. Several issues still need to be resolved.
CXBus	Initial comment period ended December 31, 1991.
RFBus	Several system alternatives are being reviewed by the committee. Final selection should be made by the time you read this.
CAL	Comments to changes are being addressed by the committee.
Router	Approved as part of interim standard.
Node **0**	To have been released for comment in December, 1991.

Table 1—*As* of December, 1991, *the* major *portions of the* CEBus *spec* were *in* various *states of acceptance.*

IN THE PUBLIC EYE

If you've read my article in this issue about the Bright Home, you already know that I feel public education is a big part of what will make or break home automation's acceptance by the masses. I recently came across another example of exposing the public to what can be done now to automate a home with off-the-shelf devices.

Most anyone who watches PBS knows about "This Old House." A similar show that started appearing on PBS a few years ago is called "Home-

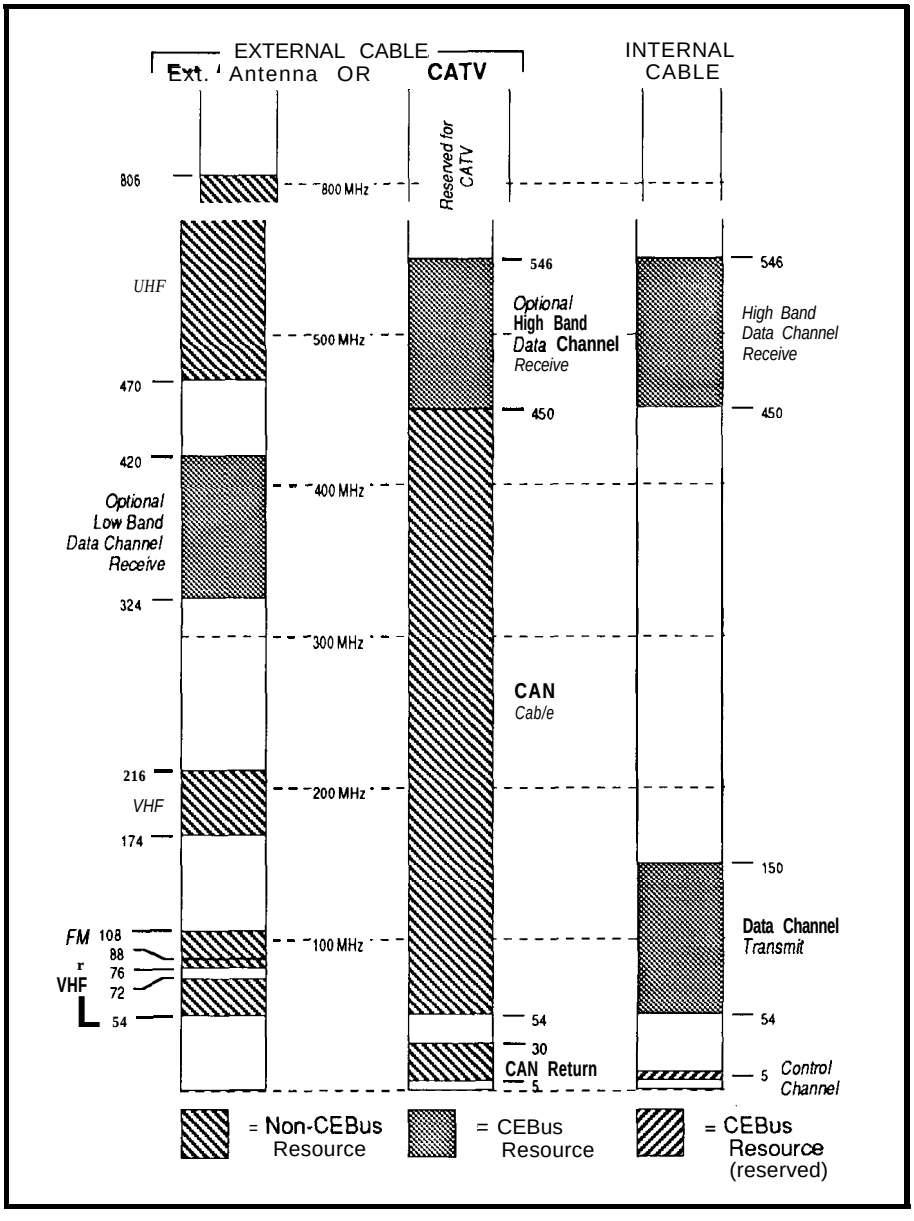


Figure 1—*CXBus* uses hvo *cables,* one for external *sources* and one for *internal* sources

time." This show is hosted by a cheery man and woman duo who make everything look like it can be done on your first try in a matter of minutes, even if it's erecting a two-story log cabin. The projects tackled by "Hometime" don't always center around renovating older houses. They often do all new construction, and sometimes they try to explore the unconventional. For example, they really did build the log cabin I mentioned above.

"Hometime's" latest project is the home of the future. More specifically, what a house might be like 20 or 30 years from now. The entire project is fascinating, even though the home automation system is only a small part of overall scheme. They cover everything from the architecture to the structure to the appliances to the landscaping.

The home automation scheme was designed by Mike Cogbill, who was instrumental in putting together the "The Installer's Guide to CEBus Home Automation" I discussed in the last issue, and Tricia Parks, who wrote the introduction to this issue's Building Automation feature section. The system they used is produced by AMX (Dallas, TX) and was originally designed to automate the boardrooms of large companies. AMX has been seeing a growing application of their system in high-end homes as a complete automation solution.

The home of the future is located in Minnesota and was part of a local "gallery of homes" tour where thousands of people toured the home during a several-day period.

The series aired in five half-hour segments starting last November, resulting in thousands more people being exposed to the ideas behind home automation. You might be lucky enough to find it locally in reruns, or you can buy a complete video from "Hometime" that contains all five segments plus additional material. At $9.99 plus $2.50 S&H, it can't be beat. Also keep an eye out for the April '92 issue of *Better Homes and Gardens* where there will be an extensive write-up about the home. ❑

Thanks to Tom Mock and George Hanover at EIA for their continued CEBus information flow, to Azt Chace of AMX for first alerting me to the Home of the Future series, and to Mike Cogbill for his very helpful last-minute details.

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IRS

428 Very Useful
429 Moderately Useful
430 Not Useful