



Industry Affairs UPDATE

Report on Voice Over Internet Protocol (VoIP): An update for alarm companies/systems integrators on VoIP, considerations and preparation for current and new security installations.

On March 3, 2005, a meeting was held in Denver, CO between alarm industry representatives and many of the major cable service providers to discuss the problems of alarm transmission connections over VoIP telephone service, and some potential solutions for this growing concern.

Representing the alarm industry at this meeting were individuals from NBFAA, SIA, and CSAA along with panel manufacturers such as Honeywell, Bosch, Telular, and DSC. ADT, Guardian, and Vector Security represented installation companies. Cable company attendees included representatives from Cox, Charter, Time Warner and many others. The NBFAA was represented at the meeting by Executive Director Merlin Guilbeau and Dave Engebretson, NTS Instructor and SDM Technology Editor.

The meeting was held at the offices of Cablelabs, a cable-industry backed testing laboratory, which develops protocols and specifications for cable equipment and service deployments.

There are two basic types of VoIP services: 'Facilities based' which is provided by the cable industry. In this scenario the cable providers send your voice data through their privately owned internet data highways. With 'Non-facilities based' service (which is what 'all other' VoIP providers – like Vonage and AT&T offer) your voice data travels via the 'common internet' highways along with everything else. (Ford Motor Company recently purchased more than 40,000 VoIP telephone instruments and related equipment for their facilities in Michigan. The vendor was SBC.) It should be noted that "next generation" telephone phone company offerings will be "facilitated."

There have been many reports of problems connecting digital alarm communicators to VoIP services. Some of these problems include the difficulty or inability of particular alarm transmission formats to pass through the VoIP network, wiring issues involving the electrical connection of the RJ-31X jack, and backup power issues.

VoIP deployment is a growing problem for our industry and is an important concern for every alarm company that has digitally monitored accounts.

This report includes information discussed at the meeting and provides some guidance and recommendation on how your company can accommodate the integration of VoIP into your current and future installations.

Thank you for your continued support and participation in the NBFAA programs that make a difference for our industry and for the communities we serve.

NBFAA Industry Affairs Committee



What is VoIP?

Voice Over Internet Protocol (VoIP) is a technology that converts analog telephone calls into digital packets, which are transported over the Internet or a privately owned and managed network to the destination, where the packets are reconverted into an analog stream.

VoIP Deployment by Cable Service Providers

The cable companies want to take the residential and light commercial telephone business, and its recurring revenues, from the old-school telephone companies such as Verizon and SBC. During a presentation by Time Warner, the following information was provided:

2 Million Projected Cable VoIP customers by the end of 2005

8 Million Projected Cable VoIP customers by the end of 2008

Cable service providers are building out their hybrid fiber coax (HFC) networks, installing fiber optic links to neighborhood nodes that can service up to 300 homes or businesses. This network build out will allow cable companies to provide high speed Internet, cable television, and telephone service as a bundled package for consumers.

Cable providers are aggressively marketing these services. For example, the cable service provider on Long Island was/is giving new VoIP telephone users one year of FREE telephone services.

PacketCable Specifications and Network

Through their testing and specifications organization, CableLabs, the cable industry has established a network plan and protocol called "PacketCable." This specification calls for what is termed a "facilitated" VoIP network, where voice message packets are given high priority, and are transmitted over cable service provider owned and operated network equipment and fiber connections. Many regional cable companies have established partnerships with cable companies outside their service area, so that long-distance VoIP packets can be transmitted from one cable company's network to another without traveling through the "common" Internet. PacketCable also establishes the compression protocols to be used by those members who choose to conform to the PacketCable specification. Currently the compression standard digitizes voice calls at 64 kbps, which is equal to the throughput the traditional telephone companies have used for years. Currently, the traditional telephone companies use the same Standard, ITU-T G.711, to digitize voice traffic from the Central Office (CO) onto their trunk lines. The current PacketCable specification is designated as PacketCable version 1.5.

One important point to remember is that although they may be members and owners of CableLabs, individual cable service providers will deploy VoIP as they choose. They are not necessarily bound to conform to the PacketCable specifications. This means that any problems for the alarm industry in connecting to VoIP services may be specific to a particular region and/or cable service provider marketing area.

Areas of Concerns With VoIP

There are five primary areas of concern for alarm company digital communication equipment when connected to VoIP services.

1. Existing Alarm Systems - Connections

The VoIP Multimedia Terminal Adapter (MTA), which enables a conventional telephone to be connected to a VoIP line, must have its telephone line output properly wired to the RJ-31X jack to provide for line seizure. A common practice in VoIP installations is called "backfeeding," where the telephone line output of the MTA (or in the case of a non-facilities based VoIP service, the Analog Terminal Adapter=ATA), is plugged into an existing RJ-11 phone jack in the home, which provides telephone service to all RJ-11s that are wired in parallel to the one that's connected to the VoIP box.

If this is done, an existing alarm communicator will be electrically placed on the "wrong" side of the telephone communications, defeating line seizure and also disconnecting the wrong side of the telephone cabling in the event of an attempted alarm signal transmission, so the alarm panel cannot communicate.

Time Warner made a presentation showing the information they

provide to their installers on the proper way to wire the VoIP service into a premise with an existing alarm communicator/panel. Their wiring concept is correct. The question is whether other cable VoIP providers will follow their lead, and whether individual cable installers will properly perform such connections.

2. Battery Backup of MTA/ATA cable VoIP devices

POTS (Plain Old Telephone Service) phone lines provided by traditional telephone companies have backup voltage supplied by central offices. The PacketCable specifications call for cable VoIP providers to have backup power for their network transport equipment. Those cable companies in attendance said that they install MTAs with various capacities of back up batteries, to provide telephone service in the event of a local power outage. Backup times of 4 to 8 hours were mentioned. These backup batteries can be actively monitored by the cable network, which is called for in PacketCable 1.5 recommendations.

This backup battery issue may spell problems for alarm systems that are designed to meet certain UL-NFPA standards for the length of time that a particular system can provide battery backup for alarm transmissions.

3. On-hook and Dial-tone issues

In the event of an outage in a cable company's VoIP network, the MTA may continue to provide the same on-hook voltage and off-hook dial tone that it would if the network was fully functional. In this scenario, an alarm communicator would sense the presence of a "phone" line, and would "hear" dial-tone when it tried to send an alarm communication that will fail.

This presents a particularly unattractive scenario when one considers the possibility of a line cut attack by a burglar.

Alarm industry attendees expressed great concern about this issue. CableLabs and the cable companies present indicated they would try to establish a recommendation that MTAs cease to provide on-hook voltage and dial-tone if the VoIP communications from the network have failed. The issue of how long the VoIP interruption lasted before this feature would be activated was discussed as well.

4. Device and Network Updates and Potential Outages

Routine maintenance, software upgrades, and other issues can and will cause cable companies' VoIP networks to be "out of service" for short periods of time, perhaps as long as a few minutes. Such outages could affect a single subscriber, a number of subscribers connected to a neighborhood node, or a larger portion of the cable provider's VoIP network. Scheduled updates are usually performed during the hours of 2 a.m. and 5 a.m., according to some of the cable people present at the meeting. Without network functionality, connected alarm systems will be unable to communicate during these outages.

Extraordinary problems and disasters can befall a cable company's VoIP network, just as they can affect traditional POTS service. As the cable providers are installing new types of equipment, their networks should be more quickly restored to service in the event of a major disaster, such as a damaging fire in a cable company's network facility. "Softswitch" technology will allow cable companies to quickly switch communication paths around a problem, according to one of the cable representatives at the meeting.

Cable VoIP telephone services, once implemented and tested, should be equal or superior to traditional Telco services in terms of the frequency and severity of outages.

5. Alarm Communicator format issues

Simply put, even if an alarm communicator is properly wired to a VoIP telephone service, it may or may not be able to transmit alarm signals over VoIP/PacketCable.

VoIP technologies are designed for voice service. Vocal sounds are sampled and digitized, put into packets, shipped over the network, reconverted to analog, and delivered.

The alarm industry has found and reported a wide variety of problems with the transmission of alarm signal formats over VoIP. As different VoIP suppliers may use one of several compression codec options, an alarm format, for example SIA, may work well when connected to one vendor's VoIP service, but not to another.



The PacketCable specification provides for the communication of DTMF (touch-tone) pulses through a protocol termed "DTMF Relay." Rather than sample the DTMF tones and digitizing them, DTMF Relay sends a special type of packet across the network, indicating that, for example, the "3" key on the telephone was pressed for 1.37 seconds. This standard was developed to allow the remote use of voice mail systems from a VoIP telephone connection. This is some good news for the alarm industry, as some communicators dial using DTMF, and some formats use those tones to transmit alarm messages.

VoIP Issues for Alarm Companies

There are some grave issues for the alarm industry when addressing format issues.

First, VoIP doesn't support pulse dialing — any communicator using pulse will have to be reprogrammed to DTMF dialing to reach the central station.

Another major issue is that of the compression codec being used by the cable companies and non-cable VoIP vendors as well. The codec called for in the PacketCable specification G.711, a 64 kbps compression algorithm. This codec actually provides no compression, and can be thought of as the digitizing of the analog voice or tones without much loss or distortion. However, the PacketCable specification also provides for other compression codecs that provide substantial compression of the digitized analog tones. Some VoIP systems function with data streams that are compressed down to as little as 5.3 to 8 kbps (ITU-T G.729A).

Although the cable vendors at the meeting said they intend to use the G.711 codec, it is very likely that as their numbers of customers increase, and the load on their networks expands, cable providers will switch to the highly compressed codecs to save bandwidth in their networks. Such changes would be performed by their network, most likely with no notification to the customers or their alarm companies.

What does this mean? It means that your company may find a format, for example the SIA Format, which works with your local cable company's VoIP service TODAY. Your company reprograms your panels connected to these VoIP services, and all is well. Then, one day, the cable company changes the codec it is using, and your panels can no longer talk to the central station.

At the meeting, the alarm industry was asked to provide to CableLabs a list of the most popular alarm transmission formats and panels and receivers for them to test for compatibility and functionality under the PacketCable recommendations. This is presently being worked on by SIA and the panel vendors.

As a side note, it has been reported that in some circumstances alarm panels connected to VoIP cannot be downloaded as is typically done with a POTS-connected panel.

Cable Industry Training

The NBF AA made a presentation at the meeting, and offered to work with the cable industry to develop educational programs that will teach cable companies and technicians how to install VoIP with minimal negative impact on an existing security system. (i.e. correctly wire a RJ31X jack and how to properly test a system at the time of installation.)

The Bottom Line

For the alarm industry, it is very important to remember that specific cable providers may or may not deploy their VoIP services as recommended in the PacketCable specification. Alarm communications over VoIP will be a regional issue — what works in Dallas may not work in Atlanta.

Some points to consider:

1. VoIP is here; learn to love it. Cable companies have the money and the technology to grab a sizable portion of the telephone business from the POTS telephone companies. The alarm industry can't stop this technological shift.

2. There are many technical issues involving the wiring, power backup, and communications formats that will prove challenging to NBF AA members' operations. Alarm industry technicians must be trained to understand how to connect to VoIP boxes, proper wiring for RJ-

31X jacks, and what formats are usable for which VoIP networks.

3. Industry standards for transmission paths and power issues may be addressed soon by UL and the NFPA. Their decisions regarding these issues may require wholesale changes by alarm companies to meet these possible new standards for connecting traditional alarm communicators to VoIP networks.

4. VoIP is being provided by a number of vendor types, including cable companies, Vonage and AT&T, as well as traditional phone companies. Although our industry is actively working with CableLabs and the cable providers to achieve some common communication standards, other VoIP providers can and will use different marketing and communication methods. Consumers can choose the VoIP supplier of their choice, and might change VoIP carriers in the future to achieve cost savings on their telephone bills.

5. VoIP Service Changes — VoIP providers can and will change the technology they're using for telephone services in the future. Any alarm system whose primary signal transmission method involves connection to a VoIP service will properly function only at the whim of the VoIP carrier. What works today may well not work tomorrow.

6. VoIP in the Backhaul — Another development that is of great concern to our industry is the use by the traditional telcos of VoIP "segments" to carry voice traffic from state to state. Telcos are increasingly using VoIP technology to digitize long-distance POTS traffic, as it is cheaper to push such calls over VoIP than over the telephone company's own network. This means that the problems that alarm systems can experience when trying to pass their alarm signal format through a cable company's MTA can also spring up when the customer's panel is connected to a POTS line, but the central station is far away or over a state line.

7. POTS is going away — VoIP in some form will become the primary method of making telephone calls within the next 10 years, for a vast majority of your clients. Already, VoIP has made sizeable inroads in enterprise-level telecommunications. Can small businesses and homeowners be far behind? Alarm companies need to seriously consider this, and understand that our industry's dependence on inexpensive built-in "digital" communicators, attached to POTS telephone lines, is a monitoring method that will soon GO AWAY. Informed alarm companies should be planning to sell and implement alternative alarm transmission methods such as IP, cellular, or radio.

What Can Installing Companies Do?

Take a proactive approach to position your company and prepare for this shift in technology:

1. *Inform Existing Monitored Subscribers:* The NBF AA has produced a sample letter that you can use to inform your subscribers of some of these issues. It is available at: www.alarm.org. A letter of this type should be sent to all subscribers.

2. *Test Messaging:* Program all existing and new accounts so that their panel will send periodic test messages. If a subscriber goes off the air, at least you'll be notified.

3. *Meet with your cable provider:* Either individually or as a representative of your local alarm association, make a meeting with any regional cable service providers that are pushing VoIP (as an aside, be aware that, although the telephone service that cable companies provide is usually VoIP technology, they may not call it that in their marketing materials). Meet with their installation managers, and discuss the issues included in this memo. Arrange a training class for their installers, to show them the proper way to wire their devices onto the RJ-31X.

4. *Test your formats:* Purchase the cable provider's VoIP service for your house, and run tests with your commonly used brand of alarm control panels. See which formats work, and which don't. If a working format is found, reprogram all residential panels to the working format.

5. *Sell alarm transmitters* that use IP or radio communications to new clients.

6. *Carefully monitor* the amount of missed or garbled communications that reach your central station. A flurry of "error" messages, particularly if they seem to originate from a specific geographic section of your service



territory, may well indicate that the local POTS TELCO has gone to VoIP in the backhaul.

Opportunities with VoIP

Alarm dealer/systems integrators can use this technological shift from POTS to VoIP as a new marketing opportunity to transform their business to include VoIP service, home networking, remote video over IP, as well as the traditional alarm business. Here are some ideas:

1. *Alarm company installed VoIP:* Installation of non-cable company supplied VoIP is easy and quick, provided your installers know how to do it and the customer has a broadband connection (DSL or cable modem). Reports from those who have installed both AT&T and Vonage services in multiple locations, are that it is "fast and easy." There are multiple benefits to installing the VoIP services for alarm companies:

- a. Proper wiring of the RJ-31X jack by the alarm technician
- b. Thorough testing of the client's alarm communications
- c. A small payment from the VoIP supplier for hooking up a new customer
- d. A very happy client. You hooked up a telephone line on which they can make unlimited USA telephone calls for \$25 a month (current Vonage program).
- e. Alarm clients with broadband connections are perfect candidates to be sold IP cameras and/or video servers to allow remote viewing of video from their home or office.

2. *Non-telco alarm transmission methods:* The vulnerabilities of the POTS (or now VoIP) connected digital communicator have been common knowledge within our industry for years. Line cut is easy to accomplish, and other methods are available to compromise or stop a "digital communicator" from reaching the central station with its messages. This VoIP-led upheaval in the telephony world should inspire alarm installing

companies to inform their clients about the possibilities of phone-line connected communications failures, and provide the new solutions of IP-based alarm communicators. All major vendors including GE, Napco, Honeywell, DMP, Bosch and DSC are producing IP alarm transmission cards for their products. SIA's Standards Program has initiated a standard to address TCP/IP communications as well. Now is the time for alarm dealer/systems integrators and their central stations to equip and train themselves to provide this type of monitoring option along with cellular and radio systems.

3. *Alarm industry personnel training:* To be successful with programs such as those described in items #1 and #2 above, life safety and security integrator company salespeople and technicians will need specific training on IP networking and VoIP. Such training is available from the NBFAA's "Security Networking Institute," a two-day course which is being presented around the USA, sponsored in conjunction with your state or local alarm association. Future classes in VoIP installation and IP alarm transmitters are being planned.

The Future

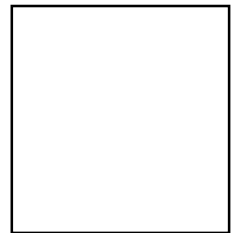
VoIP can be seen as either a grave danger, or a tremendous opportunity for our industry. Alarm dealer/systems integrators should be actively preparing their future business model for the VoIP world.

The NBFAA Industry Affairs Update is produced by the NBFAA Industry Affairs Committee as part of a series of briefings on issues, trends and information affecting electronic life safety, security and systems professionals. Special thanks to committee member and VoIP Subject Matter Expert Dave Engebretson for authoring this report for the committee. For more information, visit www.alarm.org or contact the National Burglar & Fire Alarm Association at 310/385-1855.

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