OPERATIONAL CONSIDERATIONS ASSOCIATED WITH TWO WAY CABLE SYSTEMS

David L. Leininger
Donald J. Schiller

Las Colinas Association Irving, Texas

Las Colinas is a 6,500 acre land development served by a two-way cable system owned and operated by the Las Colinas Association. By virtue of being a multi-user land development consisting of residential, commercial and industrial facilities, it provides a unique opportunity for evaluating the full range of issues associated with the utilization of two-way capabilities. In particular, their experience indicates that there are four areas concerned that must be addressed by the cable operator: 1) plant and product reliability; 2) alarm signal receiving and processing procedures; 3) design and installation of proprietary systems; 4) special purpose local origination capabilities.

INTRODUCTION

The Las Colinas Association cable system currently comprises 12 miles of active plant. There are approximately 11 miles of plant under construction at this time. Installation of a triple trunk underground plant was begun in 1974 using .500 and .412 trunk and feeder cable, most installed in conduit. A combination of Tocom, Magnavox, and RCA amplifiers were utilized.

The three trunk cable system affords a wide variety of capabilities, many of which are being utilized at the present time. Cable "A" (45-300 MHZ) carries the downstream in television programming and polling signals for security and data systems. Cable "B" (5-110 MHZ) provides the upstream return signals for the security and data systems. Cable "C" possesses both upstream (5-108 MHZ) and down-stream (174-300 MHZ) capabilities. Currently "C" cable is utilized to bring entrance and exit gate video back from remote guardhouse locations to central communications control where it is viewed by on duty security officers and may be videotaped. Shortly an interface will be complete between a community college campus and LCA's system head end, thereby permitting live and taped broadcast to be offered over the system. LCA is currently participating with Tocom, Inc. and Dow Jones, Inc. in the demonstration of two-way data retrieval services over a cable. Six installations have been utilizing these services since the spring of 1979. Additional uses of the "C" cable under immediate consideration include: return of local and audio-video programming from remote locations (such as golf course fairways) and viewing of traffic control from various points within the Development.

PLANT RELIABILITY

Plant reliability has become a major factor in two-way cable systems because of the security and interactive data services offered over such systems. Loss of service due to system outages can directly cause a disruption in business service. In the case of alarm monitoring, failure to detect an emergency signal due to a system outage could result in considerable property loss due to theft and fire damage. For these reasons, it is our belief that the design of two-way cable plant must incorporate such features as redundant amplification, stand-by power, status monitoring and alternate path routing.

To minimize service disruptions, an overall program has been undertaken by the Las Colinas Association which incorporates a number of technical and operational considerations. The system has been redesigned and a physical upgrade begun to incorporate .750 cable for trunk runs, use of some of the existing trunk for feeder, and eventual replacement of all trunk amplifiers with Jerrold JV-300 equipment. Jerrold JV-300 amplifiers were selected for trunk amplification because of the redundant amplification and status monitoring features they provide. Stand-by battery power for all power supply locations, stand-by battery, an uninterruptable power supply and a

stand-by gas powered generator for the systems control center have been installed to reduce a vulnerability to power outages and brownouts.

Alternate path routing has been incorporated as a strategy in the LCA system. It attempts to provide a minimum of two feeds into major subdivisions of property within our cable plant. If the primary feed fails, either manual or automated switching to the second feed will permit the outage to be localized anad service restored to unaffected areas beyond that point as soon as possible.

PROPRIETARY INSTALLATIONS

Another aspect of two-way cable plant design that has to be reconsidered over cable relates to proprietary plant installations such as hotels, apartment complexes and office and industrial facilities. With the introduction of security service over cable, these establishments are much more attracted to the introduction of cable systems within their premises. This will open up for the cable operator an altogether new market for their services, but it simultaneously poses some significant plant design problems.

Perhaps the most important consideration to be addressed in facilitating proper design of proprietary installations and interfacing them into commercial cable plants is the development of a series of specifications which describe and pictorially illustrate what such installations should look like in highrise facilities. We have prepared a set of typical drawings which architects and engineers can utilize when attempting to incorporate a cable plant configuration inside a new facility. A "typical" tap illustration for each floor on a highrise facility is depicted in Figure 1.

We refer to the proprietary plant "typical" as a "Backbone System" for use in a proprietary installation. It consists of a line extender at the point of entry into the facility and the installation, on each floor, of a directional coupler mounted inside an 18x24x4 inch electrical box.

A critical factor in the design of a "Backbone System" is the fact that, except for hotel and apartment properties, the final utilization of the office space in a highrise facility is often unknown at the time that construction begins. As a consequence, it is necessary to design for an intensity of use based upon assumptions about overall use rather than actual plans. We have elected to install a directional coupler on each floor so that the installation of additional drops can be accomplished without disrupting service to other floors.

The introduction of a typical "Backbone System" configuration has greatly facilitated the orientation of architects, engineers and contractors. It has made two-way cable capabilities within proprietary installations far more likely of occuring in the majority of new facilities to be constructed in Las Colinas.

SECURITY OVER CABLE

Cable operators considering the introduction of security alarm monitoring services over the cable plant will find themselves confronted with a number of basic issues relating to the actual accomplishment of this objective. In general, cable operators will need to fully acquaint themselves with the signalling devices, transmissions modes and processing approaches that companies that are presently involved in alarm monitoring employ. Among the issues which the cable operator must consider are:

TYPICAL TAP CONFIGURATION

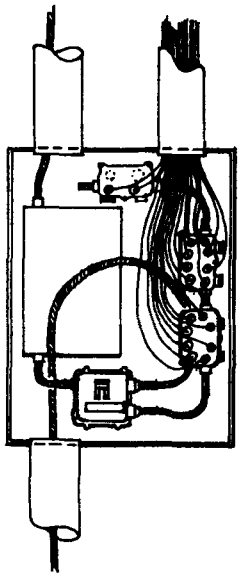

Figure 1

1) The determination of which entity or entities will receive, process and initiate appropriate response to alarm signals transmitted over cable;

2) The determination, if access tc cable channel space is provided to private security alarm companies, of the manner in which the communications interface will be accomplished between the cable operators head end facility and the private security company central station alarm monitoring facility;

3) The determination of which entity or entities will install the actual devices and alarm circuits inside protected business and residential properties and the manner in which licensing of these designated installers will be achieved;

4) The determination of which types of sensors, control equipment and basic alarm circuits may be utilized in an installation;

5) The determination of the extent to which the installation at the premise must incorporate features designed to increase overall reliability and to provide adequate notice to the occupant of system malfunction.

Access to the cable plant by private commercial security firms would greatly reduce the extent to which the other items will require in depth inquiry on the part of the operator. It is our considered opinion that the preferred method of operation would be one in which the cable operator provided access to the plant by one or several security companies and refrained from becoming directly involved in alarm monitoring, processing and emergency response.

Because of several unique circumstances, the Association elected to undertake centralized alarm monitoring itself. As a result of our early experience with the receipt of the alarm signals over cable, interfaced with an automated alarm monitoring system at the head end, we have become aware of the fact that alarm monitoring services incorporate a considerable number of procedures not immediately obvious to the cable operator. Without attempting to enumerate the many difficulties involved in the operation of a central alarm monitoring facility, sufficient to say that the automation of these procedures has proven to be very difficult.

Of the basic issues described above, the considerations associated with local premise equipment reliability and occupant notice would appear to be the most critical. It is in this area where a considerable amount of liability for personal injury can occur if equipment failure prevented an alarm message from being transmitted to the monitoring facility. It is essential that the occupant be able to readily ascertain if the alarm sensors and transmitting devices are operational and capable of transmitting such a signal.

The Las Colinas Association has elected to deal with this problem by the introduction of minimum specifications for a basic installation package in the home, apartment or business. Specifications are currently being drafted which will require that the local installation incorporate a standby battery and a timing circuit interface board which can sense when the local RF transmitter has failed or has otherwise lost communications with the receiver at the head end facility.

If system malfunction occurs, a change in status will be indicated by a red LED. If the malfunction continues beyond five minutes, a timing circuit will activate a local annunciation panel at the premise. In addition, we are going to stipulate that single family and business installations, must also incorporate a digital communicator which can transmit a signal via telephone line into a digital receiver at the head end. This approach provides an attractive, relatively low cost means to substantially improve overall reliability by providing alternative transmitting mechanism and a separate communications link with the head end.

We are presently completing the design of necessary interface boards to support these revised specifications. At this time, no such interface electronics are readily available, therefore necessitating the development of an altogether new, specialized application for our purposes.

VIDEOPHONE

The emphasis upon security services rather naturally led Las Colinas to the consideration of the introduction of access controls systems over the cable plant. One such type of system,

incorporating video monitors and audio intercom is currently undergoing development at Las Colinas.

The videophone, a one-way video, two-way audio communications devise, originated in Italy. The normal installation of this equipment is used to provide private visual and audio review of a visitor to an area. It has application in secure villages, residential apartments, commercial facilities and some limited use in single family dwelling units. Normally, videophone units are hard wired with six to eight conductor wires on a point to point basis.

The basic components of the videophone system specified for installation at Las Colinas in July, 1980 include: a camera unit, a control unit (CPU) and a monitoring unit. The camera unit incorporates two cameras of which one is mounted inside the guard facility and the other outside the guard facility. The CPU consists of the electronic processing hardware required to operate the camera units, a keyboard, monitor and handset. The monitor unit includes a video monitor screen, hand set and push button.

One of the prime features of the videophone system will be the protection of the privacy of the conversation between the guest and the resident. Only the party being contacted by the guard will have its monitoring unit activated and be able to see the visitor and hear the conversation. This will be accomplished through an encoding/decoding circuit in the videophone CPU unit.

The technical specifications of the RF videophones were designed for a two-way plant on a downstream frequency of 294 MHZ and an upstream of 30.75 MHZ. The levels run 20-40 dBmV downstream to 35-52 dBMV upstream. The video portion of the screen is currently on television European standard, however, the final units will meet American TV standards and will be UL listed.

The logic and control system provides: a decoding of the incoming signal from the control unit; receiving video and audio signals; transmitting of the audio signal and enabling the call from the resident to gate attendant; filtering of the incoming spurious frenquencies with suppresion of those over 40 DB; protection of reception of binary code signals from the CPU against interferences; automatic control of the signal level variation of the line amplifier; automatic turn off of the monitor when handset is returned to the holder; and quartz control of all frequency generated by the monitoring unit.

Future options on the videophone may include; operation from multi location guard gates, multiple monitor unit installations within a single residential or commercial unit, two-way video (guard would be able to see resident or information from resident's location) and color video presentation.

The discussion presented above clearly illustrates that a wide variety of applications are possible over a cable plant possessing two-way capabilities. Because the active utilization of two-way cable plant is so limited at the present time, the ability of a cable operator to introduce a variety of two-way services is seriously impeded by the lack of proven applications and firms competant in the installation of such applications. The success of early attempts by cable operators will therefore be a direct function of the ability of the cable operators resident technical staff to undertake a great deal of development effort in house. It is unlikely, therefore, that widespread application of two-way services will occur in the near future. Even so, a number of individual projects are currently underway, offering the prospects for more and better information on this subject within the next year or two.