

Phone Company or Phony Company?

by Dean K. Wilson, P.E.

***Question:* We don't know what to do! We just found out one of our major industrial clients plans to switch their telephone service from the public switched telephone network to one of the VoIP (Voice over Internet Protocol) service providers, specifically the local cable company. How will this affect the operation of our fire alarm system and its connection to a central supervising station?**

Answer: Welcome to the new world of data communications. You will find, as these new days unfold, that you are not alone. Many, many businesses will begin to switch their telephone service from the traditional public switched telephone network providers to one of the VoIP service providers. The huge problem that this creates: NFPA 72-2007, National Fire Alarm Code, has no substantive provision to accept such an arrangement. This means that any fire alarm system depending on such service to transmit fire alarm signals to a central station, proprietary supervising station, or remote station will not meet the requirements of the *Code*.

“Wow!” you may say. Wow is right!

NFPA 72-2007 states very clearly in Section 8.5.3.2.1.1:

8.5.3.2.1.1* Public Switched Network. A DACT shall be connected to the public switched telephone network upstream of any private telephone system at the protected premises.

(A) The connections to the public switched telephone network shall be under the control of the subscriber for whom service is being provided by the supervising station fire alarm system.

(B) Special attention shall be required to ensure that this connection is made only to a loop start telephone circuit and not to a ground start telephone circuit.

Exception: If public cellular telephone service is used as a secondary means of transmission, the requirements of 8.5.3.2.1.1 shall not apply to the cellular telephone service.

You will note the specific reference to the “public switched telephone network.” This means the network of telephone service provided by the recognized public utility. The recognition comes from the state public utility oversight body, such as the Department of Public Utility Control or other such state governmental body. And, it also comes from the Federal Communications Commission.

The Code offers this further set of requirements:

8.5.3.2.1.4 Transmission Channels.

(A)* A system employing a DACT shall employ one telephone line (number). In addition, one of the following transmission means shall be employed:

A.8.5.3.2.1.4(A) With respect to the exception, a two-number ISDN line is not a substitute for the requirement to monitor the integrity of the path.

- (1) A second telephone line (number)
- (2) A cellular telephone connection
- (3) A one-way radio system
- (4) A one-way private radio alarm system
- (5) A private microwave radio system
- (6) A two-way RF multiplex system
- (7) A transmission means complying with 8.5.4

Exception: One telephone line (number) equipped with a derived local channel or a single integrated services digital network (ISDN) telephone line using a terminal adapter specifically listed for supervising station fire alarm service, where the path between the transmitter and the switched telephone network serving central office is monitored for integrity so that the occurrence of an adverse condition in the path shall be annunciated at the supervising station within 200 seconds.

(B) The following requirements shall apply to all combinations listed in 8.5.3.2.1.4(A):

(1) Both channels shall be supervised in a manner approved for the means of transmission employed.

(2) Both channels shall be tested at intervals not exceeding 24 hours.

Exception No. 1: For public cellular telephone service, a verification (test) signal shall be transmitted at least monthly.

Exception No. 2: Where two telephone lines (numbers) are used, it shall be permitted to test each telephone line (number) at alternating 24-hour intervals.

(3) The failure of either channel shall send a trouble signal on the other channel within 4 minutes.

(4) When one transmission channel has failed, all status change signals shall be sent over the other channel.

Exception: Where used in combination with a DACT, a derived local channel shall not be required to send status change signals other than those indicating that adverse conditions exist on the telephone line (number).

(5) The primary channel shall be capable of delivering an indication to the DACT that the message has been received by the supervising station.

(6) The first attempt to send a status change signal shall use the primary channel.
Exception: Where the primary channel is known to have failed.

(7) Simultaneous transmission over both channels shall be permitted.

(8) Failure of telephone lines (numbers) or cellular service shall be annunciated locally.

8.5.3.2.1.5 DACT Transmission Means. The following requirements shall apply to all digital alarm communications transmitters:

(1) A DACT shall be connected to two separate means of transmission at the protected premises.

(2) The DACT shall be capable of selecting the operable means of transmission in the event of failure of the other means.

(3) The primary means of transmission shall be a telephone line (number) connected to the public switched network.

(4) The first transmission attempt shall utilize the primary means of transmission.

(5) Each DACT shall be programmed to call a second DACR line (number) when the signal transmission sequence to the first called line (number) is unsuccessful.

(6)* If long distance telephone service, including WATS, is used, the second telephone number shall be provided by a different long distance service provider if there are multiple providers.

(7) Each DACT shall automatically initiate and complete a test signal transmission sequence to its associated DACR at least once every 24 hours. A successful signal transmission sequence of any other type within the same 24-hour period shall fulfill the requirement to verify the integrity of the reporting system, provided signal processing is automated so that 24-hour delinquencies are individually acknowledged by supervising station personnel.

(8)* If a DACT is programmed to call a telephone line (number) that is call forwarded to the line (number) of the DACR, a means shall be implemented to verify the integrity of the call forwarding feature every 4 hours.

A.8.5.3.2.1.5(8) Because call forwarding requires equipment at a telephone company central office that could occasionally interrupt the call forwarding feature, a signal should be initiated whereby the integrity of the forwarded telephone line (number) that is being called by DACTs is verified every 4 hours. This can be accomplished by a single DACT, either in service or used solely for verification, that automatically initiates and completes a transmission sequence to its associated DACR every 4 hours. A successful signal transmission sequence of any other type within the same 4-hour period should be considered sufficient to fulfill this requirement.

Call forwarding should not be confused with WATS or 800 service. The latter, differentiated from the former by dialing the 800 prefix, is a dedicated service used mainly for its toll-free feature; all calls are preprogrammed to terminate at a fixed telephone line (number) or to a dedicated line.

The *Code* clearly makes no provision for wired telephone transmission means other than using the public switched telephone network.

I suspect that the members of the NFPA Technical Committee on Supervising Station Fire Alarm Systems will have to grapple with this matter during the next code-revision cycle. Until then, you have no choice but to advise your customer that they must retain at least two loop-start telephone lines from the public switched telephone network for each Digital Alarm Communication Transmitter in their fire alarm system. As an alternative, they can use one loop-start telephone line from the public switched telephone network and one of the other options stated in section 8.5.3.2.1.4 (A).

In addition to the above *Code*-related problems, you will typically find that the interface module (modem or multiplex interface) that connects a building telephone line (or system) to the VoIP data link will not have the required 24 hours of standby power. This will create a significant problem during a power outage at a facility.

Just when we think we have all technical matters firmly in hand... Well, we learn that we don't.

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