Summary. Chapter 26 was Chapter 8 in NFPA 72-2007. The dead and/or dying transmission methods, such as McCulloh, have been removed. Better (not perfect) differentiation between “Central Station System” and “Central Station Service”.

Legend. deleted text new text

26.2.1 Alarm Signal Disposition. Except as permitted by 29.7.8.2, all fire alarm signals received by a supervising station shall be immediately retransmitted to the public fire service communications center.

26.2.4 Qualification of Supervising Station Operators. Supervising station operators shall be qualified in accordance with the requirements of 10.4.4.

26.3 Fire Alarm Systems for Central Station Service. Fire Alarm systems used to provide central station service shall comply with the general requirements and the use requirements of Section 26.3.

26.3.1 System Scope. Fire Alarm systems for central station service shall include the central station physical plant, exterior communications channels, subsidiary stations, and alarm and signaling equipment located at the protected premises.

26.3.3 Contract Requirements. The central station service elements shall be provided under contract to a subscriber by one of the following:

(1) A listed central station that provides all of the elements of central station service with its own facilities and personnel.

(2) A listed central station that provides, as a minimum, the signal monitoring, retransmission, and associated record keeping and reporting with its own facilities and personnel and shall be permitted to subcontract all or any part of the installation, testing, and maintenance and runner service.

(3) A listed fire alarm service–local company that provides the installation, testing, and maintenance with its own facilities and personnel and that subcontracts the monitoring, retransmission, and associated record keeping and reporting to a listed central station. The required runner service shall be provided by the listed alarm service–local company with its own personnel or the listed central station with its own personnel.

(4) A listed central station that provides the installation, testing, and maintenance with its own facilities and personnel and that subcontracts the monitoring, retransmission, and associated record keeping and reporting to another listed central station. The required runner service shall be provided by either central station.

26.3.4* Indication of Central Station Service. The prime contractor shall conspicuously indicate that the fire alarm system providing service at a protected premises complies with all the requirements of this Code through the use of a
systematic follow-up program under the control of the organization that has listed the prime contractor.

26.3.4.1 Documentation indicating Code compliance of the fire alarm system shall be issued by the organization that has listed the prime contractor.

26.3.4.2 The documentation shall include, at a minimum, the following information:

1. Name of the prime contractor involved with the ongoing Code compliance of the central station service
2. *Full description of the fire alarm system as installed
3. Issue and expiration dates of the documentation
4. Name, address, and contact information of the organization issuing the document
5. Identification of the authority(ies) having jurisdiction for the central station service installation

26.3.4.3 The documentation shall be physically posted within 3 ft (1 m) of the fire alarm control unit, and copies of the documentation shall be made available to the authority(ies) having jurisdiction upon request.

26.3.4.5 Fire Alarm system service that does not comply with all the requirements of Section 26.3 shall not be designated as central station service.

26.3.6.1.6 Two independent means shall be provided to retransmit an fire alarm signal to the designated public fire service communications center.

26.3.6.1.6.2 If the principal means of retransmission is not equipped to allow the communications center to acknowledge receipt of each fire alarm report, both means shall be used to retransmit.

26.3.6.2 Personnel.

26.3.6.2.1 The central station shall have not less than two persons qualified operators on duty at the central station at all times to ensure disposition of signals in accordance with the requirements of 26.3.7.

26.4 Proprietary Supervising Station Systems.

26.4.1 Application. Supervising facilities of proprietary fire alarm systems shall comply with the operating procedures of Section 26.4. The facilities, equipment, personnel, operation, testing, and maintenance of the proprietary supervising station shall also comply with Section 26.4.

26.4.2.3 If a protected premises fire alarm control unit is integral to or co-located with the supervising station equipment, the requirements of Section 26.6 shall not apply.

26.4.3 Facilities.

26.4.3.1 The proprietary supervising station shall be located in a fire-resistive, detached building or in a cutoff room and shall not be exposed to the hazardous parts of the premises that are protected either of the following:

A.26.4.3.1 Consideration should be given to providing the following features for a proprietary supervising station location:
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(1) Fire resistive construction meeting the requirements of adopted building codes
(2) Air handling systems isolated from common building systems
(1) Fire-resistive, detached building
(2) A fire-resistive room protected from the hazardous parts of the building

26.4.4.2.2.3 One recording instrument shall be used for recording all incoming signals, while the other shall be used for required fire alarm, supervisory, and trouble signals only.

(A) Failure to acknowledge a signal shall not prevent subsequent signals from recording.
(B) Restoration of the signal to its prior condition shall be recorded.

26.4.4.3.2 Fire Alarm signals shall be segregated on a separate visual display in this configuration.
Exception: Fire Alarm signals shall not be required to be segregated on a separate display if given priority status on the common visual display.

26.4.4.4 Display Rate. To facilitate the prompt receipt of fire alarm signals from systems handling other types of signals that are able to produce multiple simultaneous status changes, the requirements of either of the following shall be met:

(1) The system shall record simultaneous status changes at a rate not slower than either a quantity of 50 or 10 percent of the total number of initiating device circuits connected, within 90 seconds, whichever number is smaller, without loss of any signal.
(2) The system shall either display or record fire alarm signals at a rate not slower than one every 10 seconds, regardless of the rate or number of status changes occurring, without loss of any signals.

Exception: If fire alarm, waterflow alarm, and sprinkler supervisory signals and their associated trouble signals are the only signals processed by the system, the rate of recording shall not be slower than one signal every 30 seconds.

26.4.4.6 Personnel.

26.4.4.6.1 The proprietary supervising station shall have at least two qualified operators on duty at all times. One of the two operators shall be permitted to be a runner.

Exception: If the means for transmitting alarms to the fire department is automatic, at least one operator shall be on duty at all times.

26.4.5 Operations.

26.4.5.1 Communications and Transmission Channels.

26.4.5.1.1 All communications and transmission channels between the proprietary supervising station and the protected premises fire alarm control unit shall be operated manually or automatically once every 24 hours to verify operation.

26.4.5.3 Retransmission. Indication of a fire shall be promptly retransmitted to the public fire service communications center or other locations accepted by the authority.
having jurisdiction, indicating the building or group of buildings from which the alarm has been received.

26.4.5.6 Dispositions of Signals.

26.4.5.6.1 Alarms. Upon receipt of an fire alarm signal, the proprietary supervising station operator shall initiate action to perform the following:

1. Immediately notify the fire department, the plant fire brigade emergency response team, and such other parties as the authority having jurisdiction requires
2. Dispatch a runner or technician to the alarm location to arrive within 2 hours after receipt of a signal
3. Restore the system as soon as possible after disposition of the cause of the alarm signal

26.4.5.6.4 Trouble Signals. Upon receipt of trouble signals or other signals pertaining solely to matters of equipment maintenance of the fire alarm system, the proprietary supervising station operator shall initiate action to perform the following, if required:

1. Communicate immediately with the designated person(s) to ascertain reason for the signal
2. Dispatch personnel to arrive within 4 hours to initiate maintenance, if necessary
3. Notify the fire department if required by the authority having jurisdiction
4. Notify the authority having jurisdiction when interruption of service exists for 4 hours or more
5. When equipment has been out of service for 8 hours or more, provide written notice to the authority having jurisdiction as to the nature of the signal, time of occurrence, and restoration of service

26.4.7 Testing and Maintenance. Testing and maintenance of proprietary fire alarm systems shall be performed in accordance with Chapter 14.

26.5.1.2 The installation, maintenance, testing, and use of a remote supervising station fire alarm system that serves properties under various ownership from a remote supervising station shall comply with the requirements of Section 26.5.

26.5.1.4 Remote supervising station fire alarm systems shall provide an automatic audible and visible indication of alarm, supervisory, and trouble conditions at a location remote from the protected premises.

26.5.1.5 Section 26.5 shall not require the use of audible or visible notification appliances other than those required at the remote supervising station. If it is desired to provide fire alarm evacuation signals in the protected premises, the alarm signals, circuits, and controls shall comply with the provisions of Chapters 18 and 23 in addition to the provisions of Section 26.5.

26.5.2 Indication of Remote Station Service. Owners utilizing remote station alarm systems shall provide annual documentation to the authority having jurisdiction identifying the party responsible for the inspection, testing, and maintenance requirements of Chapter 14. This documentation shall take one of the following forms:

1. *An affidavit attesting to the responsibilities and qualifications of the parties performing the inspection, testing, and maintenance and accepting responsibility
of compliance with Chapter 14. This document shall be signed by a representative of the service provider.

A.26.5.2(1) Chapter 14 permits the building owner or his designated representative to perform these services if they are qualified. In this situation, the documentation could be a declaration of qualification signed by the building owner. Multiple service providers are permitted.

(2) Documentation indicating code compliance of the remote station alarm system issued by the organization that listed the service provider.

(3) Other documentation acceptable to the authority having jurisdiction.

26.5.3* Facilities.

26.5.3.1 Fire Alarm systems utilizing remote supervising station connections shall transmit alarm and supervisory signals to a facility meeting the requirements of either 26.5.3.1.1, 26.5.3.1.2 or 26.5.3.1.3.

26.5.3.1.1 Fire Alarm, supervisory, and trouble signals shall be permitted to be received at a public fire service communications center, at the fire station, or at the governmental agency that has the public responsibility for taking prescribed action to ensure response upon receipt of a fire alarm signal that complies with the requirements of NFPA 1221, Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems.

26.5.3.1.2 Alarm, supervisory, and trouble signals shall be permitted to be received at the fire station or at the governmental agency that has public responsibility for taking prescribed action to ensure response upon receipt of a alarm signal.

26.5.3.1.3* Where permitted by the authority having jurisdiction, fire alarm, supervisory, and trouble signals shall be permitted to be received at an alternate location approved by the authority having jurisdiction.

A.26.5.3.1.3 A listed central station might be considered an acceptable alternate location for receipt of fire alarm, and supervisory, and trouble signals.

26.5.3.2* Trouble signals shall be permitted to be received at an constantly attended approved location that has personnel on duty who are trained to recognize the type of signal received and to take prescribed action. The location shall be permitted to be other than that at which alarm and supervisory signals are received.

26.5.3.3 If locations other than the public fire service communications center are used for the receipt of signals, access to receiving equipment shall be restricted in accordance with the requirements of the authority having jurisdiction.

26.5.4.4 Retransmission of an alarm signal, if required, shall be by one of the following methods, which appear in descending order of preference as follows:

(1) A dedicated circuit that is independent of any switched telephone network. This circuit shall be permitted to be used for voice or data communications.

(2) A one-way (outgoing only) telephone at the remote supervising station that utilizes the public switched telephone network. This telephone shall be used
primarily for voice transmission of alarms to a telephone at the public fire service communications center that cannot be used for outgoing calls.

(3) A private radio system using the fire department frequency, where permitted by the fire department.

(4) Other methods accepted by the authority having jurisdiction.

26.5.4.5.1 Personnel staffing and duties shall comply with 8.5.3.5.1 and 8.5.3.5.2. The remote supervising station shall have not less than two qualified operators on duty at the remote supervising station at all times to ensure disposition of signals in accordance with the requirements of 26.5.5.

26.5.5 Operations.

26.5.5.1 If the remote supervising station is at a location other than the public fire service communications center, alarm signals shall be immediately retransmitted to the public fire service communications center.

26.5.5.2 Upon receipt of an alarm, a supervisory, or a trouble signal by the remote supervising station other than the public fire service communications center, the operator on duty shall be responsible for notifying the owner or the owner’s designated representative immediately.

26.6 Communications Methods for Supervising Station Fire Alarm Systems.

26.6.2 Equipment.

26.6.2.4 Fire Alarm system equipment and installations shall comply with Federal Communications Commission (FCC) rules and regulations, as applicable, concerning the following:

1. Electromagnetic radiation
2. Use of radio frequencies
3. Connection to the public switched telephone network of telephone equipment, systems, and protection apparatus

26.6.2.5.3 For active and two-way RF multiplex systems that are part of a central station fire alarm system, restoration of service to the affected portions of the system shall be automatically recorded. When service is restored, the first status change of any initiating device circuit, any initiating device directly connected to a signaling line circuit, or any combination thereof that occurred at any of the affected premises during the service interruption also shall be recorded.

26.6.3 Other Transmission Technologies Communication Methods

8.6.3.1 Active Multiplex Transmission Systems.

8.6.3.1.1 The multiplex transmission channel shall terminate in a transmitter at the protected premises and in a system unit at the supervising station.

8.6.3.1.1.1 The derived channel shall terminate in a transmitter at the protected premises and in derived channel equipment at a subsidiary station location or a telephone company wire center.
The derived channel equipment at the subsidiary station location or a telephone company wire center shall select or establish the communications with the supervising station.

Operation of the transmission channel shall conform to the requirements of this Code whether channels are private facilities, such as microwave, or leased facilities furnished by a communications utility company. If private signal transmission facilities are used, the equipment necessary to transmit signals shall also comply with the requirements for duplicate equipment or replacement of critical components, as described in 8.6.5.2.

Where derived channels are used, normal operating conditions of the telephone equipment are not to inhibit or impair the successful transmission of signals. These normal conditions include, but are not limited to, the following:

1. Intraoffice calls with a transponder on the originating end
2. Intraoffice calls with a transponder on the terminating end
3. Intraoffice calls with transponders on both ends
4. Receipt and origination of long-distance calls
5. Calls to announcement circuits
6. Permanent signal receiver off-hook tone
7. Ringing with no answer, with transponder on either the originating or the receiving end
8. Calls to tone circuits (i.e., service tone, test tone, busy, or reorder)
9. Simultaneous signal with voice source
10. Simultaneous signal with data source
11. Tip and ring reversal
12. Cable identification equipment

The trunk transmission channels shall be dedicated facilities for the main channel. Exception: Derived channel scanners with no more than 32 legs shall be permitted to use the public switched telephone network for the main channel.

For Type 1 multiplex systems, the public switched telephone network facilities shall be permitted to be used for the alternate channel.

Derived channel signals shall be permitted to be transmitted over the leg facility, which shall be permitted to be shared by the telephone equipment under all on-hook and off-hook operating conditions.

If derived channel equipment uses the public switched telephone network to communicate with a supervising station, such equipment shall meet the requirements of 8.6.3.2.

The maximum end-to-end operating time parameters allowed for an active multiplex system shall be as follows:

1. The maximum allowable time lapse from the initiation of a single fire alarm signal until it is recorded at the supervising station shall not exceed 90 seconds. When any number of subsequent fire alarm signals occur at any rate, they shall be recorded at a rate no slower than one every 10 additional seconds.
(2) The maximum allowable time lapse from the occurrence of an adverse condition in any transmission channel until recording of the adverse condition is started shall not exceed 90 seconds for Type 1 and Type 2 systems and 200 seconds for Type 3 systems. The requirements of 8.6.3.1.6 shall apply.

A.8.6.3.1.5(2) Derived channel systems comprise Type 1 and Type 2 systems only.

(3) In addition to the maximum operating time allowed for fire alarm signals, the requirements of one of the following shall be met:

(a) A system unit that has more than 500 initiating device circuits shall be able to record not less than 50 simultaneous status changes within 90 seconds.

(b) A system unit having fewer than 500 initiating device circuits shall be able to record not less than 10 percent of the total number of simultaneous status changes within 90 seconds.

Exception: Proprietary supervising station systems that have operating time requirements specified in 8.4.4.4 through 8.4.4.6.

8.6.3.1.6 The classifications for active multiplex systems shall be divided into three categories on the basis of their ability to perform under adverse conditions of their transmission channels. The system classifications shall be as described in 8.6.3.1.6.1 through 8.6.3.1.6.3.

8.6.3.1.6.1 A Type 1 system shall have dual control as described in 8.6.2.6.

(A) An adverse condition on a trunk or leg facility shall not prevent the transmission of signals from any other trunk or leg facility, except those signals dependent on the portion of the transmission channel in which the adverse condition has occurred.

(B) An adverse condition limited to a leg facility shall not interrupt service on any trunk or other leg facility.

(C) The requirements of 8.6.2.1 through 8.6.2.5 shall be met by Type 1 systems.

8.6.3.1.6.2 A Type 2 system shall have the same requirements as a Type 1 system.

Exception: Dual control of the primary trunk facility shall not be required.

8.6.3.1.6.3 A Type 3 system shall automatically indicate and record at the supervising station the occurrence of an adverse condition on the transmission channel between a protected premises and the supervising station. The requirements of 8.6.2 shall be met.

Exception: The requirements of 8.6.2.6 shall not apply.

8.6.3.1.7 Allowable system loading capacities of active multiplex systems shall be in accordance with Table 8.6.3.1.7 unless otherwise permitted by 8.6.3.1.8.

A.8.6.3.1.7 The capacities of active multiplex systems are based on the overall reliability of the signal receiving, processing, display, and recording equipment at the supervising and subsidiary stations, and the capability to transmit signals during adverse conditions of the signal transmission facilities.

Table 8.6.3.1.7–Loading Capacities for Active Multiplex Systems

8.6.3.1.8 If the signal receiving, processing, display, and recording equipment are duplicated at the supervising station and a switchover is able to be accomplished in not
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more than 30 seconds with no loss of signals during this period, the capacity of a
system unit shall be unlimited.

26.6.3.1* General.

A.26.6.3.1 Certain legacy technologies (active multiplex, McCulloh, directly
connected non-coded and private microwave) have been removed from the text
of the document. Existing systems utilizing these technologies are acceptable,
because all these technologies also comply with the general provisions of
26.6.3.1.

26.6.3.1.1 Conformance. Other transmission technologies shall include those
transmission technologies that operate on principles different from specific transmission
technologies covered by this chapter and Communications methods operating on
principles different from specific methods covered by this chapter shall be permitted
to be installed if they conform to the performance requirements of this subsection and to
all other applicable requirements of this Code.

26.6.3.1.2 Federal Communications Commission. Fire Alarm system equipment and
installations shall comply with the Federal Communications Commission (FCC) rules
and regulations, as applicable, concerning electromagnetic radiation, use of radio
frequencies, and connections to the public switched telephone network of telephone
equipment, systems, and protection apparatus.

26.6.3.1.4 Communications Integrity. Provision shall be made to monitor the integrity
of the transmission technology and its communications path. The following
requirements shall apply:

(1) Any failure shall be annunciated at the supervising station within 5 minutes of the
failure.
(2) If communications cannot be established with the supervising station, an
indication of this failure to communicate shall be annunciated at the protected
premises.
(3) If a portion of the communications path cannot be monitored for integrity, a
redundant communications path shall be provided.
(4) Provision shall be made to monitor the integrity of the redundant communications
path.
(5) Failure of both the primary and redundant communications paths shall be
annunciated at the supervising station within not more than 24 hours of the failure.
(6) System units at the supervising station shall be restored to service within 30
minutes of a failure.
(7) The transmission technology shall be designed so that upon failure of a
transmission channel serving a system unit at the supervising station, the loss of
the ability to monitor shall not affect more than 3000 transmitters.

26.6.3.1.4.1 Single Communications Technology. Where only one communications
technology is used, any failure of the communications path shall be annunciated at the
supervising station within 5 minutes of the failure.

26.6.3.1.4.2 Multiple Communications Technologies. Where two or more different
technologies are used, the following requirements shall be met:
(1) Provision shall be made to monitor the integrity of each communications path.
(2) Failure of any communications path shall be annunciated at the supervising station and at the protected premises within not more than 24 hours of the failure.

Exception: Where technologies used are described elsewhere in this Code, monitoring for integrity shall be permitted to comply with those requirements.

26.6.3.1.5 Spare System Unit Equipment. An inventory of spare equipment shall be maintained at the supervising station such that any failed piece of equipment can be replaced and the systems unit restored to full operation within the time limitations specified in this Code 30 minutes of failure.

26.6.3.1.6.2 If duplicate spare system units are maintained at the supervising station and switchover can be achieved in 30 seconds, then the system capacity shall be permitted to be unlimited.

26.6.3.1.10.1 Communication of alarm, supervisory, and trouble signals shall be in a highly reliable manner accordance with this section to prevent degradation of the signal in transit, which in turn would result in either of the following:

(1) Failure of the signal to be displayed and recorded at the supervising station
(2) An incorrect corrupted signal displayed and recorded at the supervising station

26.6.3.1.10 Signal Error Detection and Correction.

8.6.4.11* Signal Priority. If the communications methodology is shared with any other usage, all fire alarm, supervisory, and trouble signals shall take precedence, in that respective order of priority, over all other signals unless otherwise permitted by the authority having jurisdiction.

Exception: If an order of signal priority cannot be assured, then the maximum duration between the initiation of an alarm signal at the protected premises, transmission of the signal, and subsequent display and recording of the alarm signal at the supervising station shall not exceed 90 seconds.

A.8.6.4.11 Signals from hold-up alarms or other signals indicating life-threatening situations are permitted to take precedence over supervisory and trouble signals if acceptable to the authority having jurisdiction.

26.6.3.1.11* Sharing Communications Equipment On-Premises.

If the fire alarm transmitter is sharing on-premises communications equipment, the shared equipment shall be listed for the purpose. If on-premises communications equipment is not listed for the purpose, the fire alarm transmitter shall be installed ahead of the unlisted communications equipment.

A.26.6.3.1.11 Most communications equipment is not specifically listed for fire alarm applications, but is listed in accordance with applicable product standard for general communications equipment.

26.6.3.1.12* Secondary Power. Secondary power capacity in accordance with 10.5.6 shall be provided for all equipment necessary for the transmission and reception of alarm, supervisory, trouble, and other signals located at the protected premises and at the supervising station.
A.26.6.3.1.12 This requirement is to ensure that communications equipment will operate for the same period of time on secondary power as the alarm control unit.

8.6.4.13 Service Provider Diversity. When a redundant path is required, both paths shall be private or the alternate path shall be provided by a public communications service provider different from the primary path, if available.

26.6.3.1.13 Unique Flaws Not Covered by This Code. If a communications technology has a unique flaw that could result in the failure to communicate a signal, the implementation of that technology for fire alarm signaling shall compensate for that flaw so as to eliminate the risk of missing an fire alarm signal.

8.6.4.14 Throughput Probability. When the supervising station does not regularly communicate with the transmitter at least once every 200 seconds, then the throughput probability of the alarm transmission shall be at least 90 percent in 90 seconds, 99 percent in 180 seconds, or 99.999 percent in 450 seconds.

26.6.3.2 Digital Alarm Communicator Systems.

26.6.3.2.1 Digital Alarm Communicator Transmitter (DACT).

26.6.3.2.1.1 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 26.6.3.2.1.1 shall not apply to the cellular telephone service.

26.6.3.2.1.4 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:

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 26.6.3.1

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 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 26.6.3.2.1.4(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.

A.26.6.3.2.1.4(B)(6) Where two telephone lines (numbers) are used, care should be taken to assign the primary DACT telephone line (number) to a nonessential telephone line (number) at the protected premises so that the primary line used in the premises is not unnecessarily interrupted.

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.

26.6.3.2.1.5 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.

A.26.6.3.2.1.5(4) Where two telephone lines (numbers) are used, care should be taken to assign the primary DACT telephone line (number) to a nonessential telephone line (number) at the protected premises so that the primary line used in the premises is not unnecessarily interrupted.
(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) 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 that signal processing is automated so that 24-hour delinquencies are individually acknowledged by supervising station personnel.

(7) 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.

26.6.3.2.3.3 Digital Alarm Radio Receiver (DARR) Equipment.

(A) A spare DARR shall be provided in the supervising station and shall be able to be switched into the place of a failed unit within 30 seconds after detection of failure.

(B) Facilities shall be provided at the supervising station for supervisory and control functions of subsidiary and repeater station radio-receiving equipment. This shall be accomplished via a supervised circuit where the radio equipment is remotely located from the supervising or subsidiary station. The following conditions shall be supervised at the supervising station:

1. Failure of ac power supplying the radio equipment
2. Malfunction of receiver
3. Malfunction of antenna and interconnecting cable
4. Indication of automatic switchover of the DARR
5. Malfunction of data transmission line between the DARR and the supervising or subsidiary station

8.6.3.3 McCulloh Systems.

8.6.3.3.1 Transmitters.

8.6.3.3.1.1 A coded alarm signal from a transmitter shall consist of not less than three complete rounds of the number or code transmitted.

8.6.3.3.1.2 A coded fire alarm box shall produce not less than three signal impulses for each revolution of the coded signal wheel or another approved device.

8.6.3.3.1.3 Circuit-adjusting means for emergency operating shall be permitted to be either automatic or be provided through manual operation upon receipt of a trouble signal.

8.6.3.3.1.4 Equipment shall be provided at the supervising or subsidiary station on all circuits extending from the supervising or subsidiary station that is utilized for McCulloh systems for performing the following:

A.8.6.3.3.1.4 The current readings, in accordance with 8.6.3.3.1.4(1), should be compared with the normal readings to determine whether a change in the circuit condition has occurred. A zero current reading in accordance with 8.6.3.3.1.4(2) indicates that the circuit is clear of a foreign ground.
8.6.3.3.2 Transmission Channels.

8.6.3.3.2.1 Circuits between the protected premises and the supervising or subsidiary station that are essential to the actuation or operation of devices that initiate a signal indicative of fire shall be arranged so that the occurrence of a single break or single ground fault does not prevent transmission of an alarm.

8.6.3.3.2.2 Circuits wholly within the supervising or subsidiary station shall not be required to be arranged in accordance with 8.6.3.3.2.1.

8.6.3.3.2.3 The carrier system portion of circuits shall not be required to be arranged in accordance with 8.6.3.3.2.1.

8.6.3.3.2.4 The occurrence of a single break or a single ground fault on any circuit shall not of itself cause a false signal that is able to be interpreted as an alarm of fire. If such a single fault prevents the functioning of any circuit, its occurrence shall be indicated automatically at the supervising station by a trouble signal that compels attention and that is distinguishable from signals other than those indicative of an abnormal condition of supervised parts of a fire suppression system(s).

8.6.3.3.2.5 The circuits and devices shall be arranged to receive and record a signal identifiable as to location of origin, and provisions shall be made for identifying transmission to the public fire service communications center.

8.6.3.3.2.6 Multipoint transmission channels between the protected premises and the supervising or subsidiary station and within the protected premises, consisting of one or more coded transmitters and an associated system unit(s), shall meet the requirements of either 8.6.3.3.2.7 or 8.6.3.3.2.8.

8.6.3.3.2.7 If end-to-end metallic continuity is present, signals shall be received from other points under any one of the following transmission channel fault conditions at one point on the line:

   (1) Open
   (2) Ground
   (3) *Wire-to-wire short

   A.8.6.3.3.2.7(3) Though rare, it is understood that the occurrence of a wire-to-wire short on the primary trunk facility near the supervising station could disable the transmission system without immediate detection.

   (4) Open and ground

8.6.3.3.2.8 If end-to-end metallic continuity is not present, the nonmetallic portion of transmission channels shall meet all of the following requirements:

   (1) Two nonmetallic channels or one channel plus a means for immediate transfer to a standby channel shall be provided for each transmission channel, with a maximum of eight transmission channels being associated with each standby channel, or shall be furnished over one channel, provided that service is limited to one plant.
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(2) The two nonmetallic channels (or one channel with standby arrangement) for each transmission channel shall be provided by one of the following means, shown in descending order of preference:
   (a) Over separate facilities and separate routes
   (b) Over separate facilities in the same route
   (c) Over the same facilities in the same route

(3) Failure of a nonmetallic channel or any portion thereof shall be indicated immediately and automatically in the supervising station.

(4) Signals shall be received from other points under any one of the following fault conditions at one point on the metallic portion of the transmission channel:
   (a) Open
   (b) Ground
   (c) Wire-to-wire short

A.8.6.3.3.2.8(4)(e) Though rare, it is understood that the occurrence of a wire-to-wire short on the primary trunk facility near the supervising station could disable the transmission system without immediate detection.

8.6.3.3.3 Loading Capacity of McCulloh Circuits.

8.6.3.3.3.1 The number of transmitters connected to any transmission channel shall be limited to eliminate interference.

8.6.3.3.3.2 The total number of code wheels or other approved devices connected to a single transmission channel shall not exceed 250.

8.6.3.3.3.3 Alarm signal transmission channels shall be reserved exclusively for fire alarm signal transmitting service unless the transmission channels meet the requirements of 8.6.3.3.3.6.

8.6.3.3.3.4 The number of waterflow switches permitted to be connected to actuate a single transmitter shall not exceed five switches.

8.6.3.3.3.5 The number of supervisory switches permitted to be connected to actuate a single transmitter shall not exceed 20 switches.

8.6.3.3.3.6 Combined alarm and supervisory transmission channels shall comply with the following:
   (1) If both sprinkler supervisory signals and fire or waterflow alarm signals are transmitted over the same transmission channel, provision shall be made to obtain either alarm signal precedence or continuous repetition of the alarm signal to prevent the loss of any alarm signal.
   (2) Other signal transmitters (e.g., burglar, industrial processes) on an alarm transmission channel shall not exceed five.

8.6.3.3.3.7* If signals from manual fire alarm boxes and waterflow alarm transmitters within a building are transmitted over the same transmission channel and are operating at the same time, there shall be no interference with the fire box signals. Provision of the shunt noninterfering method of operation shall be permitted for this performance.

A.8.6.3.3.3.7 At the time of system acceptance, verification should be made that manual fire alarm box signals are free of transmission channel interference.
8.6.3.3.8 One alarm transmission channel shall serve not more than 25 plants.

(A) A plant shall be permitted to consist of one or more buildings under the same ownership, and the circuit arrangement shall be such that an alarm signal cannot be received from more than one transmitter at a time within a plant.

(B) If such noninterference is not provided, each building shall be a plant.

8.6.3.3.9 One sprinkler supervisory transmission channel circuit shall serve not more than 25 plants. A plant shall be permitted to consist of one or more buildings under the same ownership.

8.6.3.3.10 Connections to a guard supervisory transmission channel or to a combination manual fire alarm and guard transmission channel shall be limited so that not more than 60 scheduled guard report signals are transmitted in any 1-hour period. Patrol scheduling shall be such as to eliminate interference between guard report signals.

8.6.3.3.4 Unless accepted by the authority having jurisdiction, McCulloh systems shall not be permitted to be installed after June 30, 2003.

A.8.6.3.3.4 It is anticipated that McCulloh transmission technology will cease to be a viable option due to many factors, including unavailability of parts, unavailability of telephone facilities, and lack of technical support availability. This does not preclude the use, maintenance, or expansion of existing McCulloh systems.

26.6.3.3 Radio Systems.

26.6.3.3.1 Two-Way Radio Frequency (RF) Multiplex Systems.

26.6.3.3.1.1 Maximum Operating Time. The maximum end-to-end operating time parameters allowed for a two-way RF multiplex system shall be as follows:

(1) The maximum allowable time lapse from the initiation of a single fire alarm signal until it is recorded at the supervising station shall not exceed 90 seconds. When any number of subsequent fire alarm signals occur at any rate, they shall be recorded at a rate no slower than one every additional 10 seconds.

(2) The maximum allowable time lapse from the occurrence of an adverse condition in any transmission channel until recording of the adverse condition is started shall not exceed 200 seconds for Type 4 and Type 5 systems. The requirements of 26.6.3.3.1.4 shall apply.

(3) In addition to the maximum operating time allowed for fire alarm signals, the requirements of one of the following shall be met:

(a) A system unit that has more than 500 initiating device circuits shall be able to record not less than 50 simultaneous status changes within 90 seconds.

(b) A system unit that has fewer than 500 initiating device circuits shall be able to record not less than 10 percent of the total number of simultaneous status changes within 90 seconds.

26.6.3.3.2 One-Way Private Radio Alarm Systems.

26.6.3.3.2.1 Independent Receivers.
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(A) The requirements of 26.6.3.3.2 for a radio alarm repeater station receiver (RARS) shall be satisfied if the signals from each radio alarm transmitter (RAT) are received and supervised, in accordance with Chapter 26, by at least two independently powered, independently operating, and separately located RARS or radio alarm supervising station receivers (RASSRs), or by one of each.

(B) At least two separate paths shall be provided from a RAT to the ultimate RASSR.

(C) Only one path to the RASSR shall be required to be utilized in the event alarms can be transmitted from a RAT to the RASSR and the RAT has the ability to receive a positive acknowledgment that the RASSR has received the signal.

26.6.3.3.2.2* Maximum Operating Time. The end-to-end operating time parameters allowed for a one-way radio alarm system shall be as follows:

(1) There shall be a 90 percent probability that the time between the initiation of a single alarm signal until it is recorded at the supervising station will not exceed 90 seconds.

(2) There shall be a 99 percent probability that the time between the initiation of a single fire alarm signal until it is recorded at the supervising station will not exceed 180 seconds.

(3) There shall be a 99.999 percent probability that the time between the initiation of a single fire alarm signal until it is recorded at the supervising station will not exceed 7.5 minutes (450 seconds), at which time the RAT shall cease transmitting. When any number of subsequent fire alarm signals occurs at any rate, they shall be recorded at an average rate no slower than one every additional 10 seconds.

(4) In addition to the maximum operating time allowed for alarm signals, the system shall be able to record not less than 12 simultaneous status changes within 90 seconds at the supervising station.

26.6.3.3.2.3 Supervision. Equipment shall be provided at the supervising station for the supervisory and control functions of the supervising or subsidiary station and for the repeater station radio transmitting and receiving equipment. This shall be accomplished via a supervised circuit where the radio equipment is remotely located from the system unit and the conditions of 26.6.3.3.2.3(A) through 26.6.3.3.2.3(D) are met.

26.6.3.3.2.4 Transmission Channels. Transmission channels shall comply with 26.6.3.3.2.4(A) through 26.6.3.3.2.4(F).

26.6.3.3.2.6 Loading Capacities. The loading capacities of one-way radio alarm systems shall be based on the overall reliability of the signal-receiving, processing, display, and recording equipment at the supervising or subsidiary station and the capability to transmit signals during adverse conditions of the transmission channels. Loading capacities shall comply with 26.6.3.3.2.6(A) and 26.6.3.3.2.6(B).

(A) Allowable loading capacities shall be in accordance with Table 26.6.3.3.2.6(A), except as modified by the following:

1) Each guard’s tour transmitter shall reduce the allowable RATs by 15.
(2) Each two-way protected premises radio transmitter shall reduce the allowable RATs by two.
(3) Each supervised burglar alarm (open/close) or each suppressed guard’s tour transmitter shall reduce the allowable RATs by five.
(B) If the signal-receiving, processing, display, and recording equipment is duplicated at the supervising station and a switchover is able to be accomplished in not more than 30 seconds, with no loss of signals during this period, the capacity of a system unit shall be permitted to be unlimited.

8.6.3.6 Directly Connected Noncoded Systems.

8.6.3.6.1 Circuits. Circuits for transmission of alarm signals between the fire alarm control unit or the transmitter in the protected premises and the supervising station shall be arranged to comply with either (1) or (2):

(1) These circuits shall be arranged so that the occurrence of a single break or single ground fault does not prevent the transmission of an alarm signal. Circuits complying with this paragraph shall be automatically self-adjusting in the event of either a single break or a single ground fault and shall be automatically self-restoring in the event that the break or fault is corrected.
(2) These circuits shall be arranged so that they are isolated from ground (except for reference ground detection) and so that a single ground fault does not prevent the transmission of an alarm signal. Circuits complying with this paragraph shall be provided with a ground reference circuit so as to detect and indicate automatically the existence of a single ground fault.

8.6.3.6.1.1 Additional Requirements. In addition, these circuits shall comply with all of the following requirements:

(1) A multiple ground-fault condition that would prevent alarm operation shall be indicated by an alarm or by a trouble signal.
(2) Circuits for transmission of supervisory signals shall be separate from alarm circuits.
(3) The occurrence of a single break or a single ground fault on any circuit shall not of itself cause a false signal that is able to be interpreted as an alarm of fire.

8.6.3.6.1.2 Exclusions. The requirements of this section shall not apply to the following circuits:

(1) Circuits wholly within the supervising station
(2) Circuits wholly within the protected premises extending from one or more automatic fire detectors or other noncoded initiating devices other than waterflow devices to a transmitter or fire alarm control unit
(3) Power supply leads wholly within the building or buildings protected

8.6.3.6.2 Loading Capacity of Circuits.

8.6.3.6.2.1 The number of initiating devices connected to any signaling circuit and the number of plants that shall be permitted to be served by a signal circuit shall be determined by the authority having jurisdiction and shall not exceed the limitations specified in this subsection.
8.6.3.6.2.2 A plant shall be permitted to consist of one or more buildings under the same ownership.

8.6.3.6.2.3* A single circuit shall not serve more than one plant.

A.8.6.3.6.2.3 If a single plant involves more than one gate entrance or involves a number of buildings, separate circuits might be required so that the alarm to the supervising station indicates the area to which the fire department is to be dispatched.

8.6.3.7 Private Microwave Radio Systems.

8.6.3.7.1* If a private microwave radio is used as the transmission channel and communications channel, supervised transmitting and receiving equipment shall be provided at supervising, subsidiary, and repeater stations.

A.8.6.3.7.1 A private microwave radio can be used either as a transmission channel, to connect a transmitter to a supervising station or subsidiary station, or as a communications channel to connect a subsidiary station(s) to a supervising station(s). This can be done independently or in conjunction with wireline facilities.

8.6.3.7.2 If more than five protected buildings or premises or 50 initiating devices or initiating device circuits are being serviced by a private radio carrier, the supervising, subsidiary, and repeater station radio facilities shall meet all of the following criteria:

(1) Dual supervised transmitters, arranged for automatic switching from one to the other in case of trouble, shall be installed.
(2) If the transmitters are located where someone is always on duty, switchboard facilities shall be permitted to be manually operated, provided the switching is able to be carried out within 30 seconds.
(3) If the transmitters are located where no one is continuously on duty, the circuit extending between the supervising station and the transmitters shall be a supervised circuit.
(4) Transmitters shall be operated on a time ratio of 2:1 within each 24 hours.
A.8.6.3.7.2(4) Transmitters should be operated alternately, 16 hours on and 16 hours off.
(5) Dual receivers shall be installed with a means for selecting a usable output from one of the two receivers.
(6) The failure of one receiver shall in no way interfere with the operation of the other receiver, and failure of either receiver shall be annunciated.

8.6.3.7.3 Means shall be provided at the supervising station for the supervision and control of supervising, subsidiary, and repeater station radio transmitting and receiving equipment. If the radio equipment is remote from the supervising station, this shall be accomplished via a supervised circuit.

8.6.3.7.3.1 The following conditions shall be supervised at the supervising station:

(1) Transmitter in use (radiating)
(2) Failure of ac power supplying the radio equipment
(3) Receiver malfunction
(4) Indication of automatic switchover

8.6.3.7.3.2 It shall be possible to independently deactivate either transmitter from the supervising station.

8.6.4 Other Transmission Technologies.

8.6.4.1 Conformance. Other transmission technologies shall include those transmission technologies that operate on principles different from specific transmission technologies covered by this chapter and shall be permitted to be installed if they conform to the requirements of this subsection and to all other applicable requirements of this Code.

8.6.4.2 Federal Communications Commission. Fire alarm system equipment and installations shall comply with the Federal Communications Commission (FCC) rules and regulations, as applicable, concerning electromagnetic radiation, use of radio frequencies, and connections to the public switched telephone network of telephone equipment, systems, and protection apparatus.

8.6.4.3 National Electrical Code. Equipment shall be installed in compliance with NFPA 70, National Electrical Code.

8.6.4.4 Communications Integrity. Provision shall be made to monitor the integrity of the transmission technology and its communications path. The following requirements shall apply:

(1) Any failure shall be annunciated at the supervising station within 5 minutes of the failure.

(2) If communications cannot be established with the supervising station, an indication of this failure to communicate shall be annunciated at the protected premises.

(3) If a portion of the communications path cannot be monitored for integrity, a redundant communications path shall be provided.

(4) Provision shall be made to monitor the integrity of the redundant communications path.

(5) Failure of both the primary and redundant communications paths shall be annunciated at the supervising station within not more than 24 hours of the failure.

(6) System units at the supervising station shall be restored to service within 30 minutes of a failure.

(7) The transmission technology shall be designed so that upon failure of a transmission channel serving a system unit at the supervising station, the loss of the ability to monitor shall not affect more than 3000 transmitters.

8.6.4.5 Spare System Unit Equipment. An inventory of spare equipment shall be maintained at the supervising station such that any failed piece of equipment can be replaced and the systems unit restored to full operation within the time limitations specified in this Code.

8.6.4.6 Loading Capacity of a System Unit.
8.6.4.6.1 The maximum number of independent fire alarm systems connected to a single system unit shall be limited to 512.

8.6.4.6.2 If duplicate spare system units are maintained at the supervising station and switchover can be achieved in 30 seconds, then the system capacity shall be unlimited.

8.6.4.7 End-to-End Communication Time for an Alarm. The maximum duration between the initiation of an alarm signal at the protected premises, transmission of the signal, and subsequent display and recording of the alarm signal at the supervising station shall not exceed 90 seconds.

8.6.4.8 Unique Identifier. If a transmitter shares a transmission or communications channel with other transmitters, it shall have a unique transmitter identifier.

8.6.4.9 Recording and Display Rate of Subsequent Alarms. Recording and display of alarms at the supervising station shall be at a rate no slower than one complete signal every 10 seconds.

8.6.4.10 Signal Error Detection and Correction.

8.6.4.10.1 Communication of alarm, supervisory, and trouble signals shall be in a highly reliable manner to prevent degradation of the signal in transit, which in turn would result in either of the following:

1. Failure of the signal to be displayed and recorded at the supervising station
2. An incorrect corrupted signal displayed and recorded at the supervising station

8.6.4.10.2 Reliability of the signal shall be achieved by any of the following:

1. Signal repetition — multiple transmissions repeating the same signal
2. Parity check — a mathematically check sum algorithm of a digital message that verifies correlation between transmitted and received message
3. An equivalent means to 8.6.4.10.2(1) or 8.6.4.10.2(2) that provides a certainty of 99.99 percent that the received message is identical to the transmitted message

8.6.4.11* Signal Priority. If the communications methodology is shared with any other usage, all fire alarm, supervisory, and trouble signals shall take precedence, in that respective order of priority, over all other signals unless otherwise permitted by the authority having jurisdiction.

Exception: If an order of signal priority cannot be assured, then the maximum duration between the initiation of an alarm signal at the protected premises, transmission of the signal, and subsequent display and recording of the alarm signal at the supervising station shall not exceed 90 seconds.

A.8.6.4.11 Signals from hold-up alarms or other signals indicating life-threatening situations are permitted to take precedence over supervisory and trouble signals if acceptable to the authority having jurisdiction.

8.6.4.12 Sharing Communications Equipment On-Premises. If the fire alarm transmitter is sharing on-premises communications equipment, the shared equipment shall be listed for the purpose. If on-premises communications equipment is not listed for the purpose, the fire alarm transmitter shall be installed ahead of the unlisted communications equipment.
8.6.4.13 Service Provider Diversity. When a redundant path is required, both paths shall be private or the alternate path shall be provided by a public communications service provider different from the primary path, if available.

8.6.4.14 Throughput Probability. When the supervising station does not regularly communicate with the transmitter at least once every 200 seconds, then the throughput probability of the alarm transmission shall be at least 90 percent in 90 seconds, 99 percent in 180 seconds, or 99.999 percent in 450 seconds.

8.6.4.15 Unique Flaws Not Covered by This Code. If a communications technology has a unique flaw that could result in the failure to communicate a signal, the implementation of that technology for fire alarm signaling shall compensate for that flaw so as to eliminate the risk of missing a fire alarm signal.

26.6.4 Display and Recording Requirements for All Transmission Technologies.

26.6.4.1* Any status changes, including the initiation or restoration to normal of a trouble condition, that occur in an initiating device or in any interconnecting circuits or equipment, including the local protected premises controls from the location of the initiating device(s) to the supervising station, shall be presented in a form to expedite prompt operator interpretation. Status change signals shall provide the following information:

A.26.6.4.1 The signal information can be permitted to be provided in coded form. Records can be permitted to be used to interpret these codes.

(1) Identification of the type of signal to show whether it is an alarm, supervisory, delinquency, or trouble signal
(2) Identification of the signal to differentiate between an initiation of an alarm, a supervisory, a delinquency, or a trouble signal and a clearing from one or more of these conditions
(3) Identification of the site of origin of each status change signal
(4) *Identification of specific types of signals that dictate a different Response

A.26.6.4.1(4) Any signal that would dictate a different response, such as carbon monoxide alarms or mass notification alarms, should be individually identifiable so the appropriate response to the event can be initiated. There are more types of alarms and other signals that are being received at supervising stations and that require different responses by supervising station operators. These signals could be other than fire, but still life safety in nature, and must be uniquely identified because their signal is indicative of a different response.

26.6.4.2* If duplicate equipment for signal receiving, processing, display, and recording is not provided, the installed equipment shall be designed so that any critical assembly is able to be replaced from on-premises spares and the system is able to be restored to service within 30 minutes. A critical assembly shall be an assembly in which a malfunction prevents the receipt and interpretation of signals by the supervising station operator.

Exception: Proprietary and remote station systems.

8.7 Mass Notification Systems. See Annex E.
Summary. Chapter 26 was Chapter 8 in NFPA 72-2007. The dead and/or dying transmission methods, such as McCulloh, have been removed. Better (not perfect) differentiation between “Central Station System” and “Central Station Service”.

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26.2.1 Alarm Signal Disposition. Except as permitted by 29.7.8.2, all fire alarm signals received by a supervising station shall be immediately retransmitted to the public fire service communications center.

26.2.4 Qualification of Supervising Station Operators. Supervising station operators shall be qualified in accordance with the requirements of 10.4.4.

26.3 Fire Alarm Systems for Central Station Service. Fire Alarm systems used to provide central station service shall comply with the general requirements and the use requirements of Section 26.3.

26.3.1 System Scope. Fire Alarm systems for central station service shall include the central station physical plant, exterior communications channels, subsidiary stations, and alarm and signaling equipment located at the protected premises.

26.3.3 Contract Requirements. The central station service elements shall be provided under contract to a subscriber by one of the following:

(1) A listed central station that provides all of the elements of central station service with its own facilities and personnel.

(2) A listed central station that provides, as a minimum, the signal monitoring, retransmission, and associated record keeping and reporting with its own facilities and personnel and shall be permitted to subcontract all or any part of the installation, testing, and maintenance and runner service.

(3) A listed fire alarm service–local company that provides the installation, testing, and maintenance with its own facilities and personnel and that subcontracts the monitoring, retransmission, and associated record keeping and reporting to a listed central station. The required runner service shall be provided by the listed alarm service–local company with its own personnel or the listed central station with its own personnel.

(4) A listed central station that provides the installation, testing, and maintenance with its own facilities and personnel and that subcontracts the monitoring, retransmission, and associated record keeping and reporting to another listed central station. The required runner service shall be provided by either central station.

26.3.4* Indication of Central Station Service. The prime contractor shall conspicuously indicate that the fire alarm system providing service at a protected premises complies with all the requirements of this Code through the use of a
systematic follow-up program under the control of the organization that has listed the prime contractor.

**26.3.4.1** Documentation indicating Code compliance of the fire alarm system shall be issued by the organization that has listed the prime contractor.

**26.3.4.2** The documentation shall include, at a minimum, the following information:

1. Name of the prime contractor involved with the ongoing Code compliance of the central station service
2. *Full description of the fire alarm system as installed*
3. Issue and expiration dates of the documentation
4. Name, address, and contact information of the organization issuing the document
5. Identification of the authority(ies) having jurisdiction for the central station service installation

**26.3.4.3** The documentation shall be physically posted within 3 ft (1 m) of the fire alarm control unit, and copies of the documentation shall be made available to the authority(ies) having jurisdiction upon request.

**26.3.4.5** Fire Alarm system service that does not comply with all the requirements of Section 26.3 shall not be designated as central station service.

**26.3.6.1.6** Two independent means shall be provided to retransmit an fire alarm signal to the designated public fire service communications center.

**26.3.6.1.6.2** If the principal means of retransmission is not equipped to allow the communications center to acknowledge receipt of each fire alarm report, both means shall be used to retransmit.

**26.3.6.2 Personnel.**

**26.3.6.2.1** The central station shall have not less than two persons qualified operators on duty at the central station at all times to ensure disposition of signals in accordance with the requirements of 26.3.7.

**26.4 Proprietary Supervising Station Systems.**

**26.4.1 Application.** Supervising facilities of proprietary fire alarm systems shall comply with the operating procedures of Section 26.4. The facilities, equipment, personnel, operation, testing, and maintenance of the proprietary supervising station shall also comply with Section 26.4.

**26.4.2.3** If a protected premises fire alarm control unit is integral to or co-located with the supervising station equipment, the requirements of Section 26.6 shall not apply.

**26.4.3 Facilities.**

**26.4.3.1** The proprietary supervising station shall be located in a fire-resistive, detached building or in a cutoff room and shall not be exposed to the hazardous parts of the premises that are protected either of the following:

A. **26.4.3.1** Consideration should be given to providing the following features for a proprietary supervising station location:
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(1) Fire resistive construction meeting the requirements of adopted building codes

(2) Air handling systems isolated from common building systems

(1) Fire-resistive, detached building

(2) A fire-resistive room protected from the hazardous parts of the building

26.4.4.2.2.3 One recording instrument shall be used for recording all incoming signals, while the other shall be used for required fire alarm, supervisory, and trouble signals only.

(A) Failure to acknowledge a signal shall not prevent subsequent signals from recording.

(B) Restoration of the signal to its prior condition shall be recorded.

26.4.4.3.2 Fire Alarm signals shall be segregated on a separate visual display in this configuration.

Exception: Fire Alarm signals shall not be required to be segregated on a separate display if given priority status on the common visual display.

26.4.4.4 Display Rate. To facilitate the prompt receipt of fire alarm signals from systems handling other types of signals that are able to produce multiple simultaneous status changes, the requirements of either of the following shall be met:

(1) The system shall record simultaneous status changes at a rate not slower than either a quantity of 50 or 10 percent of the total number of initiating device circuits connected, within 90 seconds, whichever number is smaller, without loss of any signal.

(2) The system shall either display or record fire alarm signals at a rate not slower than one every 10 seconds, regardless of the rate or number of status changes occurring, without loss of any signals.

Exception: If fire alarm, waterflow alarm, and sprinkler supervisory signals and their associated trouble signals are the only signals processed by the system, the rate of recording shall not be slower than one signal every 30 seconds.

26.4.4.6 Personnel.

26.4.4.6.1 The proprietary supervising station shall have at least two qualified operators on duty at all times. One of the two operators shall be permitted to be a runner.

Exception: If the means for transmitting alarms to the fire department is automatic, at least one operator shall be on duty at all times.

26.4.5 Operations.

26.4.5.1 Communications and Transmission Channels.

26.4.5.1.1 All communications and transmission channels between the proprietary supervising station and the protected premises fire alarm control unit shall be operated manually or automatically once every 24 hours to verify operation.

26.4.5.3 Retransmission. Indication of a fire shall be promptly retransmitted to the public fire service communications center or other locations accepted by the authority.
having jurisdiction, indicating the building or group of buildings from which the alarm has been received.

### 26.4.5.6 Dispositions of Signals.

#### 26.4.5.6.1 Alarms. Upon receipt of an fire alarm signal, the proprietary supervising station operator shall initiate action to perform the following:

1. Immediately notify the fire department, the plant fire brigade emergency response team, and such other parties as the authority having jurisdiction requires
2. Dispatch a runner or technician to the alarm location to arrive within 2 hours after receipt of a signal
3. Restore the system as soon as possible after disposition of the cause of the alarm signal

#### 26.4.5.6.4 Trouble Signals. Upon receipt of trouble signals or other signals pertaining solely to matters of equipment maintenance of the fire alarm system, the proprietary supervising station operator shall initiate action to perform the following, if required:

1. Communicate immediately with the designated person(s) to ascertain reason for the signal
2. Dispatch personnel to arrive within 4 hours to initiate maintenance, if necessary
3. Notify the fire department if required by the authority having jurisdiction
4. Notify the authority having jurisdiction when interruption of service exists for 4 hours or more
5. When equipment has been out of service for 8 hours or more, provide written notice to the authority having jurisdiction as to the nature of the signal, time of occurrence, and restoration of service

### 26.4.7 Testing and Maintenance.

Testing and maintenance of proprietary fire alarm systems shall be performed in accordance with Chapter 14.

#### 26.5.1.2 The installation, maintenance, testing, and use of a remote supervising station fire alarm system that serves properties under various ownership from a remote supervising station shall comply with the requirements of Section 26.5.

#### 26.5.1.4 Remote supervising station fire alarm systems shall provide an automatic audible and visible indication of alarm, supervisory, and trouble conditions at a location remote from the protected premises.

#### 26.5.1.5 Section 26.5 shall not require the use of audible or visible notification appliances other than those required at the remote supervising station. If it is desired to provide fire alarm evacuation signals in the protected premises, the alarm signals, circuits, and controls shall comply with the provisions of Chapters 18 and 23 in addition to the provisions of Section 26.5.

#### 26.5.2 Indication of Remote Station Service. Owners utilizing remote station alarm systems shall provide annual documentation to the authority having jurisdiction identifying the party responsible for the inspection, testing, and maintenance requirements of Chapter 14. This documentation shall take one of the following forms:

1. *An affidavit attesting to the responsibilities and qualifications of the parties performing the inspection, testing, and maintenance and accepting responsibility
of compliance with Chapter 14. This document shall be signed by a representative of the service provider.

A.26.5.2(1) Chapter 14 permits the building owner or his designated representative to perform these services if they are qualified. In this situation, the documentation could be a declaration of qualification signed by the building owner. Multiple service providers are permitted.

(2) Documentation indicating code compliance of the remote station alarm system issued by the organization that listed the service provider.

(3) Other documentation acceptable to the authority having jurisdiction.

26.5.3* Facilities.

26.5.3.1 Fire Alarm systems utilizing remote supervising station connections shall transmit alarm and supervisory signals to a facility meeting the requirements of either 26.5.3.1.1, 26.5.3.1.2 or 26.5.3.1.3.

26.5.3.1.1 Fire Alarm, supervisory, and trouble signals shall be permitted to be received at a public fire service communications center, at the fire station, or at the governmental agency that has the public responsibility for taking prescribed action to ensure response upon receipt of a fire alarm signal that complies with the requirements of NFPA 1221, Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems.

26.5.3.1.2 Alarm, supervisory, and trouble signals shall be permitted to be received at the fire station or at the governmental agency that has public responsibility for taking prescribed action to ensure response upon receipt of an alarm signal.

26.5.3.1.3* Where permitted by the authority having jurisdiction, fire alarm, supervisory, and trouble signals shall be permitted to be received at an alternate location approved by the authority having jurisdiction.

A.26.5.3.1.3 A listed central station might be considered an acceptable alternate location for receipt of fire alarm, and supervisory, and trouble signals.

26.5.3.2* Trouble signals shall be permitted to be received at an constantly attended approved location that has personnel on duty who are trained to recognize the type of signal received and to take prescribed action. The location shall be permitted to be other than that at which alarm and supervisory signals are received.

26.5.3.3 If locations other than the public fire service communications center are used for the receipt of signals, access to receiving equipment shall be restricted in accordance with the requirements of the authority having jurisdiction.

26.5.4.4 Retransmission of an alarm signal, if required, shall be by one of the following methods, which appear in descending order of preference as follows:

(1) A dedicated circuit that is independent of any switched telephone network. This circuit shall be permitted to be used for voice or data communications.

(2) A one-way (outgoing only) telephone at the remote supervising station that utilizes the public switched telephone network. This telephone shall be used
primary for voice transmission of alarms to a telephone at the public fire service communications center that cannot be used for outgoing calls.

(3) A private radio system using the fire department frequency, where permitted by the fire department.

(4) Other methods accepted by the authority having jurisdiction.

26.5.4.5.1 Personnel staffing and duties shall comply with 8.5.3.5.1 and 8.5.3.5.2. The remote supervising station shall have not less than two qualified operators on duty at the remote supervising station at all times to ensure disposition of signals in accordance with the requirements of 26.5.5.

26.5.5 Operations.

26.5.5.1 If the remote supervising station is at a location other than the public fire service communications center, alarm signals shall be immediately retransmitted to the public fire service communications center.

26.5.5.2 Upon receipt of an alarm, a supervisory, or a trouble signal by the remote supervising station other than the public fire service communications center, the operator on duty shall be responsible for notifying the owner or the owner’s designated representative immediately.

26.6 Communications Methods for Supervising Station Fire Alarm Systems.

26.6.2 Equipment.

26.6.2.4 Fire Alarm system equipment and installations shall comply with Federal Communications Commission (FCC) rules and regulations, as applicable, concerning the following:

(1) Electromagnetic radiation
(2) Use of radio frequencies
(3) Connection to the public switched telephone network of telephone equipment, systems, and protection apparatus

26.6.2.5.3 For active and two-way RF multiplex systems that are part of a central station fire alarm system, restoration of service to the affected portions of the system shall be automatically recorded. When service is restored, the first status change of any initiating device circuit, any initiating device directly connected to a signaling line circuit, or any combination thereof that occurred at any of the affected premises during the service interruption also shall be recorded.

26.6.3 Other Transmission Technologies Communication Methods

8.6.3.1 Active Multiplex Transmission Systems.

8.6.3.1.1 The multiplex transmission channel shall terminate in a transmitter at the protected premises and in a system unit at the supervising station.

8.6.3.1.1.1 The derived channel shall terminate in a transmitter at the protected premises and in derived channel equipment at a subsidiary station location or a telephone company wire center.
8.6.3.1.2 The derived-channel equipment at the subsidiary station location or a telephone company wire center shall select or establish the communications with the supervising station.

8.6.3.1.2* Operation of the transmission channel shall conform to the requirements of this Code whether channels are private facilities, such as microwave, or leased facilities furnished by a communications utility company. If private signal transmission facilities are used, the equipment necessary to transmit signals shall also comply with the requirements for duplicate equipment or replacement of critical components, as described in 8.6.5.2.

A.8.6.3.1.2 Where derived channels are used, normal operating conditions of the telephone equipment are not to inhibit or impair the successful transmission of signals. These normal conditions include, but are not limited to, the following:

(1) Intraoffice calls with a transponder on the originating end
(2) Intraoffice calls with a transponder on the terminating end
(4) Intraoffice calls with transponders on both ends
(6) Receipt and origination of long-distance calls
(8) Calls to announcement circuits
(7) Permanent signal receiver off-hook tone
(8) Ringing with no answer, with transponder on either the originating or the receiving end
(9) Calls to tone circuits (i.e., service tone, test tone, busy, or reorder)
(10) Simultaneous signal with voice source
(11) Simultaneous signal with data source
(12) Tip and ring reversal
(13) Cable identification equipment

8.6.3.1.2.1 The trunk transmission channels shall be dedicated facilities for the main channel.

Exception: Derived channel scanners with no more than 32 legs shall be permitted to use the public switched telephone network for the main channel.

8.6.3.1.2.2 For Type 1 multiplex systems, the public switched telephone network facilities shall be permitted to be used for the alternate channel.

8.6.3.1.3 Derived channel signals shall be permitted to be transmitted over the leg facility, which shall be permitted to be shared by the telephone equipment under all on-hook and off-hook operating conditions.

8.6.3.1.4 If derived-channel equipment uses the public switched telephone network to communicate with a supervising station, such equipment shall meet the requirements of 8.6.3.2.

8.6.3.1.5 The maximum end-to-end operating time parameters allowed for an active multiplex system shall be as follows:

(1) The maximum allowable time lapse from the initiation of a single fire alarm signal until it is recorded at the supervising station shall not exceed 90 seconds. When any number of subsequent fire alarm signals occur at any rate, they shall be recorded at a rate no slower than one every 10 additional seconds.
The maximum allowable time lapse from the occurrence of an adverse condition in any transmission channel until recording of the adverse condition is started shall not exceed 90 seconds for Type 1 and Type 2 systems and 200 seconds for Type 3 systems. The requirements of 8.6.3.1.6 shall apply.

A.8.6.3.1.5(2) Derived channel systems comprise Type 1 and Type 2 systems only.

In addition to the maximum operating time allowed for fire alarm signals, the requirements of one of the following shall be met:

(a) A system unit that has more than 500 initiating device circuits shall be able to record not less than 50 simultaneous status changes within 90 seconds.

(b) A system unit having fewer than 500 initiating device circuits shall be able to record not less than 10 percent of the total number of simultaneous status changes within 90 seconds.

Exception: Proprietary supervising station systems that have operating time requirements specified in 8.4.4.4 through 8.4.4.6.

8.6.3.1.6 The classifications for active multiplex systems shall be divided into three categories on the basis of their ability to perform under adverse conditions of their transmission channels. The system classifications shall be as described in 8.6.3.1.6.1 through 8.6.3.1.6.3.

8.6.3.1.6.1 A Type 1 system shall have dual control as described in 8.6.2.6.

(A) An adverse condition on a trunk or leg facility shall not prevent the transmission of signals from any other trunk or leg facility, except those signals dependent on the portion of the transmission channel in which the adverse condition has occurred.

(B) An adverse condition limited to a leg facility shall not interrupt service on any trunk or other leg facility.

(C) The requirements of 8.6.2.1 through 8.6.2.5 shall be met by Type 1 systems.

8.6.3.1.6.2 A Type 2 system shall have the same requirements as a Type 1 system.

Exception: Dual control of the primary trunk facility shall not be required.

8.6.3.1.6.3 A Type 3 system shall automatically indicate and record at the supervising station the occurrence of an adverse condition on the transmission channel between a protected premises and the supervising station. The requirements of 8.6.2 shall be met.

Exception: The requirements of 8.6.2.6 shall not apply.

8.6.3.1.7 Allowable system loading capacities of active multiplex systems shall be in accordance with Table 8.6.3.1.7 unless otherwise permitted by 8.6.3.1.8.

A.8.6.3.1.7 The capacities of active multiplex systems are based on the overall reliability of the signal receiving, processing, display, and recording equipment at the supervising and subsidiary stations, and the capability to transmit signals during adverse conditions of the signal transmission facilities.

Table 8.6.3.1.7–Loading Capacities for Active Multiplex Systems

8.6.3.1.8 If the signal receiving, processing, display, and recording equipment are duplicated at the supervising station and a switchover is able to be accomplished in not
more than 30 seconds with no loss of signals during this period, the capacity of a system unit shall be unlimited.

26.6.3.1* General.

A.26.6.3.1 Certain legacy technologies (active multiplex, McCulloh, directly connected non-coded and private microwave) have been removed from the text of the document. Existing systems utilizing these technologies are acceptable, because all these technologies also comply with the general provisions of 26.6.3.1.

26.6.3.1.1 Conformance. Other transmission technologies shall include those transmission technologies that operate on principles different from specific transmission technologies covered by this chapter and Communications methods operating on principles different from specific methods covered by this chapter shall be permitted to be installed if they conform to the performance requirements of this subsection and to all other applicable requirements of this Code.

26.6.3.1.2 Federal Communications Commission. Fire Alarm system equipment and installations shall comply with the Federal Communications Commission (FCC) rules and regulations, as applicable, concerning electromagnetic radiation, use of radio frequencies, and connections to the public switched telephone network of telephone equipment, systems, and protection apparatus.

26.6.3.1.4 Communications Integrity. Provision shall be made to monitor the integrity of the transmission technology and its communications path. The following requirements shall apply:

(1) Any failure shall be annunciated at the supervising station within 5 minutes of the failure.

(2) If communications cannot be established with the supervising station, an indication of this failure to communicate shall be annunciated at the protected premises.

(3) If a portion of the communications path cannot be monitored for integrity, a redundant communications path shall be provided.

(4) Provision shall be made to monitor the integrity of the redundant communications path.

(5) Failure of both the primary and redundant communications paths shall be annunciated at the supervising station within not more than 24 hours of the failure.

(6) System units at the supervising station shall be restored to service within 30 minutes of a failure.

(7) The transmission technology shall be designed so that upon failure of a transmission channel serving a system unit at the supervising station, the loss of the ability to monitor shall not affect more than 3000 transmitters.

26.6.3.1.4.1 Single Communications Technology. Where only one communications technology is used, any failure of the communications path shall be annunciated at the supervising station within 5 minutes of the failure.

26.6.3.1.4.2 Multiple Communications Technologies. Where two or more different technologies are used, the following requirements shall be met:
(1) Provision shall be made to monitor the integrity of each communications path.
(2) Failure of any communications path shall be annunciated at the supervising station and at the protected premises within not more than 24 hours of the failure.

*Exception: Where technologies used are described elsewhere in this Code, monitoring for integrity shall be permitted to comply with those requirements.*

**26.6.3.1.5 Spare System Unit Equipment.** An inventory of spare equipment shall be maintained at the supervising station such that any failed piece of equipment can be replaced and the systems unit restored to full operation within the time limitations specified in this Code 30 minutes of failure.

**26.6.3.1.6.2** If duplicate spare system units are maintained at the supervising station and switchover can be achieved in 30 seconds, then the system capacity shall be permitted to be unlimited.

**26.6.3.1.10.1** Communication of alarm, supervisory, and trouble signals shall be in a highly reliable manner in accordance with this section to prevent degradation of the signal in transit, which in turn would result in either of the following:

(1) Failure of the signal to be displayed and recorded at the supervising station
(2) An incorrect corrupted signal displayed and recorded at the supervising station

**26.6.3.1.10 Signal Error Detection and Correction.**

**8.6.4.11* Signal Priority.** If the communications methodology is shared with any other usage, all fire alarm, supervisory, and trouble signals shall take precedence, in that respective order of priority, over all other signals unless otherwise permitted by the authority having jurisdiction.

*Exception: If an order of signal priority cannot be assured, then the maximum duration between the initiation of an alarm signal at the protected premises, transmission of the signal, and subsequent display and recording of the alarm signal at the supervising station shall not exceed 90 seconds.*

**A.8.6.4.11** Signals from hold-up alarms or other signals indicating life-threatening situations are permitted to take precedence over supervisory and trouble signals if acceptable to the authority having jurisdiction.

**26.6.3.1.11* Sharing Communications Equipment On-Premises.**

If the fire alarm transmitter is sharing on-premises communications equipment, the shared equipment shall be listed for the purpose. If on-premises communications equipment is not listed for the purpose, the fire alarm transmitter shall be installed ahead of the unlisted communications equipment.

**A.26.6.3.1.11** Most communications equipment is not specifically listed for fire alarm applications, but is listed in accordance with applicable product standard for general communications equipment.

**26.6.3.1.12* Secondary Power.** Secondary power capacity in accordance with 10.5.6 shall be provided for all equipment necessary for the transmission and reception of alarm, supervisory, trouble, and other signals located at the protected premises and at the supervising station.
A.26.6.3.1.12 This requirement is to ensure that communications equipment will operate for the same period of time on secondary power as the alarm control unit.

8.6.4.13 Service Provider Diversity. When a redundant path is required, both paths shall be private or the alternate path shall be provided by a public communications service provider different from the primary path, if available.

26.6.3.1.13 Unique Flaws Not Covered by This Code. If a communications technology has a unique flaw that could result in the failure to communicate a signal, the implementation of that technology for fire alarm signaling shall compensate for that flaw so as to eliminate the risk of missing an fire alarm signal.

8.6.4.14 Throughput Probability. When the supervising station does not regularly communicate with the transmitter at least once every 200 seconds, then the throughput probability of the alarm transmission shall be at least 90 percent in 90 seconds, 99 percent in 180 seconds, or 99.999 percent in 450 seconds.

26.6.3.2 Digital Alarm Communicator Systems.

26.6.3.2.1 Digital Alarm Communicator Transmitter (DACT).

26.6.3.2.1.1* 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 26.6.3.2.1.1 shall not apply to the cellular telephone service.

26.6.3.2.1.4 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:

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 26.6.3.1

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 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 26.6.3.2.1.4(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.*

*26.6.3.2.1.4(B)(6) Where two telephone lines (numbers) are used, care should be taken to assign the primary DACT telephone line (number) to a nonessential telephone line (number) at the protected premises so that the primary line used in the premises is not unnecessarily interrupted.*

*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.

26.6.3.2.1.5 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.*

*26.6.3.2.1.5(4) Where two telephone lines (numbers) are used, care should be taken to assign the primary DACT telephone line (number) to a nonessential telephone line (number) at the protected premises so that the primary line used in the premises is not unnecessarily interrupted.*
(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) 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 that signal processing is automated so that 24-hour delinquencies are individually acknowledged by supervising station personnel.

(7) *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.

26.6.3.2.3.3 Digital Alarm Radio Receiver (DARR) Equipment.

(A) A spare DARR shall be provided in the supervising station and shall be able to be switched into the place of a failed unit within 30 seconds after detection of failure.

(B) Facilities shall be provided at the supervising station for supervisory and control functions of subsidiary and repeater station radio-receiving equipment. This shall be accomplished via a supervised circuit where the radio equipment is remotely located from the supervising or subsidiary station. The following conditions shall be supervised at the supervising station:

1. Failure of ac power supplying the radio equipment
2. Malfunction of receiver
3. Malfunction of antenna and interconnecting cable
4. Indication of automatic switchover of the DARR
5. Malfunction of data transmission line between the DARR and the supervising or subsidiary station

8.6.3.3 McCulloh Systems.

8.6.3.3.1 Transmitters.

8.6.3.3.1.1 A coded alarm signal from a transmitter shall consist of not less than three complete rounds of the number or code transmitted.

8.6.3.3.1.2* A coded fire alarm box shall produce not less than three signal impulses for each revolution of the coded signal wheel or another approved device.

8.6.3.3.1.3 Circuit-adjusting means for emergency operating shall be permitted to be either automatic or be provided through manual operation upon receipt of a trouble signal.

8.6.3.3.1.4* Equipment shall be provided at the supervising or subsidiary station on all circuits extending from the supervising or subsidiary station that is utilized for McCulloh systems for performing the following:

A. 8.6.3.3.1.4 The current readings, in accordance with 8.6.3.3.1.4(1), should be compared with the normal readings to determine whether a change in the circuit condition has occurred. A zero current reading in accordance with 8.6.3.3.1.4(2) indicates that the circuit is clear of a foreign ground.
(1) Tests on current on each circuit under nontransmitting conditions
(2) Tests on current on each side of the circuit with the receiving equipment conditioned for an open circuit

8.6.3.3.2 Transmission Channels.

8.6.3.3.2.1 Circuits between the protected premises and the supervising or subsidiary station that are essential to the actuation or operation of devices that initiate a signal indicative of fire shall be arranged so that the occurrence of a single break or single ground fault does not prevent transmission of an alarm.

8.6.3.3.2.2 Circuits wholly within the supervising or subsidiary station shall not be required to be arranged in accordance with 8.6.3.3.2.1.

8.6.3.3.2.3 The carrier system portion of circuits shall not be required to be arranged in accordance with 8.6.3.3.2.1.

8.6.3.3.2.4 The occurrence of a single break or a single ground fault on any circuit shall not of itself cause a false signal that is able to be interpreted as an alarm of fire. If such a single fault prevents the functioning of any circuit, its occurrence shall be indicated automatically at the supervising station by a trouble signal that compels attention and that is distinguishable from signals other than those indicative of an abnormal condition of supervised parts of a fire suppression system(s).

8.6.3.3.2.5 The circuits and devices shall be arranged to receive and record a signal identifiable as to location of origin, and provisions shall be made for identifying transmission to the public fire service communications center.

8.6.3.3.2.6 Multipoint transmission channels between the protected premises and the supervising or subsidiary station and within the protected premises, consisting of one or more coded transmitters and an associated system unit(s), shall meet the requirements of either 8.6.3.3.2.7 or 8.6.3.3.2.8.

8.6.3.3.2.7 If end-to-end metallic continuity is present, signals shall be received from other points under any one of the following transmission channel fault conditions at one point on the line:

   (1) Open
   (2) Ground
   (3) *Wire-to-wire short

   A.8.6.3.3.2.7(3) Though rare, it is understood that the occurrence of a wire-to-wire short on the primary trunk facility near the supervising station could disable the transmission system without immediate detection.

   (4) Open and ground

8.6.3.3.2.8 If end-to-end metallic continuity is not present, the nonmetallic portion of transmission channels shall meet all of the following requirements:

   (1) Two nonmetallic channels or one channel plus a means for immediate transfer to a standby channel shall be provided for each transmission channel, with a maximum of eight transmission channels being associated with each standby channel, or shall be furnished over one channel, provided that service is limited to one plant.
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(2) The two nonmetallic channels (or one channel with standby arrangement) for each transmission channel shall be provided by one of the following means, shown in descending order of preference:
   (a) Over separate facilities and separate routes
   (b) Over separate facilities in the same route
   (c) Over the same facilities in the same route

(3) Failure of a nonmetallic channel or any portion thereof shall be indicated immediately and automatically in the supervising station.

(4) Signals shall be received from other points under any one of the following fault conditions at one point on the metallic portion of the transmission channel:
   (a) Open
   (b) Ground
   (c) Wire-to-wire short

A.8.6.3.3.2.8(4)(e) Though rare, it is understood that the occurrence of a wire-to-wire short on the primary trunk facility near the supervising station could disable the transmission system without immediate detection.

8.6.3.3.3 Loading Capacity of McCulloh Circuits.

8.6.3.3.3.1 The number of transmitters connected to any transmission channel shall be limited to eliminate interference.

8.6.3.3.3.2 The total number of code wheels or other approved devices connected to a single transmission channel shall not exceed 250.

8.6.3.3.3.3 Alarm signal transmission channels shall be reserved exclusively for fire alarm signal transmitting service unless the transmission channels meet the requirements of 8.6.3.3.3.6.

8.6.3.3.3.4 The number of waterflow switches permitted to be connected to actuate a single transmitter shall not exceed five switches.

8.6.3.3.3.5 The number of supervisory switches permitted to be connected to actuate a single transmitter shall not exceed 20 switches.

8.6.3.3.3.6 Combined alarm and supervisory transmission channels shall comply with the following:
   (1) If both sprinkler supervisory signals and fire or waterflow alarm signals are transmitted over the same transmission channel, provision shall be made to obtain either alarm signal precedence or continuous repetition of the alarm signal to prevent the loss of any alarm signal.
   (2) Other signal transmitters (e.g., burglar, industrial processes) on an alarm transmission channel shall not exceed five.

8.6.3.3.3.7* If signals from manual fire alarm boxes and waterflow alarm transmitters within a building are transmitted over the same transmission channel and are operating at the same time, there shall be no interference with the fire box signals. Provision of the shunt noninterfering method of operation shall be permitted for this performance.

A.8.6.3.3.3.7 At the time of system acceptance, verification should be made that manual fire alarm box signals are free of transmission channel interference.
8.6.3.3.3.8 One alarm transmission channel shall serve not more than 25 plants.
   (A) A plant shall be permitted to consist of one or more buildings under the same ownership, and the circuit arrangement shall be such that an alarm signal cannot be received from more than one transmitter at a time within a plant.
   (B) If such noninterference is not provided, each building shall be a plant.

8.6.3.3.3.9 One sprinkler supervisory transmission channel circuit shall serve not more than 25 plants. A plant shall be permitted to consist of one or more buildings under the same ownership.

8.6.3.3.3.10 Connections to a guard supervisory transmission channel or to a combination manual fire alarm and guard transmission channel shall be limited so that not more than 60 scheduled guard report signals are transmitted in any 1-hour period. Patrol scheduling shall be such as to eliminate interference between guard report signals.

8.6.3.3.4 Unless accepted by the authority having jurisdiction, McCulloh systems shall not be permitted to be installed after June 30, 2003.

   A.8.6.3.3.4 It is anticipated that McCulloh transmission technology will cease to be a viable option due to many factors, including unavailability of parts, unavailability of telephone facilities, and lack of technical support availability. This does not preclude the use, maintenance, or expansion of existing McCulloh systems.

26.6.3.3 Radio Systems.

26.6.3.3.1 Two-Way Radio Frequency (RF) Multiplex Systems.

26.6.3.3.1.1 Maximum Operating Time. The maximum end-to-end operating time parameters allowed for a two-way RF multiplex system shall be as follows:

   (1) The maximum allowable time lapse from the initiation of a single fire alarm signal until it is recorded at the supervising station shall not exceed 90 seconds. When any number of subsequent fire alarm signals occur at any rate, they shall be recorded at a rate no slower than one every additional 10 seconds.

   (2) The maximum allowable time lapse from the occurrence of an adverse condition in any transmission channel until recording of the adverse condition is started shall not exceed 200 seconds for Type 4 and Type 5 systems. The requirements of 26.6.3.3.1.4 shall apply.

   (3) In addition to the maximum operating time allowed for fire alarm signals, the requirements of one of the following shall be met:
      (a) A system unit that has more than 500 initiating device circuits shall be able to record not less than 50 simultaneous status changes within 90 seconds.
      (b) A system unit that has fewer than 500 initiating device circuits shall be able to record not less than 10 percent of the total number of simultaneous status changes within 90 seconds.

26.6.3.3.2 One-Way Private Radio Alarm Systems.

26.6.3.3.2.1 Independent Receivers.
(A) The requirements of 26.6.3.3.2 for a radio alarm repeater station receiver (RARSR) shall be satisfied if the signals from each radio alarm transmitter (RAT) are received and supervised, in accordance with Chapter 26, by at least two independently powered, independently operating, and separately located RARSRs or radio alarm supervising station receivers (RASSRs), or by one of each.

(B) At least two separate paths shall be provided from a RAT to the ultimate RASSR.

(C) Only one path to the RASSR shall be required to be utilized in the event alarms can be transmitted from a RAT to the RASSR and the RAT has the ability to receive a positive acknowledgment that the RASSR has received the signal.

26.6.3.3.2.2* Maximum Operating Time. The end-to-end operating time parameters allowed for a one-way radio alarm system shall be as follows:

(1) There shall be a 90 percent probability that the time between the initiation of a single alarm signal until it is recorded at the supervising station will not exceed 90 seconds.

(2) There shall be a 99 percent probability that the time between the initiation of a single fire alarm signal until it is recorded at the supervising station will not exceed 180 seconds.

(3) There shall be a 99.999 percent probability that the time between the initiation of a single fire alarm signal until it is recorded at the supervising station will not exceed 7.5 minutes (450 seconds), at which time the RAT shall cease transmitting. When any number of subsequent fire alarm signals occurs at any rate, they shall be recorded at an average rate no slower than one every additional 10 seconds.

(4) In addition to the maximum operating time allowed for alarm signals, the system shall be able to record not less than 12 simultaneous status changes within 90 seconds at the supervising station.

26.6.3.3.2.3 Supervision. Equipment shall be provided at the supervising station for the supervisory and control functions of the supervising or subsidiary station and for the repeater station radio transmitting and receiving equipment. This shall be accomplished via a supervised circuit where the radio equipment is remotely located from the system unit and the conditions of 26.6.3.3.2.3(A) through 26.6.3.3.2.3(D) are met.

26.6.3.3.2.4 Transmission Channels. Transmission channels shall comply with 26.6.3.3.2.4(A) through 26.6.3.3.2.4(F).

26.6.3.3.2.6 Loading Capacities. The loading capacities of one-way radio alarm systems shall be based on the overall reliability of the signal-receiving, processing, display, and recording equipment at the supervising or subsidiary station and the capability to transmit signals during adverse conditions of the transmission channels. Loading capacities shall comply with 26.6.3.3.2.6(A) and 26.6.3.3.2.6(B).

(A) Allowable loading capacities shall be in accordance with Table 26.6.3.3.2.6(A), except as modified by the following:

(1) Each guard’s tour transmitter shall reduce the allowable RATs by 15.
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(2) Each two-way protected premises radio transmitter shall reduce the allowable RATs by two.
(3) Each supervised burglar alarm (open/close) or each suppressed guard’s tour transmitter shall reduce the allowable RATs by five.
(B) If the signal-receiving, processing, display, and recording equipment is duplicated at the supervising station and a switchover is able to be accomplished in not more than 30 seconds, with no loss of signals during this period, the capacity of a system unit shall be permitted to be unlimited.

8.6.3.6 Directly Connected Noncoded Systems.

8.6.3.6.1 Circuits. Circuits for transmission of alarm signals between the fire alarm control unit or the transmitter in the protected premises and the supervising station shall be arranged to comply with either (1) or (2):

(1) These circuits shall be arranged so that the occurrence of a single break or single ground fault does not prevent the transmission of an alarm signal. Circuits complying with this paragraph shall be automatically self-adjusting in the event of either a single break or a single ground fault and shall be automatically self-restoring in the event that the break or fault is corrected.
(2) These circuits shall be arranged so that they are isolated from ground (except for reference ground detection) and so that a single ground fault does not prevent the transmission of an alarm signal. Circuits complying with this paragraph shall be provided with a ground reference circuit so as to detect and indicate automatically the existence of a single ground fault.

8.6.3.6.1.1 Additional Requirements. In addition, these circuits shall comply with all of the following requirements:

(1) A multiple ground-fault condition that would prevent alarm operation shall be indicated by an alarm or by a trouble signal.
(2) Circuits for transmission of supervisory signals shall be separate from alarm circuits.
(3) The occurrence of a single break or a single ground fault on any circuit shall not of itself cause a false signal that is able to be interpreted as an alarm of fire.

8.6.3.6.1.2 Exclusions. The requirements of this section shall not apply to the following circuits:

(1) Circuits wholly within the supervising station
(2) Circuits wholly within the protected premises extending from one or more automatic fire detectors or other noncoded initiating devices other than waterflow devices to a transmitter or fire alarm control unit
(3) Power supply leads wholly within the building or buildings protected

8.6.3.6.2 Loading Capacity of Circuits.

8.6.3.6.2.1 The number of initiating devices connected to any signaling circuit and the number of plants that shall be permitted to be served by a signal circuit shall be determined by the authority having jurisdiction and shall not exceed the limitations specified in this subsection.
8.6.3.6.2.2 A plant shall be permitted to consist of one or more buildings under the same ownership.

8.6.3.6.2.3* A single circuit shall not serve more than one plant.

A.8.6.3.6.2.3 If a single plant involves more than one gate entrance or involves a number of buildings, separate circuits might be required so that the alarm to the supervising station indicates the area to which the fire department is to be dispatched.

8.6.3.7 Private Microwave Radio Systems.

8.6.3.7.1* If a private microwave radio is used as the transmission channel and communications channel, supervised transmitting and receiving equipment shall be provided at supervising, subsidiary, and repeater stations.

A.8.6.3.7.1 A private microwave radio can be used either as a transmission channel, to connect a transmitter to a supervising station or subsidiary station, or as a communications channel to connect a subsidiary station(s) to a supervising station(s). This can be done independently or in conjunction with wireline facilities.

8.6.3.7.2 If more than five protected buildings or premises or 50 initiating devices or initiating device circuits are being serviced by a private radio carrier, the supervising, subsidiary, and repeater station radio facilities shall meet all of the following criteria:

(1) Dual supervised transmitters, arranged for automatic switching from one to the other in case of trouble, shall be installed.

(2) If the transmitters are located where someone is always on duty, switchboard facilities shall be permitted to be manually operated, provided the switching is able to be carried out within 30 seconds.

(3) If the transmitters are located where no one is continuously on duty, the circuit extending between the supervising station and the transmitters shall be a supervised circuit.

(4) *Transmitters shall be operated on a time ratio of 2:1 within each 24 hours.

A.8.6.3.7.2(4) Transmitters should be operated alternately, 16 hours on and 16 hours off.

(5) Dual receivers shall be installed with a means for selecting a usable output from one of the two receivers.

(6) The failure of one receiver shall in no way interfere with the operation of the other receiver, and failure of either receiver shall be annunciated.

8.6.3.7.3 Means shall be provided at the supervising station for the supervision and control of supervising, subsidiary, and repeater station radio transmitting and receiving equipment. If the radio equipment is remote from the supervising station, this shall be accomplished via a supervised circuit.

8.6.3.7.3.1 The following conditions shall be supervised at the supervising station:

(1) Transmitter in use (radiating)

(2) Failure of ac power supplying the radio equipment

(3) Receiver malfunction
(4) Indication of automatic switchover

8.6.3.7.3.2 It shall be possible to independently deactivate either transmitter from the supervising station.

8.6.4 Other Transmission Technologies.

8.6.4.1 Conformance. Other transmission technologies shall include those transmission technologies that operate on principles different from specific transmission technologies covered by this chapter and shall be permitted to be installed if they conform to the requirements of this subsection and to all other applicable requirements of this Code.

8.6.4.2 Federal Communications Commission. Fire alarm system equipment and installations shall comply with the Federal Communications Commission (FCC) rules and regulations, as applicable, concerning electromagnetic radiation, use of radio frequencies, and connections to the public switched telephone network of telephone equipment, systems, and protection apparatus.

8.6.4.3 National Electrical Code. Equipment shall be installed in compliance with NFPA 70, National Electrical Code.

8.6.4.4 Communications Integrity. Provision shall be made to monitor the integrity of the transmission technology and its communications path. The following requirements shall apply:

(1) Any failure shall be annunciated at the supervising station within 5 minutes of the failure.
(2) If communications cannot be established with the supervising station, an indication of this failure to communicate shall be annunciated at the protected premises.
(3) If a portion of the communications path cannot be monitored for integrity, a redundant communications path shall be provided.
(4) Provision shall be made to monitor the integrity of the redundant communications path.
(5) Failure of both the primary and redundant communications paths shall be annunciated at the supervising station within not more than 24 hours of the failure.
(6) System units at the supervising station shall be restored to service within 30 minutes of a failure.
(7) The transmission technology shall be designed so that upon failure of a transmission channel serving a system unit at the supervising station, the loss of the ability to monitor shall not affect more than 3000 transmitters.

8.6.4.5 Spare System Unit Equipment. An inventory of spare equipment shall be maintained at the supervising station such that any failed piece of equipment can be replaced and the systems unit restored to full operation within the time limitations specified in this Code.

8.6.4.6 Loading Capacity of a System Unit.
8.6.4.6.1 The maximum number of independent fire alarm systems connected to a single system unit shall be limited to 512.

8.6.4.6.2 If duplicate spare system units are maintained at the supervising station and switchover can be achieved in 30 seconds, then the system capacity shall be unlimited.

8.6.4.7 End-to-End Communication Time for an Alarm. The maximum duration between the initiation of an alarm signal at the protected premises, transmission of the signal, and subsequent display and recording of the alarm signal at the supervising station shall not exceed 90 seconds.

8.6.4.8 Unique Identifier. If a transmitter shares a transmission or communications channel with other transmitters, it shall have a unique transmitter identifier.

8.6.4.9 Recording and Display Rate of Subsequent Alarms. Recording and display of alarms at the supervising station shall be at a rate no slower than one complete signal every 10 seconds.

8.6.4.10 Signal Error-Detection and Correction.

8.6.4.10.1 Communication of alarm, supervisory, and trouble signals shall be in a highly reliable manner to prevent degradation of the signal in transit, which in turn would result in either of the following:

(1) Failure of the signal to be displayed and recorded at the supervising station
(2) An incorrect corrupted signal displayed and recorded at the supervising station

8.6.4.10.2 Reliability of the signal shall be achieved by any of the following:

(1) Signal repetition — multiple transmissions repeating the same signal
(2) Parity check — a mathematically check sum algorithm of a digital message that verifies correlation between transmitted and received message
(3) An equivalent means to 8.6.4.10.2(1) or 8.6.4.10.2(2) that provides a certainty of 99.99 percent that the received message is identical to the transmitted message

8.6.4.11 Signal Priority. If the communications methodology is shared with any other usage, all fire alarm, supervisory, and trouble signals shall take precedence, in that respective order of priority, over all other signals unless otherwise permitted by the authority having jurisdiction.

Exception: If an order of signal priority cannot be assured, then the maximum duration between the initiation of an alarm signal at the protected premises, transmission of the signal, and subsequent display and recording of the alarm signal at the supervising station shall not exceed 90 seconds.

A.8.6.4.11 Signals from hold-up alarms or other signals indicating life-threatening situations are permitted to take precedence over supervisory and trouble signals if acceptable to the authority having jurisdiction.

8.6.4.12 Sharing Communications Equipment On-Premises. If the fire alarm transmitter is sharing on-premises communications equipment, the shared equipment shall be listed for the purpose. If on-premises communications equipment is not listed for the purpose, the fire alarm transmitter shall be installed ahead of the unlisted communications equipment.
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8.6.4.13 Service Provider Diversity. When a redundant path is required, both paths shall be private or the alternate path shall be provided by a public communications service provider different from the primary path, if available.

8.6.4.14 Throughput Probability. When the supervising station does not regularly communicate with the transmitter at least once every 200 seconds, then the throughput probability of the alarm transmission shall be at least 90 percent in 90 seconds, 99 percent in 180 seconds, or 99.999 percent in 450 seconds.

8.6.4.15 Unique Flaws Not Covered by This Code. If a communications technology has a unique flaw that could result in the failure to communicate a signal, the implementation of that technology for fire alarm signaling shall compensate for that flaw so as to eliminate the risk of missing a fire alarm signal.

26.6.4 Display and Recording Requirements for All Transmission Technologies.

26.6.4.1* Any status changes, including the initiation or restoration to normal of a trouble condition, that occur in an initiating device or in any interconnecting circuits or equipment, including the local protected premises controls from the location of the initiating device(s) to the supervising station, shall be presented in a form to expedite prompt operator interpretation. Status change signals shall provide the following information:

- Identification of the type of signal to show whether it is an alarm, supervisory, delinquency, or trouble signal
- Identification of the signal to differentiate between an initiation of an alarm, a supervisory, a delinquency, or a trouble signal and a clearing from one or more of these conditions
- Identification of the site of origin of each status change signal
- Identification of specific types of signals that dictate a different Response

A.26.6.4.1(4) Any signal that would dictate a different response, such as carbon monoxide alarms or mass notification alarms, should be individually identifiable so the appropriate response to the event can be initiated. There are more types of alarms and other signals that are being received at supervising stations and that require different responses by supervising station operators. These signals could be other than fire, but still life safety in nature, and must be uniquely identified because their signal is indicative of a different response.

26.6.4.2* If duplicate equipment for signal receiving, processing, display, and recording is not provided, the installed equipment shall be designed so that any critical assembly is able to be replaced from on-premises spares and the system is able to be restored to service within 30 minutes. A critical assembly shall be an assembly in which a malfunction prevents the receipt and interpretation of signals by the supervising station operator.

Exception: Proprietary and remote station systems.

8.7 Mass Notification Systems. See Annex E.