TG-7FE LTE

Telguard Communicator for Commercial Fire Applications

Architectural and Engineering Specification

TELGUARD

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1 General

1.1 Purpose

When preparing a specification or quotation for the use of a Telguard cellular device in a commercial fire application, it may be necessary to supply a detailed functional description of the equipment. The Architectural and Engineering Specifications presented in this publication cover such information for the TG-7FE model—indiscriminate of carrier variance—and are intended to be used for this purpose as required.

1.2 Scope

Although the service provider can vary (AT&T or Verizon), this Architectural and Engineering Specification document contains detailed functional description for the TG-7FE unit (-A or -V, for AT&T and Verizon, respectively) to work in conjunction with FACP systems with DACT connections.

1.3 Warranty

Telguard sells its hardware through authorized distributors. As such, Telguard has a responsibility to repair or replace (our option) inoperative units for up to a specified time from date of manufacture. The warranty period is agreed upon by the distributor upon purchase. This excludes damage due to lightning or installer error. Unauthorized modifications void this warranty. Telguard is not responsible for incidental or consequential damages. Liability is limited to price of unit to the distributor.

2 System Summary

2.1 Unit Description

The Telguard TG-7FE is a dual path communicator that can be used to provide the following three methods of communications for FACP units, using a combination of cellular and Internet-enabled LAN connections:

- Sole Path (Cellular Transmission Only)
- Dual Path Cell Primary (Cellular Primary & LAN Backup)
- Dual Path LAN Primary (LAN Primary & Cellular Backup)
- Active Dual Path Cell Primary (Canada Only; Cellular Primary & LAN Backup)
- Active Dual Path LAN Primary (Canada Only; LAN Primary & Cellular Backup)

2.2 System Overview

Depending on the configuration (determined at time of installation), the FACP will use the TG-7FE as a sole or dual path communicator to deliver alarm messages.

When it is configured as a dual path communicator, it will provide transparent access from the FACP to the central station using either a cellular connection or LAN access to the internet. When transmitting an alarm signal, the Telguard communicator obtains its data from the alarm panel by way of a DACT interface. The Telguard communicator will obtain all alarm signal information including monitoring station phone number, account number and all zones for every alarm transmission. The communicator handshakes with the FACP causing it to transmit the alarm data. The TG-7FE encodes the alarm data and transmits to the Telguard Communication Center (TCC) over the primary path if available, or the secondary path if not. The TCC performs a function similar to a central station receiver and issues the transmission acknowledgement when the last message in the transmission is received. After decoding and reformatting, the alarm signal is routed to the appropriate alarm company monitoring station for action. If configured as a sole path communicator, The TG-7FE performs similarly using a single cellular path.

As a backup communicator for a Telco connection, the incoming Telco line is connected from the premises' RJ-31x jack to one of the two FACP tip and ring connections. The Telguard's RJ-45 jack will connect to other tip and ring connection in a similar fashion. Two programmable System Trouble Condition (STC) relays provide supervisory trip outputs for connection to the FACP's trip zone input terminals in order to provide a Telguard trouble signal. Additionally, automatic self-test and remote query signals are transmitted exclusively over the chosen path (dual or sole). No extra modules are required.

The Telguard TG-7FE has its own AC power supply which keeps the required battery charged. As a matter of convenience, it can also bypass the need for an AC source and battery supply, by using the 12 or 24VDC auxiliary power provided by the panel.

2.2 Approvals

- UL: Underwriters Laboratories Inc

2.2.1 Listings (UL/ULC Standards)

- **UL 864: Standard for Control Units and Accessories for Fire Alarm Systems**
- UL 1610: Standard for Central-Station Burglar-Alarm Units
- ULC S559: Equipment for Fire Signal Receiving Centres and Systems
- ULC S304: Canadian Commercial Burglary Alarm Systems

3 Functional Description

3.1 Signal Transmission from FACP to Central Station

The path of a signal from the FACP to the Central Station receiver through the TG-7FE unit has three main stages:

1. Local capture of the signal: Using dialer capture technology
2. Data delivery to the TCC: By means of the cellular or LAN connection
3. Delivery of the signal to the Central Station: Through a choice of IP or PSTN connection

3.1.1 Dialer Capture

The TG-7FE unit has a patented integrated interface that allows digital dialers to dial into the unit using the following specifications:

- Line voltage: -30 Vdc into standard telephone device when on hook.
- Dial tone: Precision 350 + 440Hz +/- 1%. 10 digits dial out capability.
- Mode: Loop start only. 25mA +/- 10% off-hook.

As long as the TG-7FE unit has a proper connection to the wireless network or Internet-enabled LAN (depending on selected configuration), it will provide a dial tone for the FACP to use. Once the FACP has dialed in, the TG-7FE will interact with the panel by providing handshakes and kiss-offs, similar to a Central Station receiver. Provided that the alarm data received is valid per the alarm format protocol, the TG-7FE will capture the message and pertinent information for delivery, while the FACP will be satisfied with the received kiss-off. If an invalid format, or invalid data is captured, no kiss-off will be provided.

Compatible formats for the TG-7FE units are:

- Pulse Formats (Hexadecimal account numbers can be used):
    - 3+1 pulse; 10pps, Double Round, 1400 Hz ack
    - 3+1 pulse; 20pps, Double Round, 2300 Hz ack
    - 3+1 pulse; 40pps, Double Round, 2300 Hz ack
    - 4+2 pulse; 20pps, Double Round, 1400 Hz ack
    - 4+2 pulse; 20pps, Double Round, 2300 Hz ack
    - 4+2 pulse; 40pps, Double Round, 2300 Hz ack
- Contact ID (Hexadecimal account numbers can be used, 4 or 10 digits in length)
- Modem IIe/IIIa2/4 (Hexadecimal account numbers can be used, 4 digits in length)
- SIA2 (SIA-DC-03 level 2 release at 300 baud)
- Sonitrol
- DMP

3.1.2 Cellular Transmission

Once the signal is obtained by the TG-7FE, it is encrypted (256-bit AES) and packetized for digital delivery via the cellular network. Depending on the version of the TG-7FE unit used (Verizon or AT&T), the carrier of choice will be used. All transmissions between the TG-7FE and the TCC will occur via the best available cellular technology at the time, with data sessions being the primary delivery path and SMS being the secondary option. The TG-7FE can work on different bands depending on the carrier of choice:

- AT&T supported bands: 2, 4, 12
- Verizon supported bands: 4, 13

Similar to the way a central station receiver operates, the TG-7FE will not be satisfied until there is an acknowledgment of receipt from the TCC. If acknowledgment is not received by the TG-7FE, a failure will be created and annunciated via suppression of the dial tone.

3.1.3 Internet Transmission

If the communicator is configured to use the LAN path, the same encrypted message is attempted using the available internet connection. Receipt of an acknowledgement for sent messages is still expected, same as it would be with transmission over the cellular path.

3.1.4 Delivery to Central Station

After the TCC receives the data, it will process it for delivery. Based on the subscription options chosen during the registration of the TG-7FE, the TCC can either use the captured phone number and account number to deliver the signal or use a predetermined phone number and account number to redirect the signal. A third option that is available to companies that have set up a connection with a Central Station ahead of time is to use IP delivery rather than POTS to send signals to Central Station. The TCC can deliver signals via IP using the Fibro protocol (for Contact ID and SIA formats) to Surgard receivers, as well as using DMP protocol to send to DMP receivers. Whether using POTS or IP for delivery, the TCC uses an acknowledgment-based retry sequence, where it requires receiver acknowledgment.

3.2 Link Supervision for Sole Path installations

3.2.1 NFPA 72 requirement

The TG-7FE communicator provides a feature known as "Link Supervision" that complies with NFPA 72, editions 2010-2019 for use a sole path communicator. Link Supervision is a feature by which the TCC checks the unit's connectivity and will

create a signal to be delivered to the Central Station if a disruption in service is discovered.

In the US, link supervision can be configured for Sole Path communication and set for 5 minutes (per 2010 edition requirements) or 60 minutes (per 2013 and later edition requirements). In Canada, the requirement for link supervision is 180 seconds. This service is available Sole Path or a version of Dual Path known as Active Dual Path. While in an Active Dual Path configuration, the TG-7FE can enable link supervision on either the chosen primary or secondary path, depending on which is currently active.

3.2.2 Link Supervision

Link Supervision must be enabled from the online portal. It will reprogram the device to initiate check-in signals over the data network, at a frequency that is much higher than the disruption timeout (180 seconds, 5 or 60 minutes). If the TCC detects that there has been no communication for the predetermined disruption timeout, it will create a signal (customized during registration) that will be delivered to the Central Station. Once the check-ins resume, a restoral signal will be created and delivered as well. The check-in signals are between the TG-7FE and the TCC and are therefore not visible to the FACP or the Central Station.

4 Physical Description

4.1 Metal Enclosure
- Paint: Red Urethane
- Locking Mechanism: Zinc die cast lock, 90° turn
- Physical Size: 11.4" x 7.75" x 3.3" (290mm x 197mm x 84mm)
- Shipping weight: Approximately 5 lbs.

4.2 PCB
The TG-7FE unit has I/O connections for communication and power, as well as LEDs to display device status.

4.2.1 I/O Connections
- Antenna port: TNC female connection, 50 ohms
- RJ connections: Two RJ-45 connectors: One black jack for communication from the panel. One silver jack for wired LAN connectivity.
- Pin connectors and terminal blocks: There are four sets of pins, with three available terminal blocks.
    - DC-GND pins: 12/24VDC in. To be used if receiving power from an FACP.
    - STC and Trip In pins: There are two pairs of STC pins. STC 1 acts as a Normally Open relay that will trip on a programmed Telguard failure, whereas STC2 will trip as a Normally Closed relay. There is also a pair of Trip Input connections labeled as Trip and Gnd, which can be optionally used to monitor a dry contact device, with the capability of sending an event to Central Station or provide customer notification on that trip closure/restoral.
        - STC 1 Relay: 30VDC/120mA Max Load (Resistive)
        - STC 2 Relay: 30VDC/100mA Max Load (Resistive)
        - Trip Input: 30VDC/100mA Max Load. <750Ω considered short circuit, and >10kΩ considered open.
    - Battery pins: There is a set of three pins labeled as BATT, with only the outer pins functional and labeled as – and +. This is an alternate connection for the battery, with the same functional specifications as the battery connector.
    - AC pins: There is a set of two pins for an AC Adapter connection. Polarity is not labeled because it is AC voltage.
- Battery Connector: There is a VHR-2N connector that is keyed to fit with the provided battery harness. Polarity is not labeled as the battery harness can only fit in a specific way.

4.2.2 LED Display

LED Symbol	Color	Pattern	Indication
LED 1 Activation	Green	Solid On	Unit is activated at TCC and enabled
		Off	Unit not activated at TCC (and disabled)
		1 Flash*	Unit is disabled
LED 2 STC (System Trouble Condition)	Red	Off	All OK
		1 Flash*	System Trouble Condition – Low/Missing AC Power
		2 Flashes*	System Trouble Condition – Low/Missing Battery and/or Battery Charger Failure
		3 Flashes*	System Trouble Condition – LANFC
		4 Flashes*	System Trouble Condition – NSC
		5 Flashes*	System Trouble Condition – RFC
		6 Flashes*	System Trouble Condition – DTF
		7 Flashes*	System Trouble Condition – PPF
LED 3 Mode	Yellow	Off	FACP idle (Telguard is primary or Sole Path)
		Flash	FACP off-hook (cellular mode)
		On	FACP idle (Telguard is backup)
LED 4 Acknowledge	Red	Solid On	Waiting for acknowledgement from TCC
		Off	Idle state
		1 Flash*	When flashing with LED 1, unit has failed activation

LED 5 Radio	Green	Off	Telguard initialized
		On	Telguard initializing with cellular network
		Flash (1 sec)	Radio receiving message
		Flash (2 sec)	Radio sending message
		Flash * (2 fl / 6 sec)	Link Supervision Mode
LED 6 LAN	Yellow	On	LAN active and operational
		1 Flash*	Disconnected from LAN
		2 Flashes*	Network not detected
		3 Flashes*	Unable to reach TCC
		4 Flashes*	No acknowledgement from TCC
		Flash * (1 fl / 4 sec)	LAN pathway being validated
		Off	Configured in Cellular Only mode
LED 7 Trip Input	Green	Solid On	Trip Input activated
		Off	Trip Input not activated or restored
LED 8 AC Power	Red	Solid On	AC power connected to unit

Note: * means that the LED pattern will repeat until condition clears.

4.3 Accessories
4.3.1 Included with TG-7FE
- Cellular antenna: 8in, 50-ohm nominal, omni-directional LTE antenna with knuckle and male TNC connector. 2dBi gain.
- Antenna cable: 12-ft RG-58 UL approved cable in PVC jacket with 50-ohm TNC male connector and TNC female bulkhead.
- Mounting bracket: 90° angle bracket with .566in-diameter opening for TNC connector.

- Battery harness: 20in battery cable assembly with VHR-2N connector on one end and two quick connect connectors on black and red 18ga wires.
- Enclosure key lock.
- Terminal blocks: Pluggable screw terminal blocks, 3.5mm pitch. Set of 6-, 3-, and 2-position blocks.
- Transformer: UL Listed 12VAC 800mA.

4.3.2 Optional Accessories
- ACD-35 antenna cable: RG-8 UL approved cable in PVC jacket with 50-ohm TNC male connector and TNC female bulkhead. 35ft in length.
- ACD-50 antenna cable: RG-8 UL approved cable in PVC jacket with 50-ohm TNC male connector and TNC female bulkhead. 50ft in length.
- ACD-100 antenna cable: RG-8 UL approved cable in PVC jacket with 50-ohm TNC male connector and TNC female bulkhead. 100ft in length.
- HGDL-0: High gain directional LTE antenna, wideband 690-2700MHz, 50-ohm. U-bolts for up to 1.75" pole-mount outdoor use. 8-10dBi. 11.575" x 8" x 2.375" (294mm x 203mm x 60mm). Type-N female connection, comes with adapter to TNC
- EXDL-0: Omnidirectional LTE antenna, 698-960MHz, 1700-2700MHz, 50-ohm. No ground plane, 3dBi. 3.45" x 1.45" diameter (88mm x 37mm). Type-N female connection, comes with adapter to TNC.

5 Sole Path Installation

5.1 Power Up Requirements

If using its own power source, the TG-7FE unit must comply with the NFPA 72 requirements which state that the unit will have a secondary power source besides the main power source. The backup source will allow it to go uninterrupted for 24 hours at the end of which it should be able to handle 5 minutes of signal transmission. When the provided transformer is used as a primary power source, the TG-7FE units require, but do not come with, a backup battery. The following consumption rates are to be used to calculate the size of the battery required.

- 12VDC: 113mA (idle with link supervision enabled), 260mA (transmitting)

Note: For a UL approved installation, the transformer and connections must be protected. A UL Listed pull box must be used in conjunction with a UL Listed outlet box and receptacle. Same guidelines that apply to the FACP power supply installation should apply here.

If using the auxiliary power provided by the FACP, ensure that the battery calculations for the FACP take the added consumption into account. This type of installation utilizes the FACP secondary power source to comply with NFPA requirements.

5.2 Signal Strength Requirements

It is recommended that the signal strength during the time of installation follows our guidelines to reduce the amount of perceived network issues. Having a lower signal strength than recommended may result in a higher number of incidents as it is the nature of the cellular network to fluctuate in signal quality and bandwidth.

RSSI Value	LED's Lighted	RF dBm
No SVC	LED 5 = slow flash, LED 4-2 = off	n/a
1	LED 5 = on, LED 4-2 = off	≤ -111
1½	LED 5 = on, LED 4 = slow flash LED 3-2 = off	≥ -110
2	LED 5-4 = on, LED 3-2 = off	≥ -100 (Minimum signal strength for Dual Path)
2½	LED 5-4 = on, LED 3 = slow flash LED 2 = off	≥ -90 (Minimum signal strength for Sole Path)
3	LED 5-3 = on, LED 2 = off	≥ -80
3½	LED 5-3 = on, LED 2 = slow flash	≥ -70
4	LED 5-2 = on	≥ -60

Approved accessories as previously listed can be used to relocate or change the type of antenna used.

5.3 Communication and Supervision Requirements

If using the TG-7FE unit as the sole dial tone supplier for the FACP, it will be necessary for the TG-7FE unit to provide dial tone to both DACT connections on the panel, unless one can be disabled. To do this, the Tip and Ring connection on the FACP must be connected in parallel for both Telco connections.

As far as supervision of the TG-7FE, there are two System Trouble Condition relays that can be used to locally annunciate to the panel any issues, as programmed during registration. However, the TG-7FE will also announce through the suppression of the dial tone to the panel any issues caused by loss of the configured communication path.

Note: Because a low/missing battery or low/missing AC power on the TG-7FE unit will not result in any other type of annunciation, at least one STC relay should be connected to a zone on the FACP, if using this power option.

5.4 Other UL Installation Requirements

UL Comm Fire	UL Comm Fire/Burg	ULC Comm Fire	
Optional	Yes	Optional	Enclosure Tamper Switch connected to 24-hour circuit
Yes	Yes	Yes	AC adapter lines in conduit (length limits apply)
Yes	Yes	Yes	AC adapter plugged into un-switched outlet.
Yes	Yes	Yes	AC adapter plugged into dedicated branch circuit.
Yes	Yes	Yes	Antenna cable in flexible conduit concealed
24hr	24hr	24hr	Battery Backup requirement if using AC

No	No	Yes	Radio Frequency warning label placed on outside of front cover
Yes	Yes	Yes	Flexible or Rigid conduit required to protect connections #

All conductors of a fire alarm system shall be installed in metal raceway of the totally enclosed type or incorporated in a cable having a metal armor or sheath; these metal elements must be grounded

5.5 Wiring Diagrams

Dual Path: