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Emergency communications: From the simple to the complex requirements of elevator applications

When passengers need assistance while transiting in an elevator, they expect to have the ability to contact someone to provide help. This might be because the elevator has stopped due to a power outage, there is an emergent medical need, or a plethora of other reasons.

In North America, emergency communications requirements for elevator applications are defined in the American Society of Mechanical Engineers (ASME) ANSI A17.1 / Canadian Standards Association (CSA) B44 Safety Code for Elevators and Escalators (hereafter referred to as “Code”).

Prior to the 2019 version of the Code, elevator emergency communications typically utilized a copper Plain Old Telephone Service (POTS) line. An actual telephone handset or pushbutton was connected to initiate an emergency call in the elevator cab and was answered by the designated emergency call center. The caller’s needs were made known to the call center, via voice-only communication, so that an appropriate response could be dispatched (e.g., fire department, ambulance, elevator technician, etc.).

Over the past several years, the telecommunications industry has started decommissioning these copper POTS lines in favor of IP-based systems as part of their modernization efforts. This is particularly true in North America and Europe but is also occurring in other parts of the world. The monthly costs of operating these copper POTS lines have been steadily increasing.

CEDES has partnered with 2N Telekomunikace (Czech Republic) to provide a replacement solution that upgrades an existing POTS line installation to a cellular-based solution using the same phone line from the machine room to the elevator cab. The EasyGate IP gateway allows customers to connect an existing phone and converts the functionality to a 4G cellular signal. This EasyGate IP solution can fulfill the 2016 and earlier versions of the Code. Figure 1 provides an overview of a typical installation.

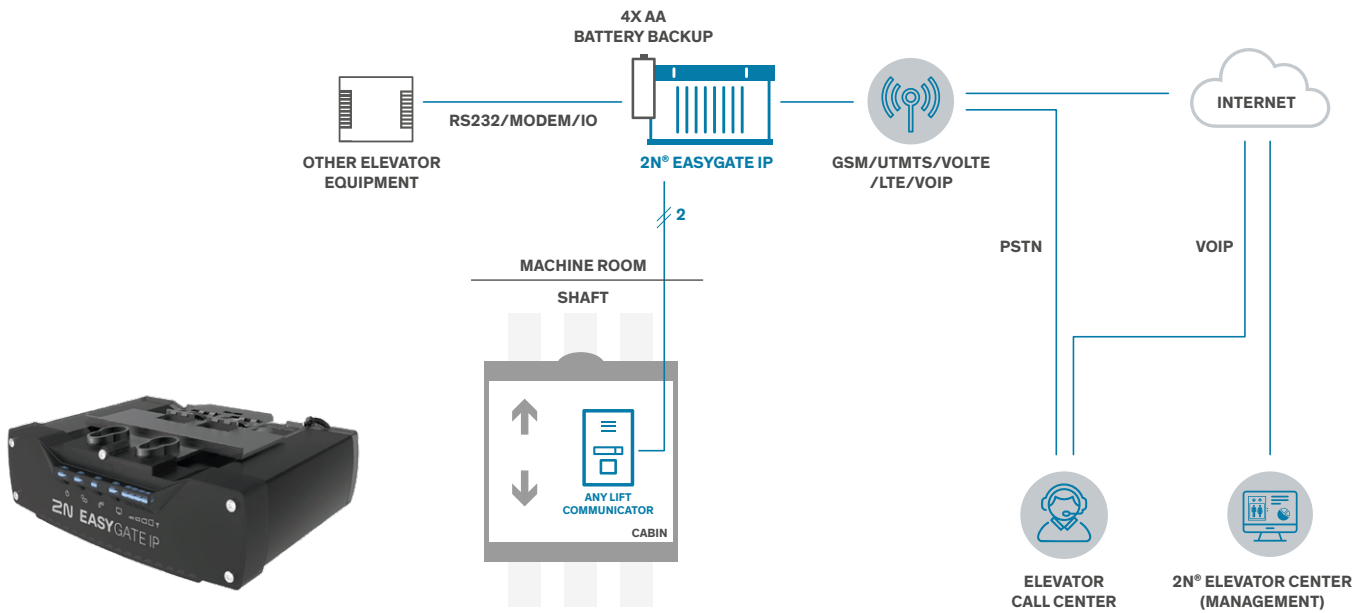


Figure 1: EasyGate IP typical installation.

Significant changes were implemented in the 2019 edition of the Code that incorporated new prescriptive requirements specific to individuals with special needs. These changes addressed passengers who may be unable to speak, speak a different language, and passengers who are unable to hear.

CEDES has collaborated with several companies to put a system-based emergency communications solution together for customers. These systems can range from simple to complex, depending on specific customer requirements. The 2019 and later versions of the Code require emergency communications systems to provide:

- ▶ A communications means between the car and a location staffed by authorized personnel who can take appropriate action that can address emergency needs,
- ▶ Information that identifies the building location and elevator number automatically,
- ▶ A means to display messages,
- ▶ A means to display video to observe passengers at any location on the car floor, and
- ▶ A separate means for on-site emergency personnel to take over the communications when the elevator rise greater than 18 m (60 ft).

Figure 2 provides an overview for a “simple” single elevator application that could fulfill the 2019 and later versions of the Code.

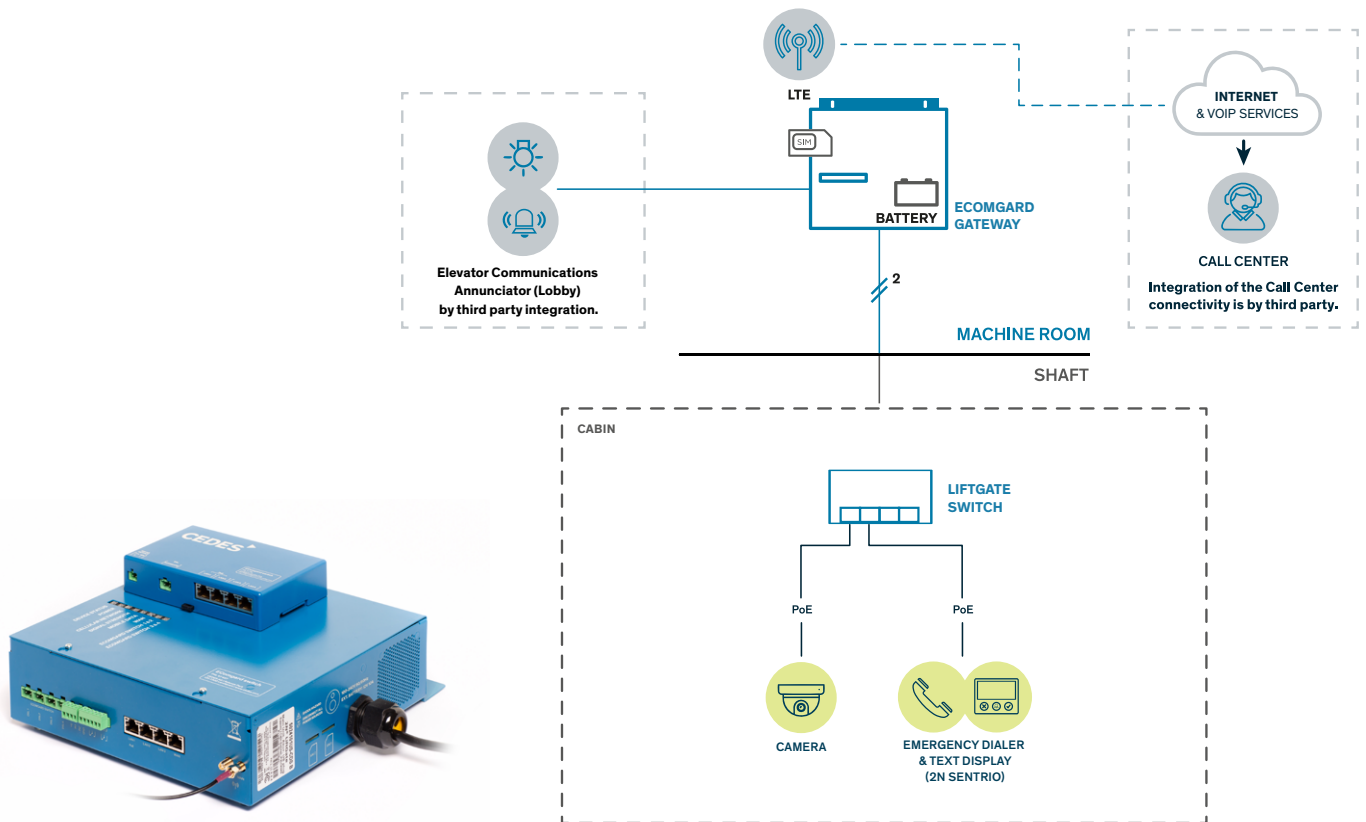


Figure 2: Emergency communications system overview - "simple" installation

CEDES offers two levels of functionality, depending on the customer's needs. For emergency communications functionality only, we recommend the 2N LiftGate Controller and LiftGate Switch.

For emergency communications plus IoT (Internet of Things) functionality, the CEDES EComgard Controller and cegard/Smart products provide Code compliant solutions capable of fulfilling emergency communications requirements plus the door reopening device requirements, which also had significant changes in the 2019 Code.

The IoT functionality monitors the elevator door(s) and elevator cab performance to provide users with valuable insights into elevator performance, door health and ride comfort. For additional information on cegard/Smart IoT components, please visit www.cedes.com. It is important to note that the IoT functionality is completely separated from the emergency communications functionality. Figure 3 provides an example of a front and rear door elevator showing both the emergency communications and the additional functionality of the EComgard / cegard/Smart hardware platform for the door reopening devices.

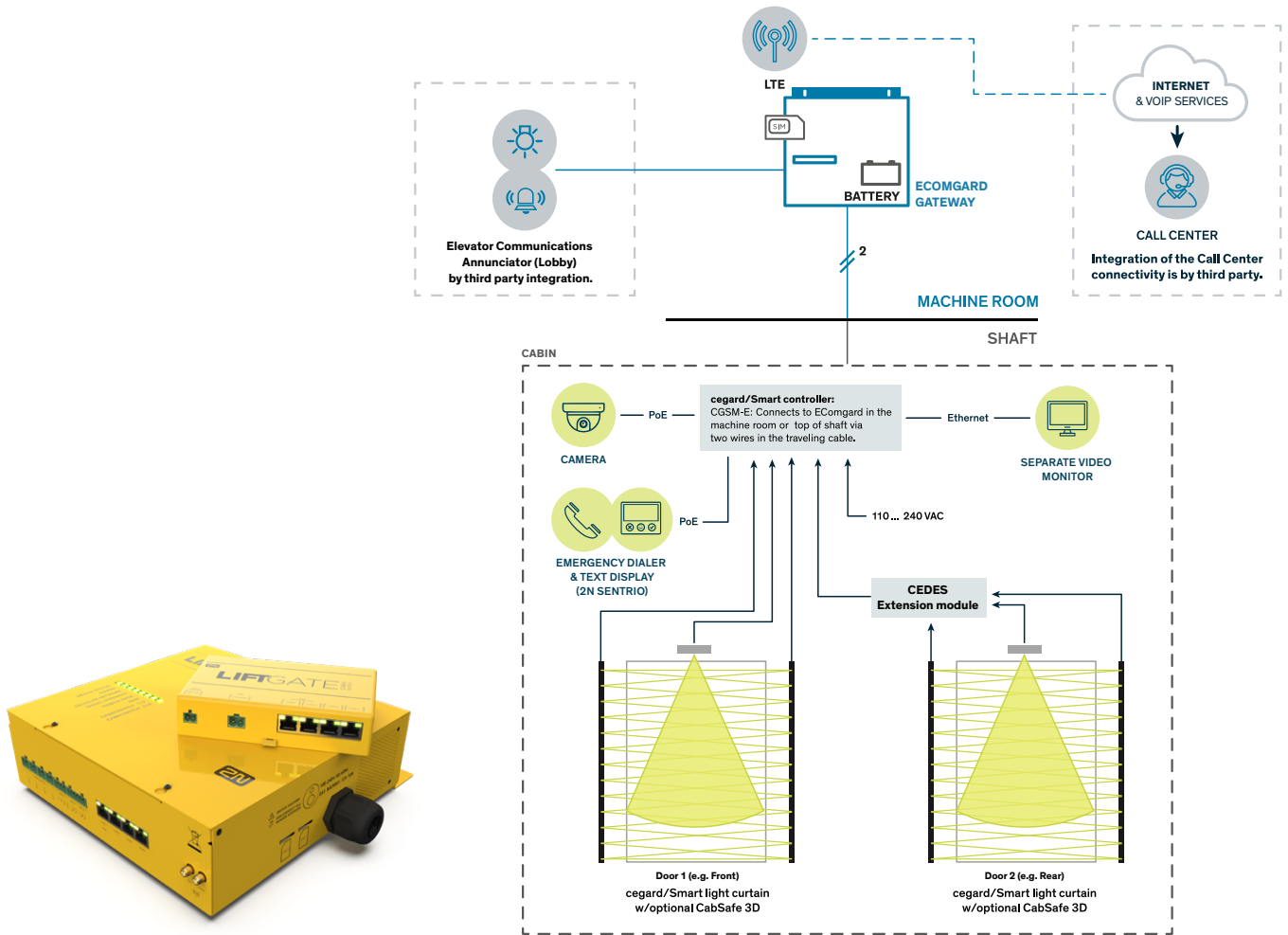


Figure 3: Landing door leads car door during door closing cycle

The “complexity” differences between Figure 2. and Figure 3. are related to the addition of the horizontal door reopening device that detects the presence of approaching objects, objects between the doors, elevator door performance metrics, as well as overall elevator performance metrics. As far as the emergency communications are concerned, they are effectively the same hardware.

The fundamental components used for both EComgard and LiftGate solutions include:

- ▶ 2N Sention Cabin with Sention Switch,
- ▶ Gateway
 - ▶ 2N Liftgate Controller (non-IoT) with SIM card (customer enabled / supplied) or
 - ▶ CEDES EComgard Controller (IoT-enabled, SIM Card provided with subscription),
- ▶ Ethernet router
 - ▶ 2N Liftgate Switch (non-IoT) or
 - ▶ CEDES cegard/Smart CGSM-E Controller (IoT-enabled) with built-in switch,
- ▶ Camera with a clear view of the elevator cab floor and ONVIF / RSTP capability; and a
- ▶ Elevator communications annunciator.

Both the EComgard and LiftGate products provide a unique solution that is ideal in elevator applications. The Controllers communicate to the Switches using only two wires in the traveling cable. Since these systems are replacing an existing POTS line, the two wires required for this communication already exist in the traveling cable. No additional wires or Ethernet cables are needed.

The cegard/Smart and LiftGate Switches located on or in the elevator cab feature four Ethernet ports, two of which are power over Ethernet (PoE). These PoE ports are used to connect the Sentries Cabin unit (for voice and text communications) and the camera (for video), thus providing the elements required to meet Code. It is important to connect these devices to the PoE ports as they are battery backed up in accordance with Code. An additional port or two is available for connecting other devices e.g., a card reader, a video monitor, etc.

Additionally, each EComgard or LiftGate Controller can support a second cegard/Smart or LiftGate Switch respectively, simplifying the hardware required in duplex elevator applications.

The system can be configured locally using a computer connected to the Wide Area Network (WAN) port on the EComgard or LiftGate Controller, or via connection to 2N Elevator Center (when wireless communication is implemented and the devices have been onboarded into the 2N Elevator Center).

The following configuration parameter groups are used in the EComgard or LiftGate Controller:

- ▷ Network routing / communication
- ▷ Mobile data
- ▷ LAN Port
- ▷ Power and battery monitoring
- ▷ Output parameters for relays

Elevator specific details are defined in the configuration of the Sentries Cabin and Sentries Lobby (used for elevators with 60 ft (18m) rise or more). These configuration parameters define the details for a specific elevator and include the following groups:

- ▷ Telephone directory,
- ▷ Alarm, check and operational call definitions,
- ▷ Session Initiation Protocol (SIP) communication – SIP identity, authentication, proxy details, registration, and Voice Over Internet Protocol (VOIP) including telephone number,
- ▷ Audio parameters,
- ▷ Camera connection details including Real-Time Streaming Protocol (RTSP) and Open Network Video Interface Forum (ONVIF), and
- ▷ Other service and system settings

As the reader might imagine, based on the number of configuration parameters, a fully functioning 2019 Code-compliant emergency communications system is more complex than the traditional copper POTS line-based communication. Even so, once a system configuration is defined, it can be saved as a template and serve to significantly simplify future configuration of components in similar applications.

To further ensure system capability for functioning correctly, CEDES has collaborated with **Elevator Telecom** to provide customers with the confidence that the Subscriber Identity Module (SIM) card used in the EComgard or LiftGate Controller is suitable for their application's communication requirements. Depending on these requirements,

Elevator Telecom can assist with:

- ▶ data communications only,
- ▶ data communications and VOIP services,
- ▶ data communications and standard voice, or
- ▶ VOIP services only.

Once the devices are installed and configured, the next step is to make arrangements with an elevator call center. CEDES is working very closely with **Beacon Elevator Monitoring** to give confidence to customers that the elevator monitoring services they have subscribed to fulfill the Code requirements for communicating by voice and text, as well as monitoring the video feed during emergency calls.

The following table provides a summary overview of the various options customers can use to fulfill their elevator emergency communications needs.

Overview - IoT & emergency communications standards solutions







	CEDES <small>ELEVATOR</small> IoT ONLY	2N EMERGENCY COMMUNICATIONS			CEDES <small>ELEVATOR</small> 2N IoT - EMERGENCY COMMUNICATIONS	
	cegard/Smart	EGIP	SENTRIO CABIN	SENTRIO LOBBY	cegard/Smart ECOM w/ SENTRIO CABIN	cegard/Smart ECOM w/ SENTRIO LOBBY
Base components:	cegard/Smart B/C 	EasyGate IP 	LitGale + Sentrio Cabin 	LitGale + Sentrio Cabin + Sentrio Lobby 	ECorgale + Sentrio Cabin 	ECorgale + Sentrio Cabin + Sentrio Lobby 
1 Replaces Plain Old Telephone Service (POTS) <i>Replaces costly copper POTS line with cellular-based system</i>	X	✓	✓	✓	✓	✓
2 Text / Video interface <i>Text, voice and video available to emergency call center</i>	X	X	✓	✓	✓	✓
3 IP connectivity <i>using only two wires in the traveling cable for four IP devices</i>	X	X	✓	✓	✓	✓
4 Supports mid- to high-rise for emergency response <i>as required for elevators having 60 ft (20 m) of rise or more</i>	X	X	X	✓	X	✓
5 Provides insights into elevator performance <i>CEDES Elevate SaaS services required</i>	✓	X	X	X	✓	✓
6 Includes re-opening device for elevator doors <i>Supports 2D, 2D/3D and single / multi-entrance elevators</i>	✓	X	X	X	✓	✓
7 Includes Data Plan for both IoT and POTS Line <i>SIP to VOIP services must be ordered by customer, if needed</i>	Data Plan included with SaaS Subscription	Customer Supplied	Customer Supplied	Customer Supplied	Data Plan included with SaaS Subscription	Data Plan included with SaaS Subscription

Table 1: Comparison of CEDES emergency communications systems portfolio

CEDES is known for its quality and performance. To continue this mantra in emergency communications solutions, CEDES has purposely chosen to collaborate closely with companies that share our vision, are known for their attention to detail and have customer-centric views.

Emergency communications systems can range from simple to complex applications. CEDES is proud to work with customers to implement Code-compliant solutions and support them in their efforts. Additional information is available at www.cedes.com. For emergency communications product information, select Products - Elevator / Escalator – Emergency Communications. For contact information regarding CEDES sales representatives, select Contact and then either select Americas or click on the map where you are located.

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James O'Laughlin is a Senior Product Manager for Elevator and Escalator products at CEDES. He is a Senior Member of the Institute of Electrical and Electronics Engineers (IEEE) and an electrical engineering (BSEE) graduate from Minnesota State University- Mankato. He has 35 years of experience in product management, product marketing and technical support and is focused on sensors and systems utilized in the elevators and escalators market sector.