

Elevator & Door Entry Systems

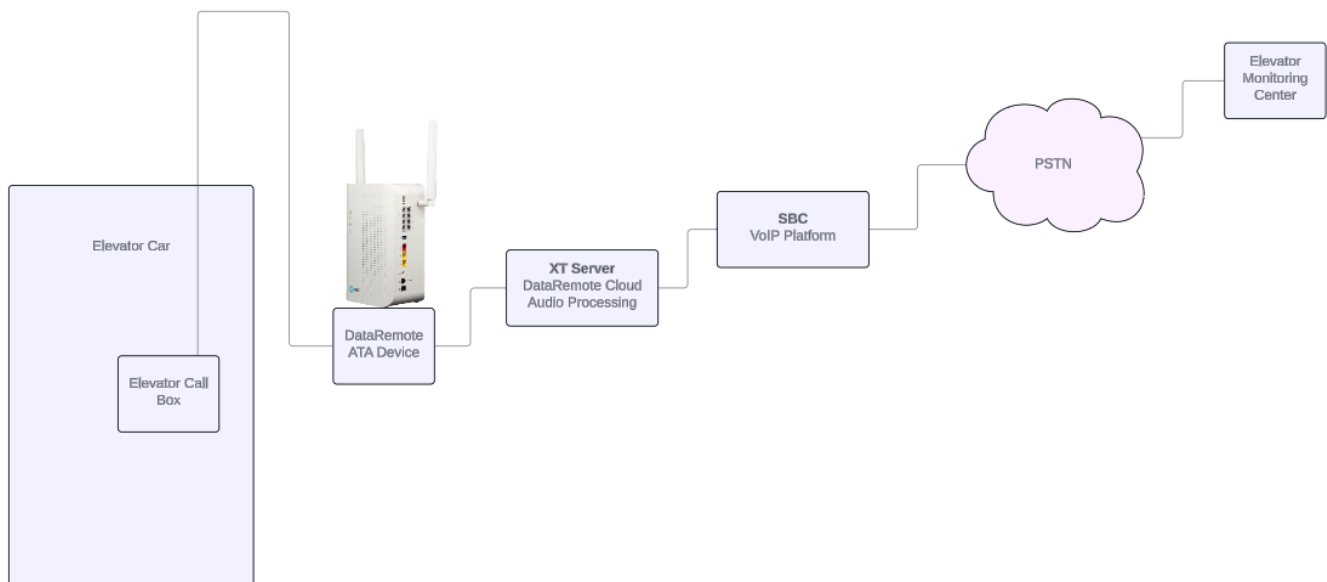
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The purpose of this whitepaper is to outline the best practices for service delivery of lines for elevator call boxes and door entry systems. This includes recommendations for line provisioning (DRI Mode) and FXS configuration (electrical characteristics). This guide is intended to help ensure a successful transition for elevator/door entry POTS lines to the PIAB solution.

Overview

The POTS in a BOX solution is utilized in many different use cases for POTS line migrations. When POTS lines are migrated for elevator call box phone lines and door entry call box phone lines, there are some unique features & capabilities that are required to offer a seamless customer experience. A key factor that is unique to these particular use cases is the fact that these lines require the ability to carry standard human voice audio while also supporting certain modem/DTMF tone transmission.

In the scenario where the DataRemote device is being used to provide dial tone to an elevator call box, the call box telephone line connects directly into one of the DataRemote FXS ports. The DataRemote device serves as a gateway onto the PSTN network so that the elevator can make calls to the central monitoring center.



Elevator Line

Every elevator car includes a call box that allows the people inside the elevator car to make an outbound call for emergency communication purposes. Traditional elevator call-boxes include an FXO phone port that requires phone service from a telco DMARC FXS line. These lines have traditionally been provided by standard telco POTS server, and DataRemote's POTS in a BOX solution can be used to migrate off the old POTS lines.

As a passenger in the elevator call, the elevator call box serves as a help line so that you can dial out in the case of an emergency. The elevator call box is designed to be extremely simple to use. The most common implementation is a single push button to initiate a telephone call to a centralized monitoring center.

When you press the call button, the call box takes the phone line off hook, automatically dials a pre-configured phone number, and places a call to the central center. Note that there is no "hang up" button, which is an important distinction because the call box is expected to hang up at the end of the phone call without any user intervention. In other words, the system is expected to automatically disconnect the phone line at the end of the phone call.



Door Entry Line

Another very common use case for call boxes is for door entry and gate entry systems. Similar to an elevator call box, a typical door entry call box does not have a traditional handset for the user to pick up like a telephone. Instead, there is a microphone and speaker with some type of input interface, usually a number keypad. The intent is for a person to approach the gate/door and use the call box to obtain authorization from somebody on the other end of a phone call to enter the premises. The person on the receiving end of the phone call uses DTMF tones through the telephone line to provide authorization and open the gate/door.



A simple example of where this setup is used is with apartment buildings. In a multi-tenant residential building, a door entry system will be at the gate or door where guests are attempting to enter the premises. As a user of the system, when you approach the gate/door, you use the keypad to enter the apartment number for the person you are visiting.

The call box then automatically takes the phone line off hook, dials the pre-programmed number for the person on file for that apartment number, and places a telephone call. When the resident receives the phone call, often on their cell phone, they press a pre-determined digit (like dialing "9" as a signal to authorize the person for entry). This DTMF tone coming back to the call box serves as authorization, and it then triggers a mechanical opening of the door/gate. It's important to note that the call box is responsible for terminating the telephone call since there is not a "hang up" button on the call box.



What is special about these types of lines?

Telephone lines used for elevator call boxes and door/gate entry call boxes have some unique requirements that need to be considered for POTS migration. For example:

- They have a particular user experience where the user does not have a handset to take off-hook/on-hook
- They have a speaker/microphone to simulate the handset for the user
- They have a method for the user to initiate a phone call; typically, this is just a button that the user presses
- They don't have a method for the user to terminate the call; it's triggered by the callee & handled automatically
- They primarily require voice communication between two humans
- They often also require modem calls using traditional M2M modem technologies – both outbound and inbound
- They both make use of inbound DTMF tones that need to be processed correctly
- They both require CPC support, which is a traditional analog technology to automatically terminate a call

Call Features

There are several call features that are important for the support of elevator lines and door/gate entry lines.

- Traditional voice capability
- Outbound DTMF signaling
- Inbound DTMF signaling comingled with the voice communication
- Inbound DTMF signaling used to terminate the call as an alternative to CPC signaling
- Inbound modem/programming (support for both modem and DTMF signaling)
 - o This can be the elevator being called by central station for inbound programming
 - o This can be the elevator placing an outbound normal modem call
 - o This can be the gate/door entry panel being called inbound for programming. In some cases, during the initial phase of inbound call, the remote end (caller) sends the code of the panel as a way to authenticate

Call Phases

- OUTBOUND

- Outbound / Call Initiation
- Outbound / Mid-Call Communication
 - Can include voice, (person talking into a microphone on the device (both for elevator and door king))
 - DTMF outbound, (apartment tenant entering apartment number)
 - DTMF inbound, (door entry box using DTMF as a trigger for tenant to remotely open the gate for a guest, and also elevator using DTMF as an alternative to CPC)
 - modem, (elevator reporting nightly/weekly/monthly metrics)
- Outbound / Call Termination

- INBOUND

- Inbound / Call Initiation (initiated by a modem from central station – or could be somebody calling in to talk to people in the elevator?)
- Inbound / Mid-Call Communication
 - Can include voice, (person in elevator talking to somebody on remote end – for emergency response)
 - DTMF inbound, (elevator using DTMF as an alternative to CPC)
 - modem, (inbound programming for both elevator and door entry call box)
 - and even “DTMF first, then modem second” (some door king boxes work this way)
- Inbound / Call Termination

Recommendations for Provisioning

When provisioning a device that will be used for elevator call boxes or gate/door entry call boxes...

The recommendation is to put the FXS port in MODEM mode (not standard voice mode).

In addition, it is recommended to utilize an “enhanced DID” that is being routed through a customized SIP trunk to improve audio quality.

This will care for all of the features listed above. It is important to note that no single install will require all of the features listed above. However, configuring the line in MODEM mode increases the chance for success, both for the initial install, as well as, the ongoing operation post-install (for example, when the customer attempts to perform inbound programming for the first time).

Operationally, it is inefficient to default lines to VOICE mode and then try to figure out when to put them in MODEM mode as part of TTU. This will create a poor install technician experience, a poor customer experience, and often result in a failed install. It is more efficient to simply configure elevator and gate/door entry call box lines as MODEM mode from the start.

Recommendations for TTU

Be ready to diagnose loop current issues. It is common for elevator and door entry system migrations to experience loop current issues because of the long cable runs.

Examples:

- Elevator in a downtown building that has 50 floors. The PIAB is installed in the telco room and the POTS line inside wiring (ISW) has a long run that goes from the telco room to the call box inside of the elevator car. As the length of a copper twisted pair increases, the amount of resistance increases across the tip and ring. This additional distance requires the FXS line on the PIAB to be configured with increased "loop current" to compensate.
- Call box that is installed at a gate entry location, but the DMARC where the PIAB is located is far away and the twisted pair is a long run.

Conclusion

DataRemote's recommendation is to build in considerations for elevator and door/gate entry lines as part of the pre-install preparation process. When the device is being configured for the initial install, make it a standard practice to put elevator call box lines and gate/door entry call box lines in MODEM mode. This will set up the TTU for the best chance of success.