AN-170

Protege GX KONE HLI Integration

Application Note

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Contents

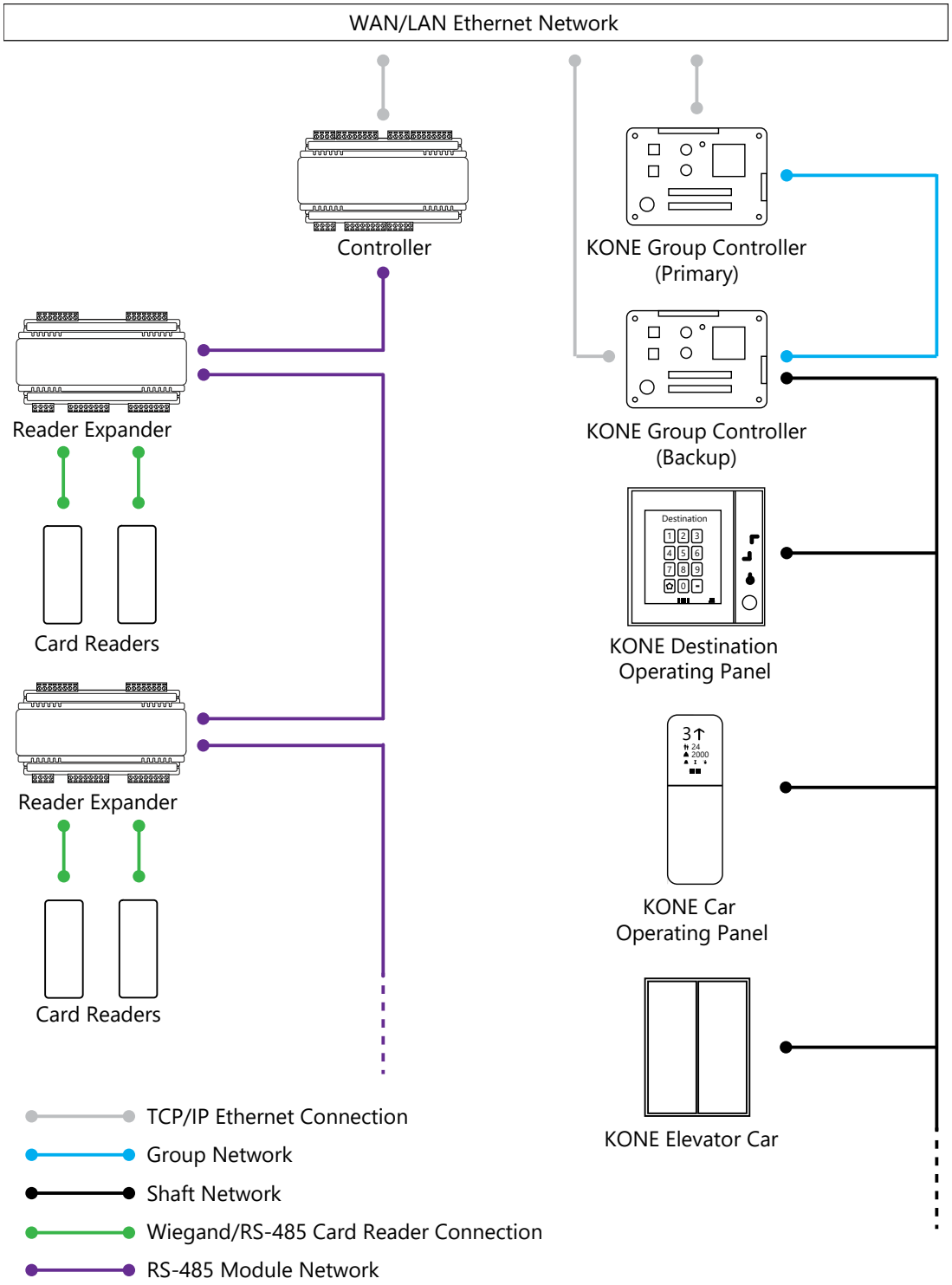
Introduction ____ 4
Prerequisites ... 6
Floor Mapping ____ 7
Floor Relay Numbering ... 7
Skipped Floor Numbers ... 7
Floors with Rear Doors ... 8
Programming Steps ____ 10
Enabling the KONE HLI ... 10
Configuring up to 128 Floors ... 11
Adding Floors ... 11
Programming Floor Groups ... 12
KONE Masks ... 12
Configuring Default Floor Groups ... 12
Configuring Specific Floor Groups ... 13
Programming KONE DOPs and COPs ... 14
Programming Antipassback ... 14
Programming the Reader Expander ... 15
Configuring Users and Access Levels ... 15
User Programming ... 16
Troubleshooting ____ 17
Additional Commands ____ 18
KONE ACI Certificate of Completion ____ 19

Introduction

Many commercial buildings and residential dwellings use KONE elevator systems to control access to elevator cars and floors. Integration with Protege GX increases security within these sites while further improving people flow.

The KONE elevator system provides elevator controllers and operating panels, while ICT card readers and the Protege GX system controls access to the floors within the building

When a user scans their access card at a Protege GX reader next to a KONE DOP (Destination Operating Panel) or a COP (Car Operating Panel), a request is sent to Protege GX to verify that the user has permission to access the selected floor. Once the user's access has been verified, the KONE elevator system is able to automatically call an elevator to transport the user to the selected floor.



The Protege GX KONE HLI elevator integration supports up to 128 floors.

This integration is a licensed feature.

An extension of the KONE HLI integration functionality is available with the Protege GX KONE Destination 880 integration. Information can be found in Application Note 274: Protege GX KONE Destination 880 Integration.

Prerequisites

The following must be installed and operational to configure this integration.

Component	Version	Notes
Protege GX	4.3.322.25 or higher	
Protege GX Controller	2.08.1345 or higher	
KONE GCAC	1.8	This integration has been successfully tested against the KONE Access Control Integration Factory Acceptance Test for the following feature sets: • Traditional DCS • Hybrid DCS • Conventional • Turnstile Integration These are the **only** tested and supported versions for this integration. Any KONE hardware used in this integration must support these protocol versions. The Certificate of Completion is included at the end of this document for reference.
KONE RCGIF	1.12	
KONE API	8.5	

Licensing

The following licenses are required for this integration.

License	Order Code	Notes
Protege GX KONE HLI Integration License	PRT-GX-ELV-HLI-KN	1 license per controller used for this integration
Protege GX Door License	PRT-GX-DOR-1	1 license per KONE Destination Operating Panel (DOP) or Car Operating Panel (COP)
	PRT-GX-DOR-10	
	PRT-GX-DOR-50	

It is the responsibility of the installation professional to verify the version of the proposed third-party system and supported components with the version listed in this document. ICT will not accept responsibility for the failure to verify integrated system versions and requirements.

Floor Mapping

Before beginning to program the elevator integration, it is important to correctly map the layout of the elevator system. All elevator-accessible floors need to be identified and mapped in sequential order from bottom to top. You need to identify which (if any) floors have rear doors, and which (if any) floors are considered 'below ground' in the elevator system programming. This is essential for Protege GX to correctly map floors for event reporting and 'home floor' functionality.

Floor Relay Numbering

Each floor accessed by the elevator system needs to be programmed in Protege GX, with a unique **Floor relay** number assigned. The floor relay number tells the controller where the physical floor is located, creating a map in Protege GX of accessible floors.

Floor relay numbers must be **unique**, programmed in **numerical order** (starting at 1), and beginning at the **lowest accessible floor**, including any basement floors.

The lowest accessible floor must be assigned a floor relay of **1**, as shown in the example below.

Physical Floor	Floor Relay Number
Basement 2	1
Basement 1	2
Ground Floor	3
Level 1	4

Skipped Floor Numbers

Numbers are commonly skipped in floor labels due to superstitions surrounding specific numbers, and technicians may also skip these in the elevator controller programming. Where this occurs a placeholder floor record must be created in Protege GX to maintain the required sequential floor relay numbering, as in the example below.

Physical Floor	Elevator System Floor Relay	Floor Relay Number
Ground	0	1
Level 1	1	2
...	...	...
Level 12	12	13
N/A	Not programmed	14 (Placeholder)
Level 14	14	15

In this example a placeholder floor record is added with relay number 14 to maintain the sequential numbering and represent the skipped programming in the elevator system. Had the sequence been maintained in the elevator system (i.e. Level 14 programmed with elevator system floor relay 13) no placeholder floor would be required.

Floors with Rear Doors

For some floors it may be possible to exit the elevator at the rear as well as the front. Each 'rear floor' must also be programmed in Protege GX.

The rules for programming rear floors are as follows:

- The **Floor relay** number of the rear floor must be equal to that of the corresponding front floor.
- Each rear floor must be programmed with the command `Rear`.
- The controller must be programmed with the command `HLI_128_FLOORS = true`.

The `Rear` and `HLI_128_FLOORS = true` commands are supported in controller firmware version 2.08.1158 or higher. For earlier firmware versions, rear doors must be programmed with relay numbers from 65-128.

The table below demonstrates front and rear floor relays in a building with 50 aboveground floors and two basement floors.

Physical Floor	Front Floor Relay	Rear Floor Relay
Basement 2	1	1
Basement 1	2	2
Ground Floor (no rear access)	3	-
Level 1 (no rear access)	4	-
Level 2	5	5
...	...	...
Level 48	51	51
Level 49	52	52

It is not necessary to program rear floor records for any floors that do not have rear access, but you may want to do this to keep the programming tidy.

Rear Floor Relays 65-128

For sites with up to 64 floors the rear floor relays can be programmed from 65-128 without using the `Rear` command. To calculate the rear floor relay, add 64 to the front floor relay.

This is a legacy programming option which provides backward compatibility for existing installations and controller firmware versions prior to 2.08.1158, but is not recommended for new installations. It supports a maximum of 64 floors and is not available if the controller has been configured to support 128 floors.

The table below demonstrates front and rear floor relays in a building with 50 aboveground floors and two basement floors where the **Rear** command is not used and rear floor relays start at 65.

Physical Floor	Front Floor Relay	Rear Floor Relay
Basement 2	1	65
Basement 1	2	66
Ground Floor (no rear access)	3	-
Level 1 (no rear access)	4	-
Level 2	5	69
...	...	...
Level 48	51	115
Level 49	52	116

Programming Steps

The following programming steps are required for KONE HLI integration with Protege GX:

- Enable the KONE HLI
- Program the floors
- Program default floor groups and specific floor groups
- Program KONE Destination Operating Panels (DOPs) and Car Operating Panels (COPs)
- Program the reader expander
- Configure access levels and users

Enabling the KONE HLI

The KONE HLI integration must be enabled and configured in the controller.

1. Navigate to **Sites | Controllers** and select the controller connected to the KONE server.
2. Open the **Configuration** tab and scroll down to the **Elevator HLI** section.
3. Set the **Elevator HLI type** to KONE, then configure the required options:
   - **Network adaptor**: Only Cable is supported for this integration.
   - **Primary port**: The TCP/IP port for communication with the primary KONE group controller.
   - **Secondary port**: The TCP/IP port used for communications with the secondary (backup) KONE group controller.
   - **Primary IP address**: The IP address of the primary KONE group controller.
   - **Secondary IP address:** The IP address of the secondary (backup) KONE group controller.
4. Leave all the default floor groups <Not set>. We will create and assign default floor groups later in the programming (see page 12).
5. If required, configure the following:
   - **Enable elevator call functionality**: Enables the KONE Remote Call Giving Interface (RCGIF) functionality. Using this interface, a user can badge their card to summon an elevator which will automatically take them to the **Elevator destination floor** set in their access level (**Users | Access levels | General**).
     - **RCGIF primary port**: The TCP/IP port on which the primary RCGIF KONE controller is listening.
     - **RCGIF secondary port**: The TCP/IP port on which the secondary (backup) RCGIF KONE controller is listening.
     - **RCGIF primary IP**: The IP address of the primary RCGIF KONE controller.
     - **RCGIF secondary IP**: The IP address of the secondary (backup) RCGIF KONE controller.
   - **Elevator HLI debug:** When this option is enabled, all HLI packets sent and received via ethernet are viewable using a telnet terminal. This should be used for troubleshooting only, and disabled during normal operation.

     To view HLI packets, set up a serial printer service in **Programming | Services** and open a telnet session to the configured port. When packets are exchanged between the Protege GX controller and the KONE controller the data received will be echoed to the telnet window.

     Although some of the information is displayed in plain English, much of the data requires a low level understanding of the KONE protocol.
6. Click **Save**.

Configuring up to 128 Floors

By default the controller supports up to 64 floors for this integration. However, with some additional configuration the integration can support up to a maximum of 128 floors.

This feature requires controller firmware version 2.08.1158 or higher.

1. Navigate to **Sites | Controllers** and select the controller to be used for the integration.
2. Expand the **Commands** field and enter the following commands:
   - `HLI_MAX_FLOORS = X`

     Where **X** is the total number of floors in the building. This can be a value from 1-128.
   - `HLI_128_FLOORS = true`

     This command is required to enable the controller to support using the `Rear` command for rear floors.
3. Click **Save**.

Adding Floors

Each floor accessed by the elevator system needs to be configured in Protege GX with a floor relay number assigned. This tells the controller where the physical floor is located, creating a map of accessible floors.

1. Navigate to **Programming | Floors**.
2. Add a floor record for each elevator-accessible physical floor, assigning the **Floor relay** for each floor as explained in the Floor Mapping section (see page 7).
3. If the floor is a 'rear floor' add the `Rear` command in the **Commands** field.

   The `Rear` command is supported in controller firmware version 2.08.1158 and above. The controller must also be programmed with the `HLI_128_FLOORS = true` command.
4. Click **Save**.

Programming Floor Groups

KONE Masks

KONE elevator system controllers have two types of 'masks' (equivalent to floor groups in Protege GX): **Default** and **Specific**.

- **Default** masks are programmed for the controller and represent all of the floors that are included in the KONE integration. There are several types of default masks, which are outlined further below. In summary:
  - Source masks define all the floors where a DOP can be used to call elevators.
  - Destination masks define all the floors which can be accessed freely at all times from a DOP or COP.
  - Disconnection source and destination masks are used when the KONE system is offline with the controller. In this situation, the specific DOP or COP floor groups are ignored. When the system is disconnected credentials cannot be validated, so it may be necessary to either restrict or allow free access to certain floors.

  Default masks **do not** take schedules into account. A floor assigned to a default destination mask will always be freely accessible.

- **Specific** masks are programmed for specific DOPs or COPs and represent the floors which that DOP/COP can access. Schedules can be used to define when floors are freely accessible, and when credentials are required for access.
  - If a floor is not included in the specific mask, it cannot be accessed from that DOP/COP.
  - If a floor is included in the specific mask and its schedule is valid, the floor is freely accessible without a credential.
  - If a floor is included in the specific mask and its schedule is invalid, the floor can only be accessed with valid credentials.

If **either** a default destination mask or a specific mask allows free access to a floor, the KONE controller will allow free access.

Configuring Default Floor Groups

A number of default floor groups must be programmed to determine the default operation of the integration. The default floor groups are:

- **Default DOP source floor group**: This floor group contains all of the floors that have a KONE DOP that can be used to call elevators.
- **Default DOP destination floor group**: This floor group contains all of the floors that can be freely accessed at all times from a KONE DOP.
- **Default COP destination floor group:** This floor group contains all of the floors that can be freely accessed at all times from a KONE COP.
- **Default DOP disconnection source floor group:** This floor group contains all of the floors with a KONE DOP that can be used to call elevators while the KONE system is disconnected from the controller.
- **Default DOP disconnection destination floor group:** This floor group contains all of the floors that can be freely accessed from a KONE DOP while the KONE system is disconnected from the controller.
- **Default COP disconnection destination floor group:** This floor group contains all of the floors that can be freely accessed from a KONE COP while the KONE system is disconnected from the controller.

To add each default floor group:

1. Navigate to **Groups | Floor groups** and click **Add** to create a floor group.
2. Give it a **Name** corresponding to one of the default floor groups.
3. In the **Floors** section, click **Add** and select the floors that will be included in the floor group.
4. Click **Save**.
5. Navigate to **Sites | Controllers** and select the controller used for the integration.
6. In the **Configuration** tab, expand the **Elevator HLI** section and assign each floor group programmed above to its corresponding default floor group setting.
7. Click **Save**.

Configuring Specific Floor Groups

Specific floor groups contain the floors that each KONE Destination Operating Panel (DOP) or Car Operating Panel (COP) is able to access. The schedules assigned to the floors determine when those floors can be accessed without credentials.

1. If there are any floors which are not freely accessible at all times, you will need to program one or more schedules to determine when the floors are freely accessible. Navigate to **Sites | Schedules** to program any schedules that are required.
   - When the schedule is valid, the floor is freely accessible.
   - When the schedule is invalid, the floor requires valid credentials for access.
2. In **Groups | Floors groups**, click **Add** and **Name** the floor group (e.g. KONE DOP FLG Destination Group).

   The same floor group can be used for multiple DOPs or COPs if required.
3. In the **Floors** section, click **Add** to select the floors that will be included in the floor group.
4. For each floor, set the **Schedule** to define when that floor can be freely accessed.
   - If the floor is always accessible without credentials, set the schedule to Always.
   - If the floor is only freely accessible during specified hours, set the relevant schedule.
5. Click **Save**.

Programming KONE DOPs and COPs

KONE DOPs and COPs are programmed as door records in Protege GX.

One door license is required for each DOP or COP programmed (see page 6).

1. To create a DOP or COP record, navigate to **Programming | Doors** and click **Add**.
2. Enter a **Name** for the DOP.

   It is recommended to include a floor reference in DOP names.
3. In the **Elevator HLI** section, enable the **Door used for elevator HLI** option to display options relevant to elevator configuration.
   - **Controller**: The Protege GX controller used to control elevator HLI.
   - **Operator panel type**: Defines whether this door will be configured as a DOP (Destination Operating Panel) or a COP (Car Operating Panel).
   - **DOP/COP ID**: The unique ID of the DOP/COP which has been configured in the KONE system.
   - **Floor group**: The floor group that can be accessed from this DOP/COP, programmed above (see previous page).
   - **Floor**: For DOPs only. Defines which floor the DOP is located on.

     The combination of DOP ID and Floor must be unique.
   - **Elevator group**: For COPs only. Sets the internal elevator group number that has been configured in the KONE system.
   - **DOP sends elevator call**: This option enables the remote call giving interface for this DOP. With this option selected, when a user gains access to this DOP it will automatically send a call to transport the user to the to the **Elevator destination floor** set in their access level (**Users | Access levels | General**).

     The KONE Remote Call Giving Interface must enabled using **Enable elevator call functionality** in **Sites | Controllers | Configuration**.
4. Click **Save**.
5. Repeat the process to create all remaining DOPs and COPs.

Programming Antipassback

Optionally, you can use antipassback with operating panels in HLI elevator integrations. For example, you could enable hard antipassback on a turnstile to prevent users from entering the turnstile then passing their card back to someone on the other side.

The operation is the same as standard door antipassback: the system tracks which area each user is in based on their access activity, and reports an antipassback violation if the user is not recorded in the correct area required to enter or exit the door.

Requirements for Elevator HLI Antipassback

- This feature is available in controller firmware version **2.08.1297 or higher**.
- Antipassback should only be used on turnstiles, security gates or similar operating panels with **entry and exit readers** to record movement into and out of the area. When the user enters the turnstile, the system will update their user area and call an elevator based on their home floor or selection. When the user exits the turnstile, it will update their user area without calling an elevator.
- User area tracking is based on the **inside and outside area** programmed in the door record, **not** the floor that the user has selected. For example, the outside area might be the ground floor reception. When a user accesses the turnstile, it grants entry to the elevator lobby and calls an elevator.

Antipassback should not be enabled for operating panels which are only used to select a floor (such as car operating panels), as the user could be going to any floor instead of entering a specific physical area such as a lobby.

- User credentials must be processed by the Protege GX controller, not the elevator system.
- The **Reader 1/2 elevator** in the reader expander programming must be <not set>.

Programming Antipassback for a Turnstile

1. Navigate to **Programming | Door types** and add a new door type.
2. Set the **Entry passback mode** to control entry through the turnstile and **Exit passback mode** to control exit. The options are:
   - **Hard passback**: Access will be denied if a user attempts to enter/exit the turnstile from the wrong area.
   - **Soft passback**: Access will be granted even if a user attempts to enter/exit the turnstile from the wrong area, but a 'Soft Passback Violation' event will be logged.
3. Optionally, enable **Entry/Exit passback is qualified with door opening**. This will prevent the user's antipassback status from being updated unless they actually pass through the turnstile after badging.
4. Program any other settings required for this door type such as the **Entry/Exit reading mode**, then click **Save**.
5. Navigate to **Programming | Doors** and select a door record which represents a turnstile, security gate or other operating panel.
6. Set the **Door type** to the one programmed above.
7. Set the **Area inside door** and **Area outside door** for the turnstile.
8. Click **Save**.

Programming the Reader Expander

Protege GX door records that are associated with a KONE DOP or COP can be assigned to a reader expander's reader port. This allows the readers connected to this port to be used for elevator access control.

Assign a KONE DOP/COP door record to one of the two reader expander ports as follows:

1. Navigate to the **Expanders | Reader expanders** menu. Select the relevant reader expander.
2. Select either the **Reader 1** or **Reader 2** tab.
3. Set the **Reader door** to one of the door records used for KONE elevator integration.
4. Set the **Reader mode** to Elevator so the reader is treated as part of the KONE elevator system.
5. Click **Save**. Wait for the programming to be downloaded to the controller, then right click on the reader expander record and click **Update module**.
6. Repeat the above steps for the remaining KONE elevator door records.

Note: As setting **Reader mode** to Elevator disables the **Reader door** option, assign the door before setting the reader mode.

Configuring Users and Access Levels

Access levels link floors and floor groups to users, defining which floors the user has access to and when. An access level can contain a single floor, providing users with access to that floor only, or any number of floors as required by the site and user configuration.

1. Navigate to **Users | Access levels** and create or edit access levels.
2. You can assign either individual floors in the **Floors** tab, or floor groups in the **Floor groups** tab.
3. In either case you can select a **Schedule** which defines when the user has access to those floors.

4. **Save** each access level.
5. Assign the access levels to users in **Users | Users | Access levels**.

Elevator Destination Floors

If elevator call functionality has been configured in the controller programming, the KONE Remote Call Giving Interface is enabled, allowing you to set a home floor for users. When the user badges their card at a DOP with **DOP sends elevator call** enabled, an elevator will be summoned to take the user to the destination floor specified in their access level.

To assign a home floor to an access level:

1. Select the desired access level in **Users | Access levels**.
2. In the **General** tab, expand the **Elevator HLI** section.
3. Set the **Elevator destination floor** to the desired home floor for that access level.
4. Click **Save**.

User Programming

Assign the appropriate access level(s) to each user as required.

By default, all calls are normal call types. To specify an alternative call type for a user, select the required call type in **Users | Options | KONE elevator HLI options**.

Troubleshooting

- **Even with the remote call giving interface enabled, some DOPs are prompting for floor selection instead of calling an elevator for the home floor:**

  When the RCGIF is used in conjunction with the GCAC/ELI interfaces, each access request will cause requests to be sent to both interfaces, causing the home floor call to be canceled. To resolve this issue, upgrade the Protege GX controller firmware to version 2.08.1274 or higher.

  If you cannot upgrade the controller firmware, there is an alternative workaround for this issue. For each door record with **DOP sends elevator call** enabled, add the command `DontSendAccess = true`.

- **The Protege controller is closing the connection with the KONE group controller even when it is still sending messages:**

  The Protege controller expects explicit heartbeat messages from the KONE group controller every 30 seconds, whereas some group controllers will not send heartbeats if they are sending other messages to the controller. To resolve this issue, upgrade the Protege GX controller firmware to version 2.08.1232 or higher. There is no other workaround for this issue.

Additional Commands

In Protege GX controller firmware version 2.08.1345 some changes were made to the default operation of the KONE integration. These changes can be reversed if required by entering specific commands in **Sites | Controllers | General**.

- When a KONE controller comes online, Protege GX will now send global masks to that controller only.

  Previously when a KONE controller came online Protege GX would send global masks to all KONE controllers. To reinstate this behavior enter the following command in the controller programming:

  `FilterHLIMasks = false`
- When a global COP mask is changed, Protege GX will update only the global COP masks in the KONE controllers, and similarly for global DOP masks.

  Previously when a global COP or DOP mask was changed Protege GX would update all global masks in KONE controllers. To reinstate this behavior enter the following command in the controller programming:

  `FilterHLICOPDOPMasks = false`

Certificate of Completion for Access Control Integration (KONE ACI)

is hereby granted to

Integrated Control Technology Ltd.

To certify that the software and version below has been successfully tested according to feature set

Protege GX

.version 4.3.322.25

KBM	GCAC - v1.8, RCGIF – v1.12	API	v8.5
X	Traditional DCS	X	Hybrid DCS
X	Conventional	X	Turnstile Integration
	CS-API Integration		

Granted: FEBRUARY 3, 2023

Raymond Ogienoyevbede, Digital Operations Lead

Name, title

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