AN-278

Access Level Area Counting in Protege GX

Application Note

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Introduction

Area counting in Protege GX is used to monitor and control the number of people in a specified area. For more advanced functionality, area counting can be configured to count the users with a defined access level who are present in the area.

Once programmed in the Protege GX software, these counts can be monitored and used to control a variety of advanced access, intrusion and automation functions.

Access level area counting has a wide range of potential applications, including:

- Restricting access to areas or equipment unless a defined minimum number of staff members are present, a common safety requirement in laboratories.
- Restricting general access to areas unless specific high security staff members are present, extremely useful for managing compliance situations.
- Enabling cryptographic and security functions only when a defined number of authenticated staff members are present.
- Changing door modes based on the occupancy count of a room or building.
- Managing car park usage based on the company associated with each vehicle.

Prerequisites

- An operational Protege GX system.
- A Protege GX controller with firmware version 2.08.916 or higher.

Setting up Access Level Area Counting

Access level area counting employs the **CountOnAccess** function, which allows a defined data value to be incremented or decremented every time a person with a specified access level enters or leaves the area. The data value can then be used to control access or other features via programmable functions.

Following are the general steps for activating access level area counting using the **CountOnAccess** function.

Identify the Access Levels

First identify the access levels that will be monitored.

1. Navigate to **Users | Access Levels**.
2. Identify and take note of the Database ID of the access level(s) that you want to monitor.

Create the Data Values

A data value record will be required for each group of access levels that will be monitored.

1. Navigate to **Automation | Data Values** and click **Add**.
2. Enter a **Name** to identify the data value's access level grouping.
3. Click **Save**.
4. Note the Database ID of all data values created.

Additional data values may be required for programmable functions, as in the following Programming Scenario.

The number and configuration of data values required will be dependent upon your specific requirements. Refer to the following Programming Scenario (see page 8) for an example.

Enable Area Counting

1. Navigate to **Programming | Areas** and select the area to enable area counting in.
2. Select the **Options 1** tab.
3. In the **Reporting Options** section, enable the **Enable User Counting** option.
4. Click **Save**.

Set the Max User Count

The **Max User Count** defines the maximum number of users that the system will allow to occupy an area. For example, if the **Max User Count** is set to 10, the 11th user who attempts to enter the area will be denied access.

1. Navigate to **Programming | Areas** and select the area to configure.
2. Select the **Configuration** tab.
3. In the **Setup** section, enter the maximum area occupancy in the **Max User Count** field.
4. Click **Save**.

Important: The **Max User Count** cannot be left at zero for area counting. If occupancy restriction is not required, an unrealistically high value should be set to implement area counting without restricting access.

Configure Area Counting on Access

The `CountOnAccess` function needs to be defined for each area, using the data values that will record the count and the access levels that will determine which users will be counted.

1. Navigate to **Programming | Areas** and select the area to be configured.
2. Select the **Configuration** tab.
3. Scroll down and enter the following command into the **Commands** field:
   `CountOnAccess=W[X,Y,Z]`
   where:
   - `W` refers to the Database ID of the relevant data value
   - `X,Y,Z` refer to the Database IDs of the included access levels

Up to 16 comma-separated access levels can be included in each command. Up to four commands can be applied to each area. Each command must begin on a new line.

Area Count on Door Opening

In general, a user is determined to have entered/exited the area when they present a valid credential and are granted access. The area count is incremented/decremented accordingly.

In some environments where there is potential for users to badge and be granted access without entering or exiting, it is preferable to only update the area count when the door is actually opened.

This can be achieved by enabling the Area Count on Door Opening option.

This option requires Protege GX controller firmware version 2.08.1161 or higher.

1. Navigate to **Programming | Areas** and select the area(s) to apply this option to.
2. Go to the **Configuration** tab, and in the **Commands** field add `AreaCountOnDoorOpening = true`
3. Click **Save**.

The area count will be updated only if the door has been opened after entry/exit is granted.

Allow Reading Opened/Unlocked

When a user presents their credential and is granted access while the door is already open this is treated as though the user opened the door, and the area count is updated accordingly.

This is controlled by the Allow Reading Opened/Unlocked option and can be disabled for any readers that require more controlled access for area counting.

1. Navigate to **Expanders | Reader Expanders** and select the reader expander(s) the affected readers are connected to.
2. Go to the **Reader 1**/**Reader 2** tabs as required and disable the **Allow Reading Opened/Unlocked** option.
3. Click **Save**.

When this option is disabled the reader performs no action when a card is presented while the door is unlocked or open. The user will not be granted access and the area count will not be updated.

Use the Data Values

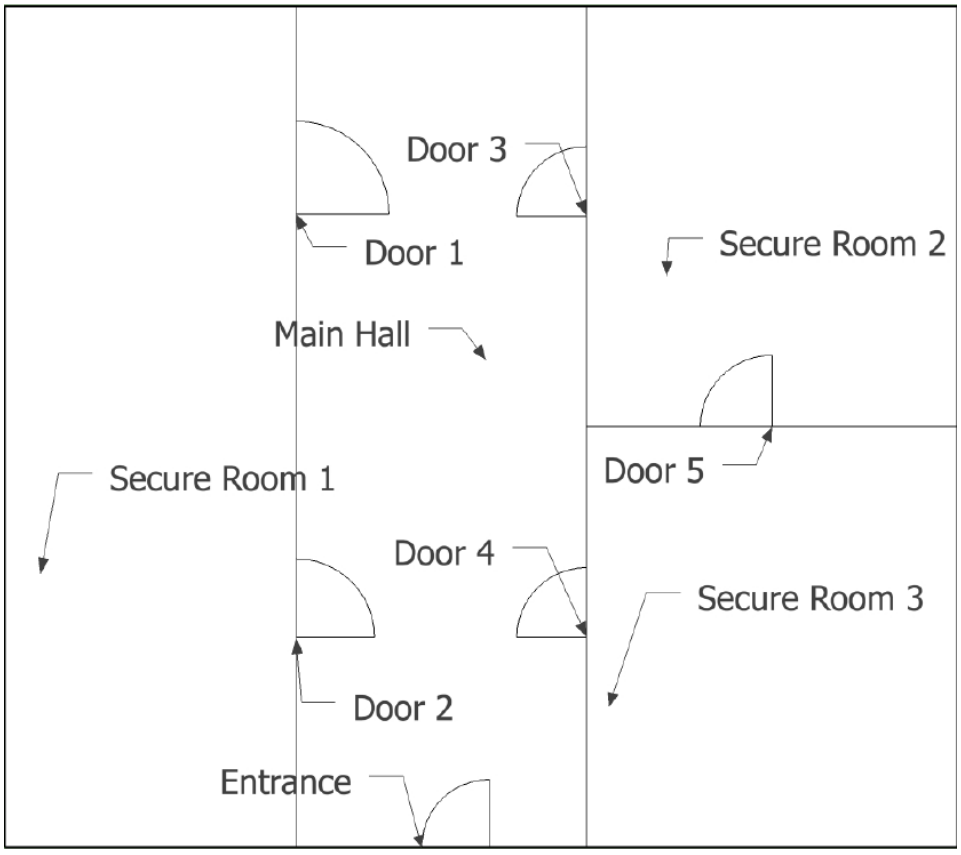
Once the setup steps are complete, the data values will record the number of users with the selected access levels assigned who are in the area at any time. This information can be used in a variety of ways:

- Monitor the user count by creating a variable for each data value. Variables can be created in **Automation | Variables** and added to a status list or floor plan.
- Use the data values to control or activate other features using programmable functions.
  - **Value Compare** programmable functions compare two data values and activate an output based on their relative quantities.
  - **Variable Output Compare** programmable functions compare a single input data value with a series of 'fixed point' data values, and update an output data value based on the result.
  - **Average** programmable functions calculate the average of input data values and write it to an output data value.

By combining different programmable functions, a wide range of advanced applications is possible.

Programming Scenario

The following programming scenario will illustrate one implementation of access level area counting. The floor plan below provides a visual representation of the scenario:



The programming steps provided in this scenario assumes that the doors and areas named on the floor plan have already been created in the software and assigned to their respective reader expander modules.

Restricting Low Security Staff Access

This scenario demonstrates how to use access level area counting to control low security staff access to secure rooms. Low security staff will not be permitted to access Secure Room 1 if there is a controlled material on site, unless there is a supervisor present. In addition, an output will be activated if there are unsupervised low security staff in the area when a controlled material comes on site.

In summary:

- The system will track the entry and exit of specific user groups, based on assigned access levels.
- Counter data values will monitor occupancy numbers of each access group within the defined secure area.
- Set point data values will be used for comparison to determine when the counters exceed a defined number (in this case, zero).
- Virtual outputs will represent the various conditions, including an output that controls when low security staff are permitted to enter the secure area.
- A series of programmable functions will activate the outputs when the appropriate conditions are met.
- A virtual output will be assigned as the qualify output for a schedule which is assigned to the low security access level. The schedule will be valid when there is a supervisor present OR when there is no controlled material on the site, allowing low security users to enter the secure area.
- An indicator output will be activated if low security users are unsupervised with controlled material present.

Creating Virtual Outputs

Eight virtual outputs are required for the system to monitor the status of the area.

For the purposes of our scenario, virtual outputs represent conditions that can be monitored and compared via programmable functions. This allows the outputs to be activated based on the state of the configured data values, which in turn is used to validate access level schedules.

1. Create the virtual outputs in a batch by navigating to **Expanders | Output Expanders** and adding a new output expander (16 outputs). Ensure that the **Virtual Module** option is selected and the module address is set to a high number (e.g. 32).

   Alternatively, virtual outputs can be created individually in **Programming | Outputs**.

2. Navigate to **Programming | Outputs** and assign appropriate names to the new virtual outputs. Include all information necessary to prevent confusion in the future.

Room 1 Supervisor Present
Room 1 Low Security Staff Present
Room 1 No Supervisor Present
Room 1 Low Security Staff Unsupervised
Room 1 Low Security Staff Only
Room 1 Controlled Material On Site
Room 1 Controller Material Not On Site
Room 1 Low Security Staff Allowed In

The Supervisor Present and Low Security Staff Present outputs will be controlled by the data values defined in the following steps. The Controlled Material On Site output may be linked to an input that can be triggered when necessary. Other outputs will be controlled by the programmable functions defined below.

Configuring Data Values

Four data values are needed for this scenario: two which act as counters and increment/decrement when users enter/exit, and two to serve as set point constants for comparison in programmable functions.

1. Navigate to **Automation | Data Values** and create four data values with relevant names:

Room 1 Data A Supervisor
Room 1 Data B Low Security Staff
Room 1 Supervisor Setpoint (0)
Room 1 Low Security Staff Setpoint (0)

2. Set the two Setpoint (constant) data values to 0 and ensure that the **Preset Power Up** and **Preset Value** options are selected.
3. At this stage it is convenient to assign these data values to variables, which allow the staff numbers to be monitored via a floor plan or status page. Navigate to **Automation | Variables** and create four variables, assigning one of the new **Data Value** records to each. No other variables settings need to be changed.

Variable	Data Value
Room 1 Var Supervisor	Room 1 Data A Supervisor
Room 1 Var Low Security Staff	Room 1 Data B Low Security Staff
Room 1 Data A Setpoint	Room 1 Supervisor Setpoint (0)
Room 1 Data B Setpoint	Room 1 Low Security Staff Setpoint (0)

Configuring Access Levels

Access levels should be configured so that the correct staff have access to doors in the correct circumstances.

1. A schedule is required to determine when a low security user is allowed to access a secure room.
   - Navigate to **Sites | Schedules** and create a Low Security schedule that is valid at all times (i.e. from 00:00 to 00:00, for all days of the week and ignoring holidays).
   - Select the **Options** tab and select a **Qualify Output**: the schedule should be valid when the Low Security Staff Allowed In output is On.
2. Navigate to **Users | Access Levels** and create three access levels:

Supervisor Staff
Low Security Staff
Low Security Staff Exit

   Note the Database ID of each access level.

3. Select the **Doors** tab and assign appropriate door access to each access level.
   - Supervisor Staff should have access to secure doors in Both directions Always.
   - Low Security Staff should have Entry access to secure doors only when the Low Security schedule created above is valid, which is qualified by the Low Security Staff Allowed In output.
   - Low Security Staff Exit should have Exit-only access to secure doors Always.
   - All users should Always have access to the Entrance door.

Activating Access Level Area Counting

There are two relevant areas in this scenario: Main Hall (the area inside the Entrance door) and Secure Room 1 (the area inside Doors 1 and 2). Only Secure Room 1 requires access level area counting.

1. Enable user counting.
   - Navigate to **Programming | Areas** and select the Secure Room 1 area.
   - Select the **Options 1** tab.
   - In the **Reporting Options** section, enable the **Enable User Counting** option.
2. Set the max user count.
   - Select the **Configuration** tab.
   - In the **Setup** section, enter the maximum area occupancy in the **Max User Count** field.

   We'll set this at 3, to restrict access to a maximum of two low security staff, with at least one supervisor.

3. Configure area counting on access for supervisors.
   In the **Configuration** tab add the following command to the **Commands** field:
   `CountOnAccess=W[X]`
   where:
   - **W** is the Database ID of the Room 1 Data A Supervisor data value.
   - **X** is the Database ID of the Supervisor Staff access level.
4. Configure area counting on access for low security staff.
   In the **Configuration** tab add the following command to the **Commands** field:
   `CountOnAccess=W[X]`
   where:
   - **W** is the Database ID of the Room 1 Data B Low Security Staff data value.
   - **X** is the Database ID of the Low Security Staff access level.
5. Click **Save.**

Creating Programmable Functions

Finally, seven programmable functions are required to tie the rest of the programming together.

Navigate to **Automation | Programmable Functions** and create the following functions:

- **Room 1 Count Supervisor Zero**

  When a supervisor is present in the secure room, a virtual output is activated.

  - **Type:** Value Compare
  - **Activate Output When Above Set Point**: Room 1 Supervisor Present
  - **Analog Input Data Variable Register**: Room 1 Data A Supervisor
  - **Set Point Data Value**: Room 1 Supervisor Setpoint (0)

- **Room 1 Count Low Security Staff Zero**

  When any low security staff are present in the secure room, a virtual output is activated.

  - **Type**: Value Compare
  - **Activate Output When Above Set Point**: Room 1 Low Security Staff Present
  - **Analog Input Data Variable Register**: Room 1 Data B Low Security Staff
  - **Set Point Data Value**: Room 1 Low Security Staff Setpoint

- **Room 1 Invert Supervisor Present**

  When a supervisor is not present in the secure room, a virtual output is activated.

  - **Type**: Logic Control
  - **Logic Function Mode**: Inverted Follow and Test First Output
  - **First Output to Check**: Room 1 Supervisor Present
  - **Second Output to Check**: None
  - **Output to Control**: Room 1 No Supervisor Present

- **AND No Supervisor Present and Low Sec Present**

  When there are low security staff present but no supervisor, an output is activated.

  - **Type**: Logic Control
  - **Logic Function Mode**: Follow Logic AND
  - **First Output to Check**: Room 1 No Supervisor Present
  - **Second Output to Check**: Room 1 Low Security Staff Present
  - **Output to Control**: Room 1 Low Security Staff Only

- **AND Low Sec Only and Controlled Material**

  When there are only low security staff present and a controlled material is on site, an output is activated to indicate that the low security staff are unsupervised.

  - **Type**: Logic Control
  - **Logic Function Mode**: Follow Logic AND
  - **First Output to Check**: Room 1 Low Security Staff Only
  - **Second Output to Check**: Room 1 Controlled Material On Site
  - **Output to Control**: Room 1 Low Security Staff Unsupervised

- **Invert Controlled Material On Site**

  When there is no controlled material on site, an output is activated.

  - **Type**: Logic Control
  - **Logic Function Mode**: Inverted Follow and Test First Output
  - **First Output to Check**: Room 1 Controlled Material On Site
  - **Second Output to Check**: None
  - **Output to Control**: Room 1 Controlled Material Not On Site

- **Is Low Security Staff Allowed**

  When there is no controlled material on site or when a supervisor is present, an output is activated to validate the Low Security schedule, allowing low security staff to enter the secure room.

  - **Type**: Logic Control
  - **Logic Function Mode**: Follow Logic OR
  - **First Output to Check**: Room 1 Controlled Material Not On Site
  - **Second Output to Check**: Room 1 Supervisor Present
  - **Output to Control**: Room 1 Low Security Staff Allowed

When these programmable functions have been activated and access levels have been assigned to users, staff numbers in the areas will be monitored and low security staff members will be allowed access to the secure room only when appropriate.

This is only one of many potential applications of access level area counting in the Protege GX system.

Designers & manufacturers of integrated electronic access control, security and automation products.
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