

Survalent.

Training Manual

SurvalentONE SCADA System Level 1

**MODULE 3 – Creating Stations, Points, Communication
Lines, and RTUs**

Revision 01



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Document Control

Revision	Date of Issue	Author(s)	Reviewer(s)	Brief Description of Change
01	Sept 1, 2022	Duke Hoang		Updates to screenshots.

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Module 3 – Creating Stations, Points, Communication Lines, and RTUs.

Introduction

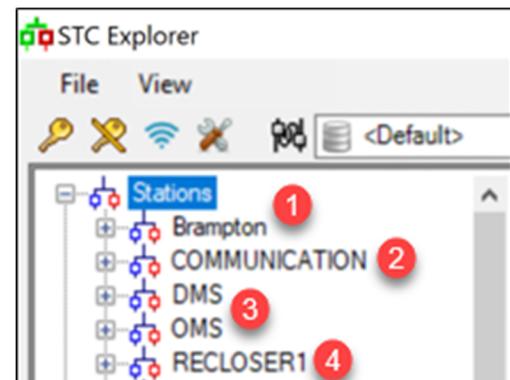
In the first two modules, we prepared our database and graphics folders for a Substation in the town of Riverdale. We prepared the database by defining users, zones, and point types. We prepared the graphics by defining colors, color tables, and fonts.

In this module we will begin representing the North Substation in the town of Riverdale.

Entering the Station Name

If we look at the first 5 stations in our sample database, we see that stations in the database seem to serve a variety of functions:

- Brampton suggests a physical location (1).
- COMMUNICATION suggests functionality (2).
- DMS and OMS are advanced Survalent products (3).
- RECLOSER 1 suggests equipment (4).



3.1 Examples of Stations

It helps, then, to think of Stations in the database to be a collection of points (data objects such as Open/Closed or 52 AMPS). They don't necessarily have to reflect physical substation locations. In this respect, they can be thought of as folders on a computer – the common function is that they provide the best way for you to locate points you wish to monitor and/or control.

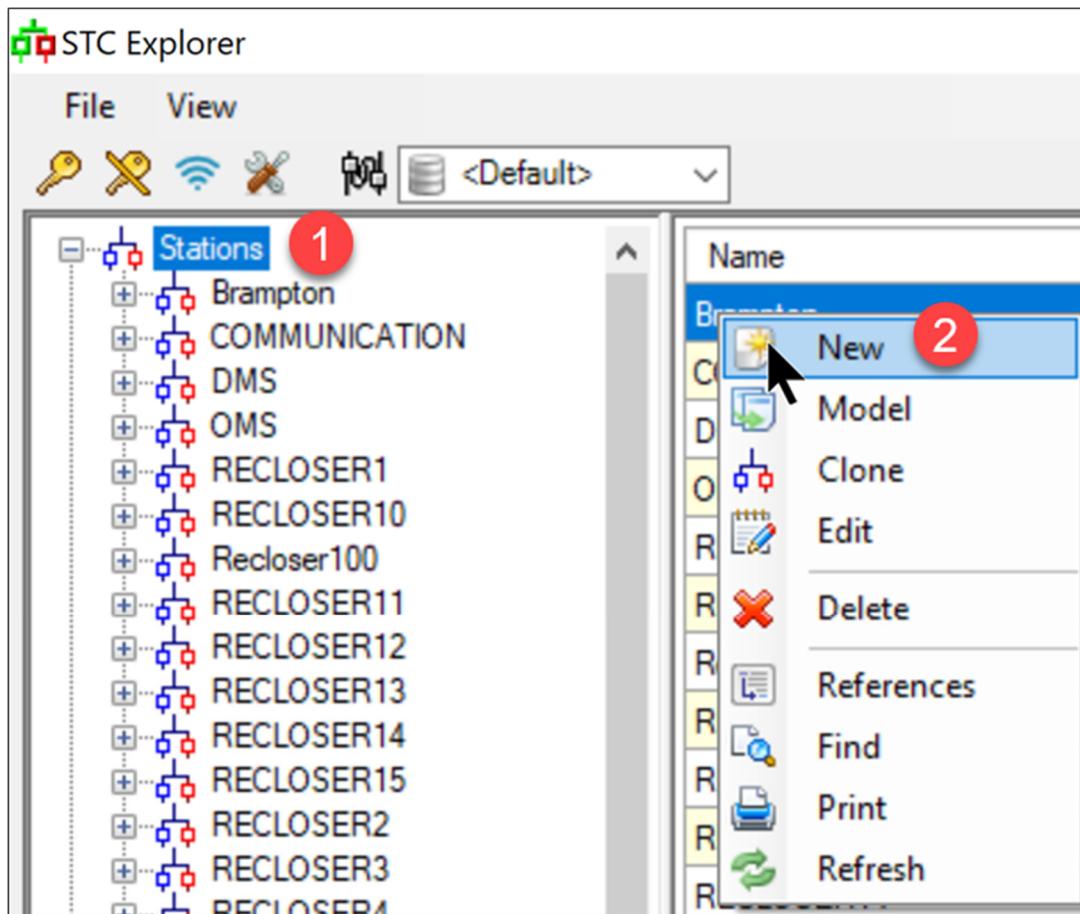
We will see that the stations shown in image 3.1 are realistic with 1 exception.

The exception is that having a physical location such as Brampton existing on the same level as equipment (e.g. RECLOSER 1) is not common. Realistic alternatives would be:

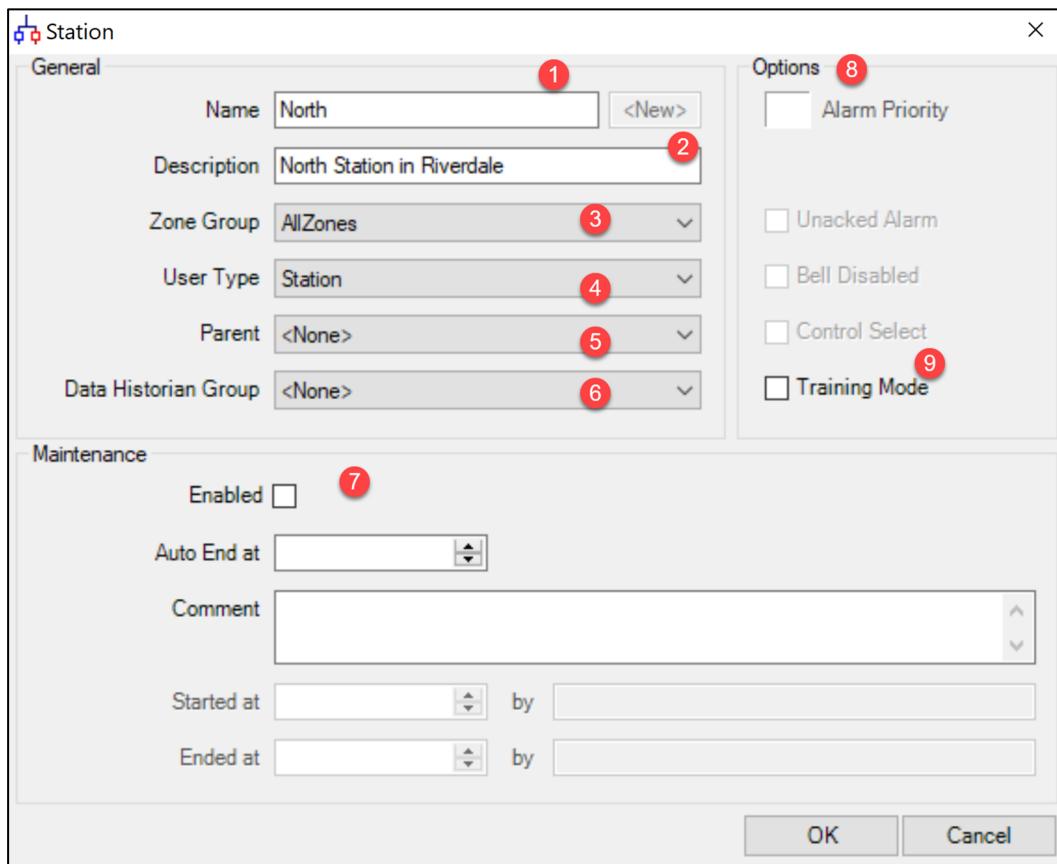
1. Just using the physical substations.
 2. Just using the physical devices.
- Or
3. Placing the devices inside the substations (the devices become subfolders).

The person who created this database made use of logical stations when they created COMMUNICATIONS, DMS, and OMS. This is a best practice when it comes to pseudo points (points without telemetry settings).

So, we have decided that we want to create a substation called North which is part of our Riverdale map. To enter in the new station, make sure stations (1) is selected on the left side of the explorer window and then right-click on the right side. Choose New (2).



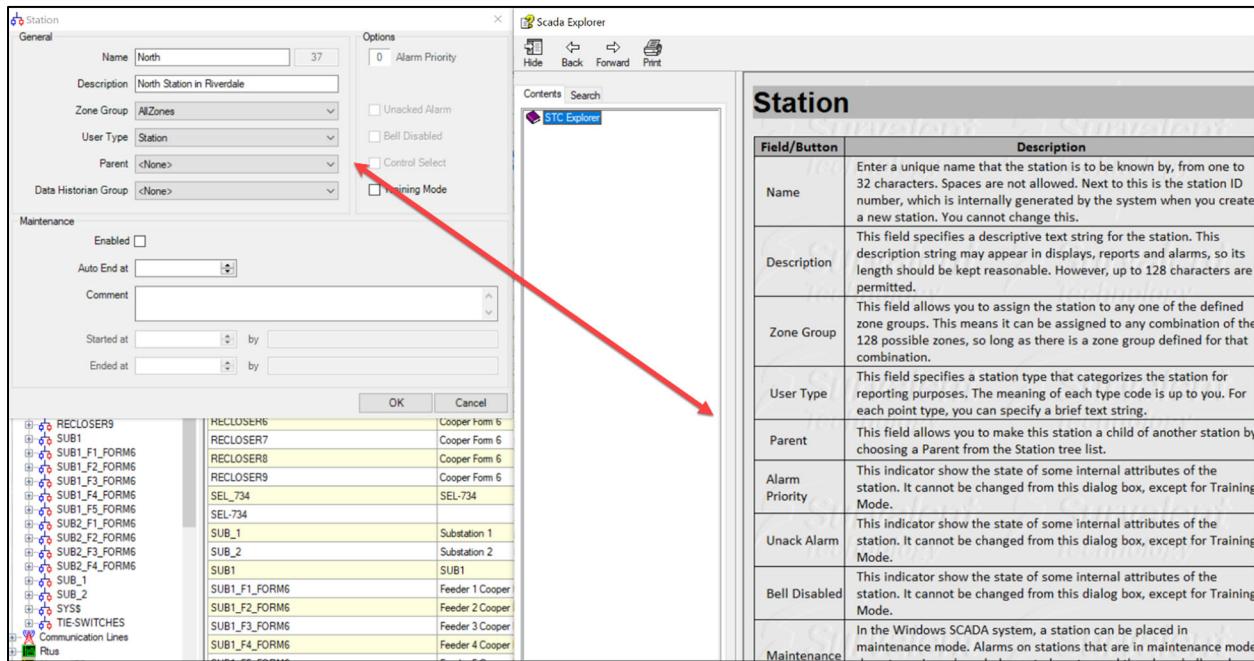
3.2 Choosing the New Station option.



3.3 Configuring the Station

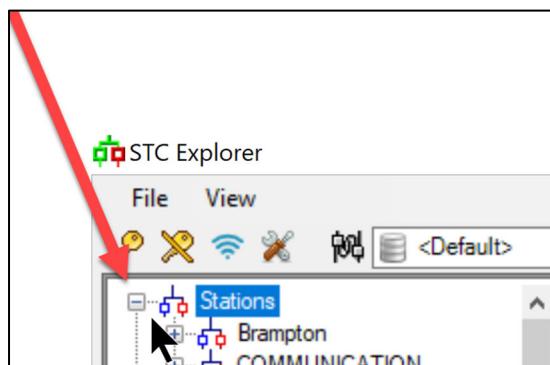
- Enter the station name (1) - no spaces are allowed but you can used underline and hyphen symbols to separate words to a maximum of 32 characters.
- If you wish to add more information to describe the station, use this field (2) - spaces are permitted
- You can select whatever Zone Group (3) that suits your utility because of the preparations we did in Module 1.
- User Type (4) is the same as (3) directly above.
- The stations shown in Image 3.1 are all parents. If you say None (5), this station will be a parent station and sit at the same level. If you select another station here from the dropdown, this station will be tucked under that station, and it will function as a subfolder.
- Data Historian Group (6) is only applicable if Historian being used (not applicable for this course).
- Maintenance (7) is used when we want to work on the points in a station – blocks all alarms.
- Alarm Priority (8) can't be set. It's an information box that shows the highest priority that has been set among all the points in the station.
- Training Mode (9) – allows new operators to become familiar with the system and its operation without interfering with the operation of the remaining station. Not applicable for our course.

Throughout this course, we will find many selection options in STC Explorer. You can find definitions for many of these options by tapping your F1 key (for some manufacturers the key combination is Fn+F1). Below is the information that displays if you hit this key combination while configuring the station.



3.4 Handy F1 Key

After saving our entries for the North Station, you should refresh the STC Explorer screen so you can see the new station. This can quickly be accomplished by toggling between the – and + keys shown below.

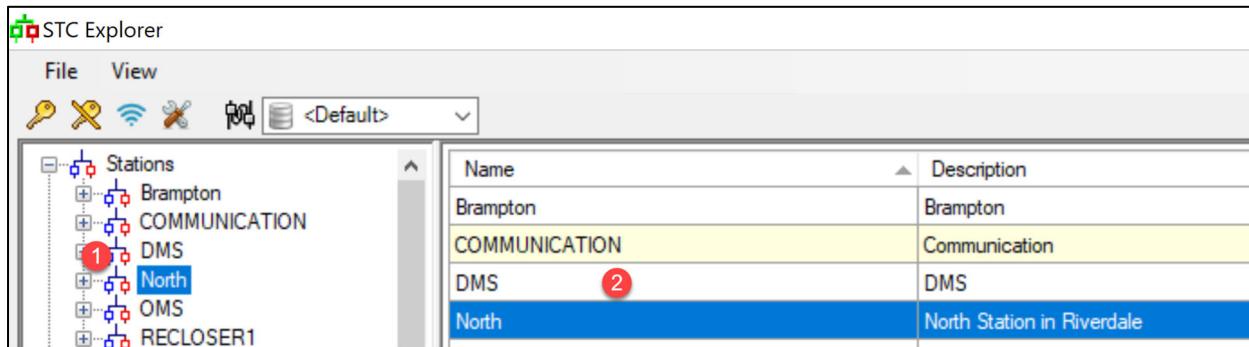


3.5 Toggle to Refresh the Station List

Shown in Image 3.6 you have the refreshed STC Explorer window, and on the left you can see a hierarchical view of the new North Station (1). If you click the + sign, you will see any points or substations (child stations) placed inside the North Station.

On the right side, you will see a list of all the stations (2). The list is not hierarchical on the right;

however, clicking the stations on the right will open all the settings used to configure the stations.



3.6 Saved Station

Health Points aka Housekeeping Points

In our North station, we are going to monitor and control point information that is going to travel through Communication Lines and RTUs. However, **before** we create and configure the Communication Lines and RTUs, we need to determine how we want the database to report on them.

In other words, we must create special points to hold information that reports on whether the Communication Lines and RTUs are **communicating** properly. This is why you saw a Communication Station in image 3.1. **It's a best practice to place all these health or housekeeping points in one Communication station.**

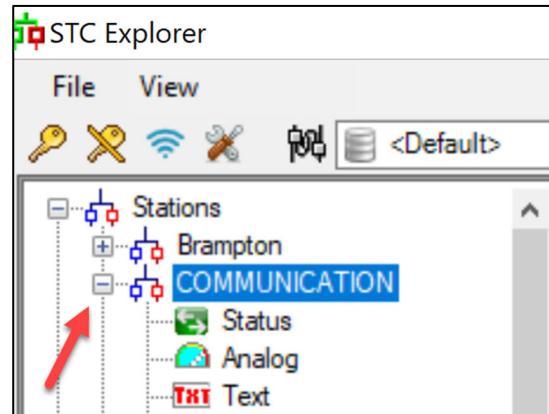


Exercise

In-class exercise: Create a Communication Station that we will use to hold the Health Points.

After creating the Communication station, click on the + sign to expand the different point types:

- Status are points that reveal discrete (e.g. Open or Closed information). These are also referred to as digital points.
- Analog points reveal numerical values (e.g. 58 Volts or 32 AMPS).
- Text values – returning Text values – aren't as common.



3.7 The Communication Station

Health points are status points – either the line isn't working (Fail) or it is working as expected (Normal).

The next step, then, is to click on Status as shown below (1). You will see points that have been set up as Health points for Communication Lines and RTUS (2).

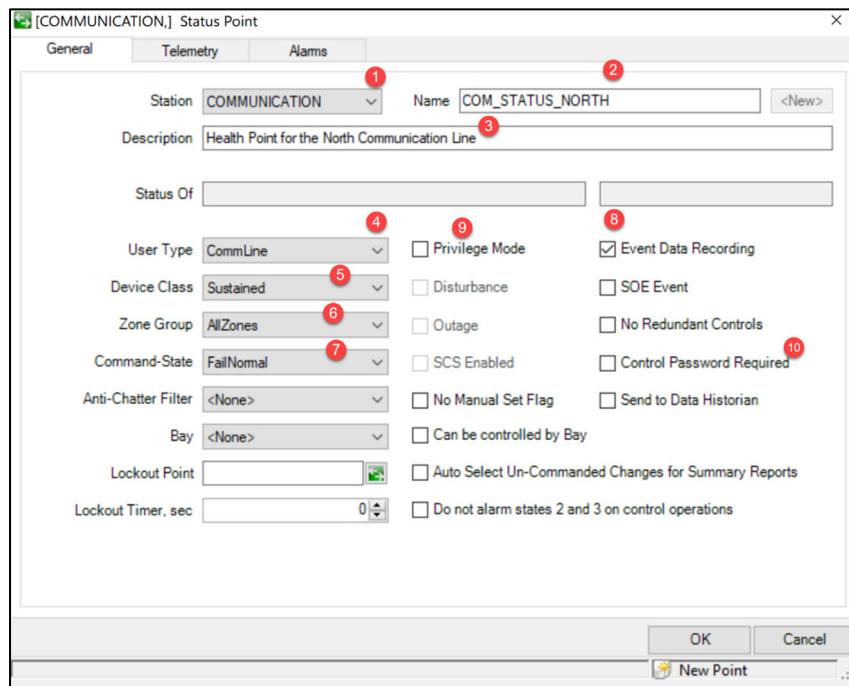
The screenshot shows the STC Explorer software interface. The left pane displays a tree view of project components: Stations, Brampton, COMMUNICATION, Status (highlighted with a red circle 1), Analog, and Text. The right pane shows a table of existing health points. The first column is 'Name' and the second is 'Description'. The table contains the following data:

Name	Description
COM_STATUS_1	Status of Communication Line 1
COM_STATUS_2	Status of Communication Line 2
COM_STATUS_3	Status of Communication Line 3
COM_STATUS_4	Status of Communication Line 4
RTU_STATUS_1	Status of RTU 1
RTU_STATUS_2	Status of RTU 2
RTU_STATUS_3	Status of RTU 3

3.8 Existing Health Points

To create a new health point for our Communication Line, please right-click anywhere on the right window and select new.

When creating a new point, there are 3 tabs to configure. The first is the General tab.



3.9 The General Tab for Status Points

- Since the Communication Station (1) was the one that was open on the left side, an assumption was made that this new point will also be in the Communication Station. This can be changed using the drop-down arrow.
- Enter the name of the point (2). Remember the rules for names – no spaces and 32 characters allowed. Note, we are naming this to show it will be used for the North station; however, the other health points have a different naming convention (image 3.8). The best practice would be to name all these points similarly.
- Enter the description (3).
- From the User Types (we configured some in module 1), select the type of point (4).
- The Device Class (5) we choose is Sustained (if the point goes into alarm status, it must BOTH be acknowledged and returned to its normal state before a timer counts down to removing it from the alarm list). Another popular option is Momentary (no acknowledgement required) for points that more frequently go into alarm status). Sustained and Momentary are the most common. For a complete list of all the options, use the F1 key described in image 3.4.
- All Zones (6) comes from the Zones and Zone groups we set up in Module 1.
- Select the Command State (7) (another area that we saw in Module 1). We are saying that either the point is in a Failed State or it's working Normally.
- Switching Event Data Recorder (8) on (by checking the box) will enable a report to be created

showing all the times that this point changed status (From Fail to Normal or from Normal to Fail).

- This is the first of two that we just want to draw your attention toward. In Module 1 we saw that some users could be set up as Privileged. We mentioned there are places where this comes into play. If we select the Privilege Box (9), we are only allowing Privileged Users to issue Controls.
- The second of two FYI boxes is Control Password required (10). Going back to Module 1, only users with separate control passwords will be able to issue controls to this point.

The second tab (Telemetry) is not necessary for Housekeeping points. Telemetry is only used for points that are directly connected to equipment. If we do not get a direct response for information from the point then we say the point has failed.

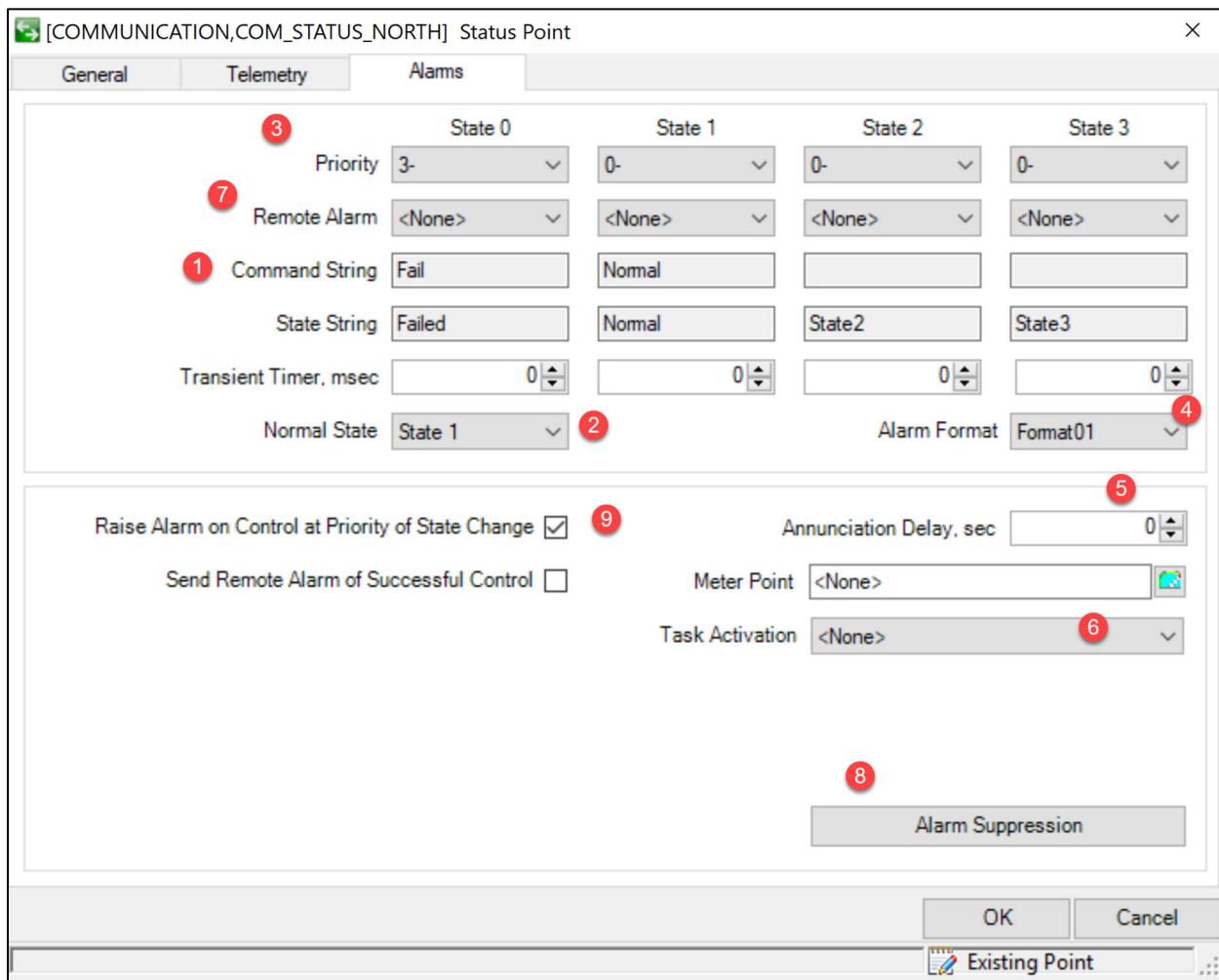
The failure of an RTU is different as it will be determined by logic in the software. If we can't get information from any of the points in an RTU, we will consider that the RTU has failed.

The failure of a Communication Line will be determined similarly. If all the RTUs on the Communication Line fail, then we will fail the Communication Line.

Since Health points are not sensors, we leave the Telemetry tab blank.

There are 9 settings that will be part of the Level 1 course. More advanced settings will be covered in Level 2. Please enter the settings as below. An explanation for the settings can be found below the image and will continue to the next page.

If you would like to explore all the options, remember the F1 Key shortcut or, for even more information, you can download the DB-402 Alarm Database Editing Guide from the support portal.



3.10 Alarm Settings for Status Points

- This is the option we chose when setting up the point (1). Either this Communication Line will Fail or it will be Normal. Some points have 4 states which is why you see two more boxes that are not being used.
- Fail and Normal are words that we chose. We now must tell the system which of these is the Normal state. By picking State 1 (2) we are saying that Normal is normal and that Fail is not a normal state.
- If the point changes from Normal to Fail, what type of Alarm (3) do we want to raise? An Alarm value of 0 just provides information, no operator acknowledgement is required. Alarm Priorities 1-10 must be acknowledged. Please note that using all Alarm Priorities is not necessary. Many clients use just 3 or 4 priorities. The effect of each Alarm Priority from 1-10 is determined by the client. Different sounds, colors, and remote annunciations can be applied to each priority.
- Note that we have a Priority 3 set when it goes to Fail and a Priority 0 set when it returns to

Normal. Often utilities will also want to set a Priority 3 for when it returns to normal.

- We looked at Alarm Formats in Module 1. What wording do we want the Operators to see when alarms are raised? This is set in Alarm Formats (4).
- Do we want the alarm to be noticed by the operators immediately? If so, leave this value at 0. If you would like to have a delay of a few seconds (in case it may clear quickly), enter the number of seconds here (5).
- Tasks or Alarm Sequences (6) are scripts that clients can write if the default Survalent functions don't provide what they need. For example, by default, Survalent will have the alarms make sounds, show special colors, and send text messages. Anything over and above these settings can be written up in a Command Sequence and executed when the point goes into an alarm state.
- As mentioned in Point 6, annunciations messages can be configured (7) to be sent out by text (or email or page).
- Alarm Suppression (8) sets up a relationship between points. We can suppress Alarms being raised on Point B if Point A has raised alarms.
- By checking this box (9), even alarms intentionally raised by Operators must be acknowledged.



Exercise

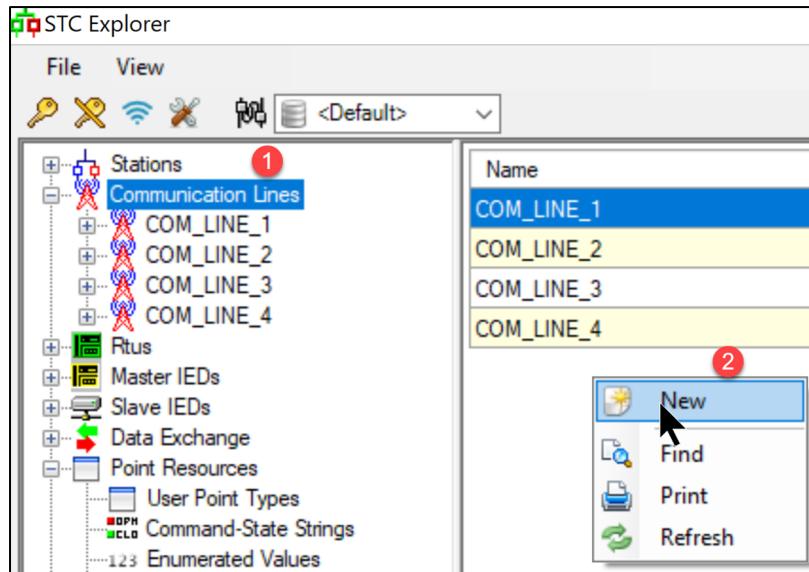
In-class exercise: Create an RTU Health point that, except for the name and description, has the same settings as the Communication Line Health point that we just created.

Name the point RTU_STATUS_NORTH and provide a description for the point.

Create and Configure the Communication Line

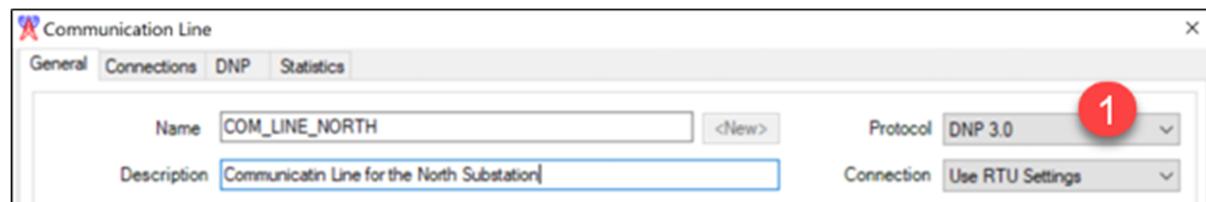
With the Health Points configured, we can now move to adding a Communication Line and an RTU. In this section, we'll set up the Communication Line.

On the left Explorer window, click on Communication Lines (1). Move to the right window, right-click with your mouse, and select New (2).



3.11 Creating a New Communication Line

To begin, provide a name for the Communication Line as shown in image 3.12. Then click the dropdown box (1) to define the protocol being used by the devices.



3.12 First Entries in Configuring Comm Line

The two most common options for connection are Use RTU Settings (2) or TCP/IP (not shown).

If you select Use RTU Settings, then connection information will have to be entered for each RTU connected to the communication line. The Connections tab for Communication Line would not have to be configured.

If you select TCP/IP, then you are saying that some sort of terminal server will be providing IP addresses

for all the RTUs connected to the Communication Line. The address of the device providing the IP addresses will have to be configured in the Connections tab as opposed to each of the RTUs.

Since RTUs are becoming more advanced, it is becoming more common to select Use RTU Settings as this provides much more information about each RTU. We will use this setting for the course.

The next option – Link Status – is the reason why we configured the Health Points in the last section.

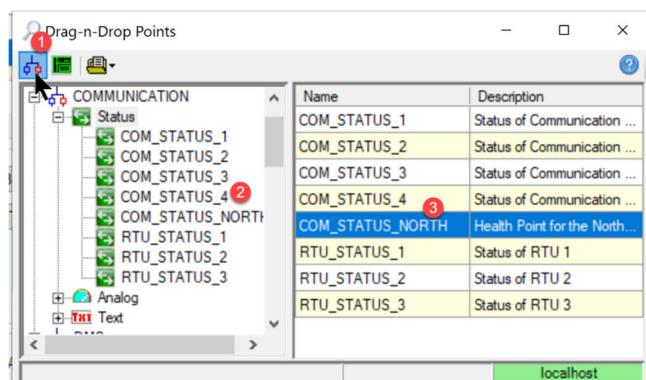


3.13 Link Status

The link status is asking for the location of the Health Point. Click the green icon as shown in 3.13.

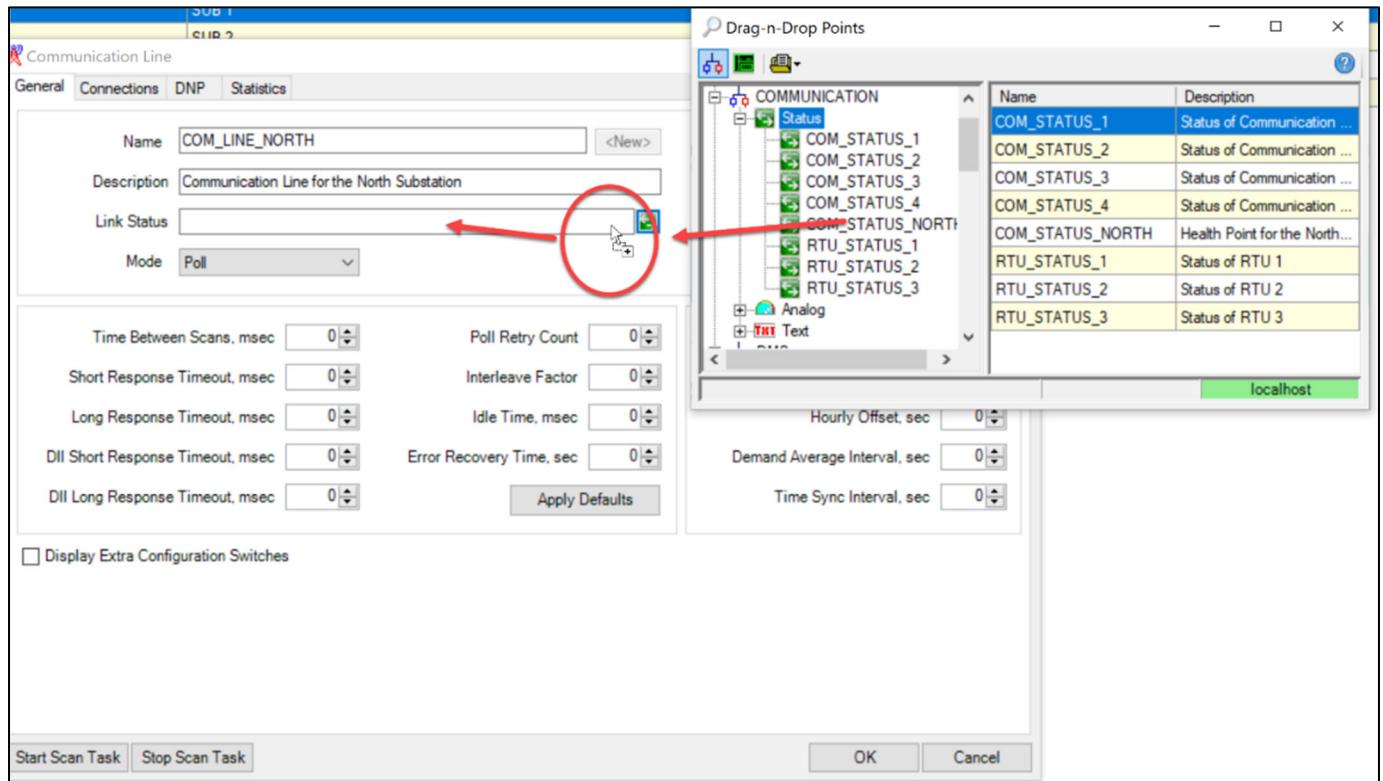
Upon clicking the green icon, the Drag-n-Drop Points window appears. From here we can pick points within our station if we click the icon shown with label 1.

The point we are looking for was named COM_STATUS_NORTH. You can select it from the left side (2) or the right side (3).



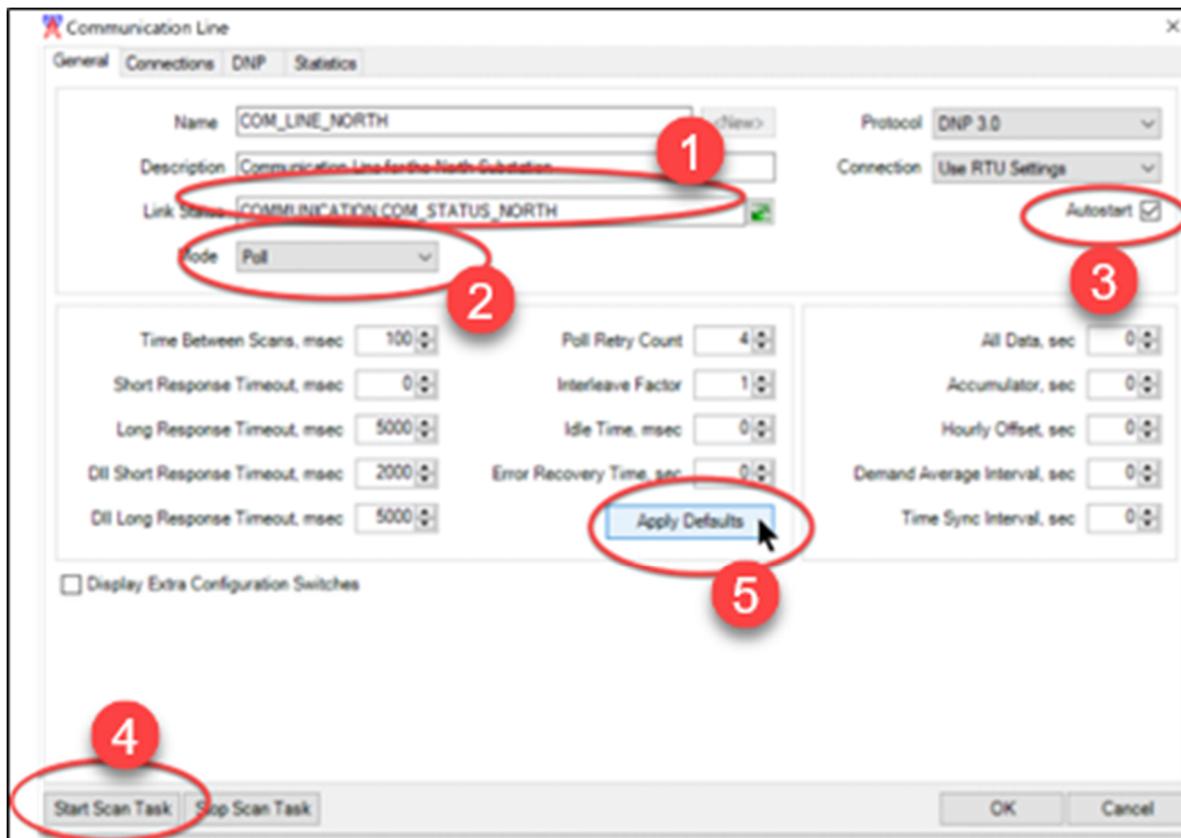
3.14 Drag-n-Drop Points Window

Once you select the box, drag it into the Link Status Field.



3.15 Dragging the Point to the Link

After dragging the point into the Link Status, we see the station called COMMUNCATION followed by a comma and then COM_STATUS_NORTH (1). This is the full name for the point. Dragging the point name was set up to avoid typographical errors.



3.16 General Tab Completed

Also notice that the Mode is set to Poll (2). This is the most common setting – we will be actively polling the points on this Communication Line. The other option – Quiescent – is not used very much. This would be a configuration where we wait for points to send us a distress or failure message.

AutoStart (3) is a commonly checked. Upon system start-up, we want this line to immediately and automatically re-start its polling. If not selected, Start Scan Task (4) must be clicked.

Apply Defaults (5) applies default timing settings for the protocol. There are multiple fields and they can be understood using F1. Three basic ones are:

Time Between Scans

Specifies the time to wait, in milliseconds, between outgoing polls. Initially, you may want to set this fairly high until you can see that communication is taking place correctly. Then you can reduce it to improve the response time of your system. Just avoid making it so short that the RTUs are not ready to receive the next poll (this will make communication less reliable).

Poll Retry Count

The number of times the scan task is to retry polling an RTU that is not responding, before giving up and

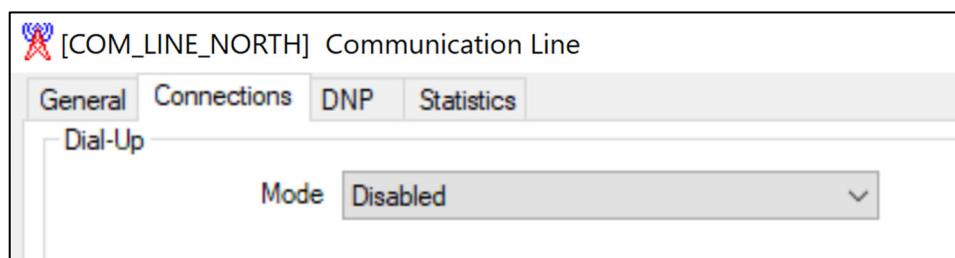
declaring the RTU failed. If omitted, the scan task defaults to three retries.

Interleave Factor

Specifies how often the scan task is to interrupt its normal round robin polling to perform a retry if a point can't be polled.

If the interleave factor is 2, for example, then the scan task will retry accessing a failed point poll after every 2 normal polls.

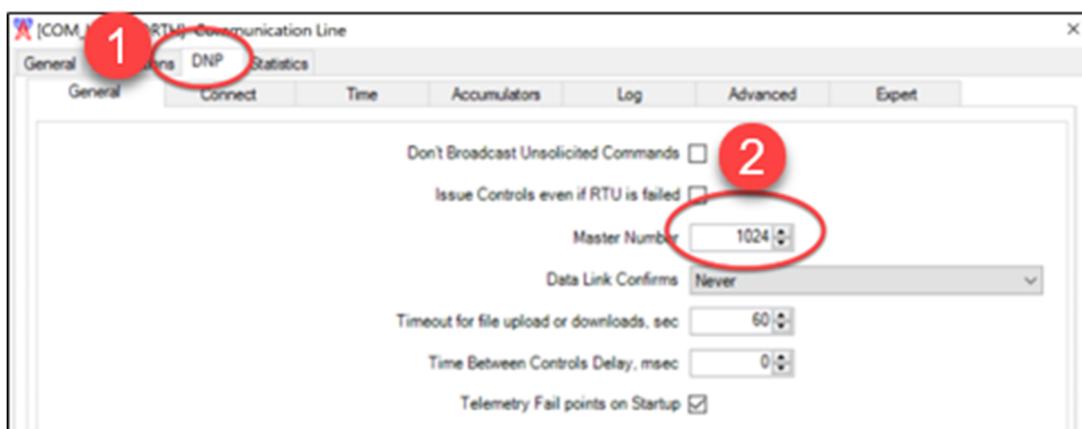
There are no Connection options when we use the RTU Connection option.



3.17 Connections Tab with RTU Connection Option

Under DNP (1), the default Master Number is 1024 (2). RTUs and IEDs connected to this Communication Line will be assigned addresses but 1024 is reserved.

There are numerous other options but they are normally used under advisement from Technical Support.

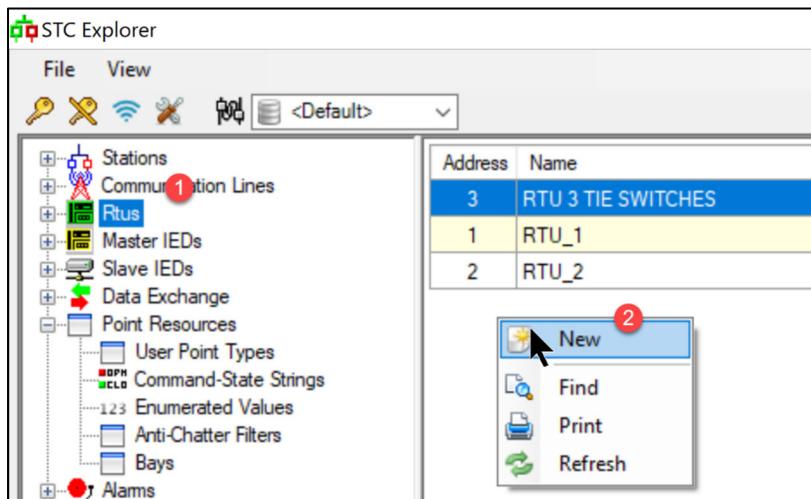


3.18 Master Number 1024

Create and Configure an RTU

Now that our Communication Line has been created in the database, we can move on to connecting RTUs and IEDs to the line. In this section, we will install an RTU. IED installation will be covered in a later section.

As with most elements that we add to the database, we begin by selecting the type of element we are installing in the left window (1). We then move to the right window, right-click the mouse, and then select New (2).



3.19 Creating a new RTU

As we did for the Communication Line, fill in the Name(1) and Description(2) and then click the green icon to set the Link Status.

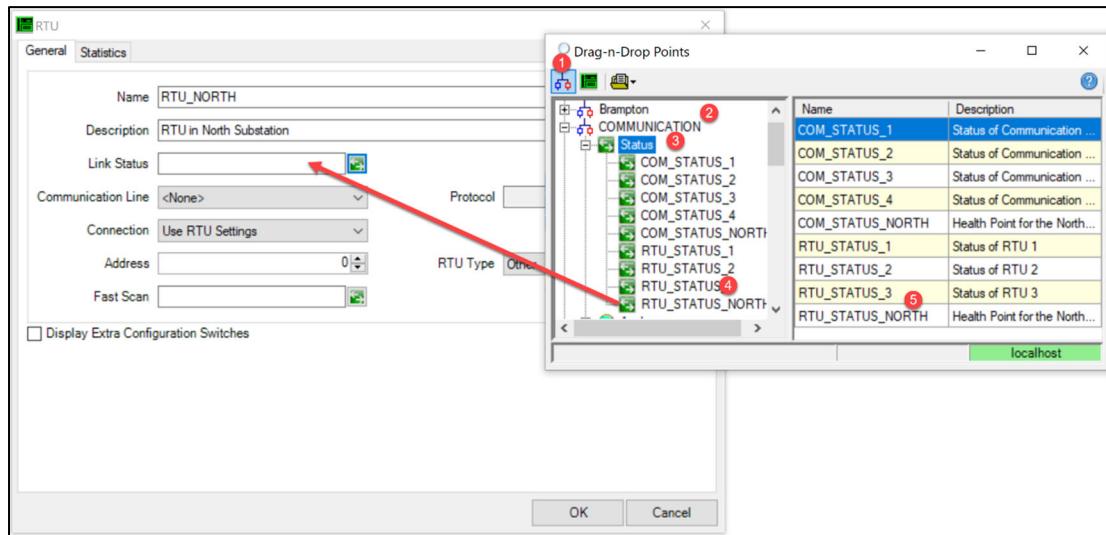
The screenshot shows the 'RTU' configuration dialog. It has two tabs: 'General' (selected) and 'Statistics'. The 'General' tab contains fields for 'Name' (containing 'RTU_NORTH', with a red circle 1), 'Description' (containing 'RTU in North Substation'), and 'Link Status' (with a green icon and a red circle 2). The 'Statistics' tab is also visible.

3.20 Entering the RTU Name

Similar to the Communication Line, we can click on the Station Icon (1) and select our Communication Station (2).

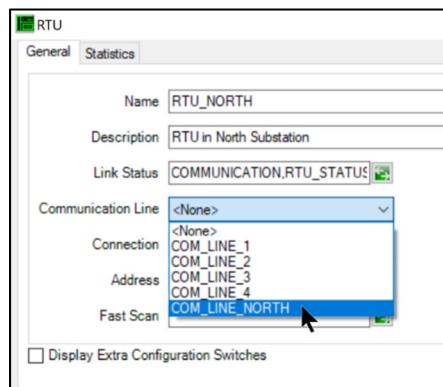
Next, we click on Status (3) and select the point we created. You can choose the label at (4) or (5).

Once you've selected the point, drag it into the Link Status box. We've now linked the health point to the RTU.



3.21 Linking to the Health Point

Next, we link the RTU to the North Communication Line as shown below.



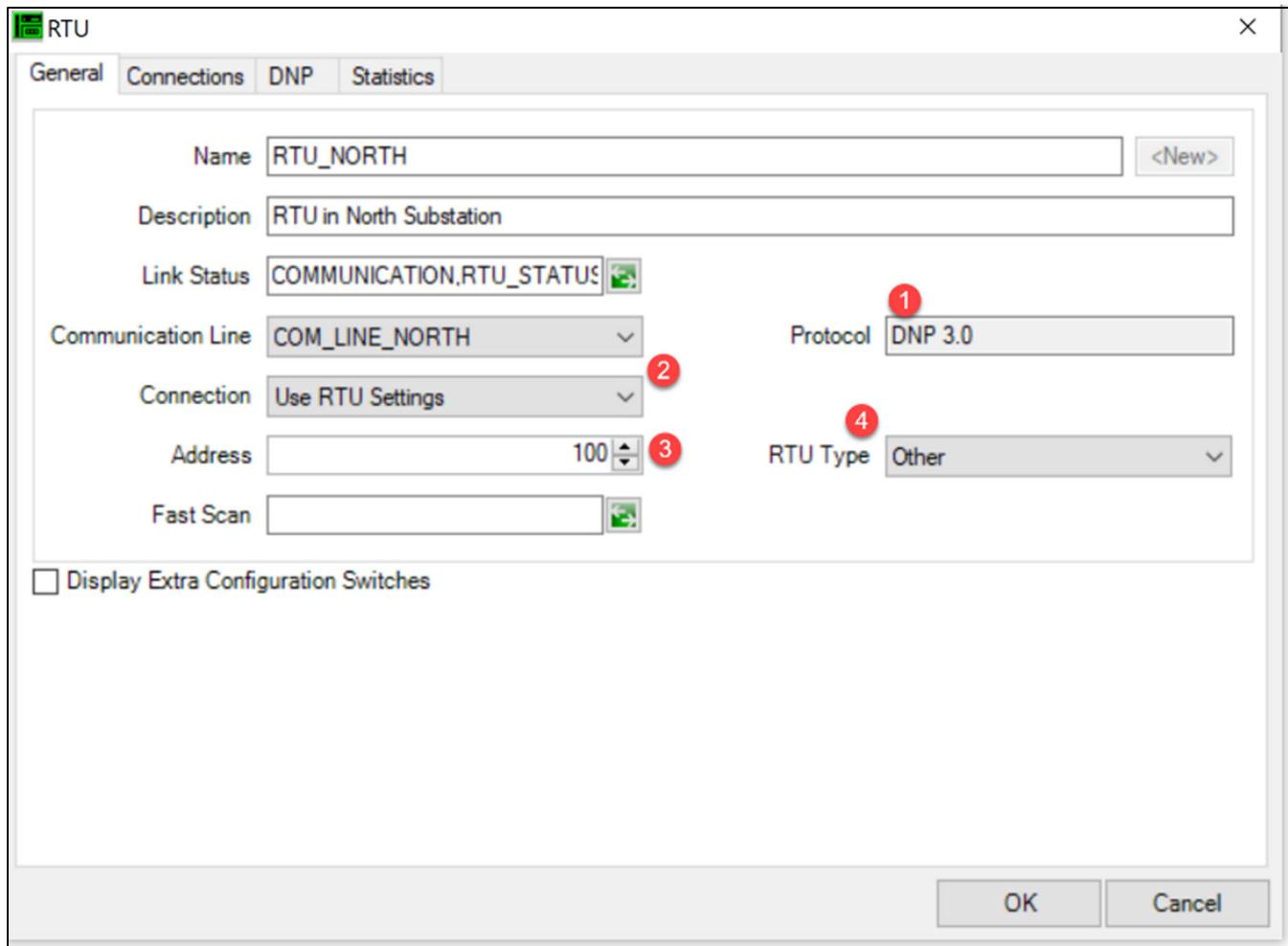
3.21 Linking to the Communication Line

When we selected the Communication Line, the protocol for the Communication Line automatically was entered (1).

The Use RTU Settings option is consistent with what we said when we configured the Communication Line – that is, each RTU will be configured with settings. This means that we will have to make entries in the Connections tab (2).

When we configured the Communications Line, we saw that Address 1024 was reserved for the server functioning as the SCADA Master. We also must give the RTU an address and it can't be 1024 (3).

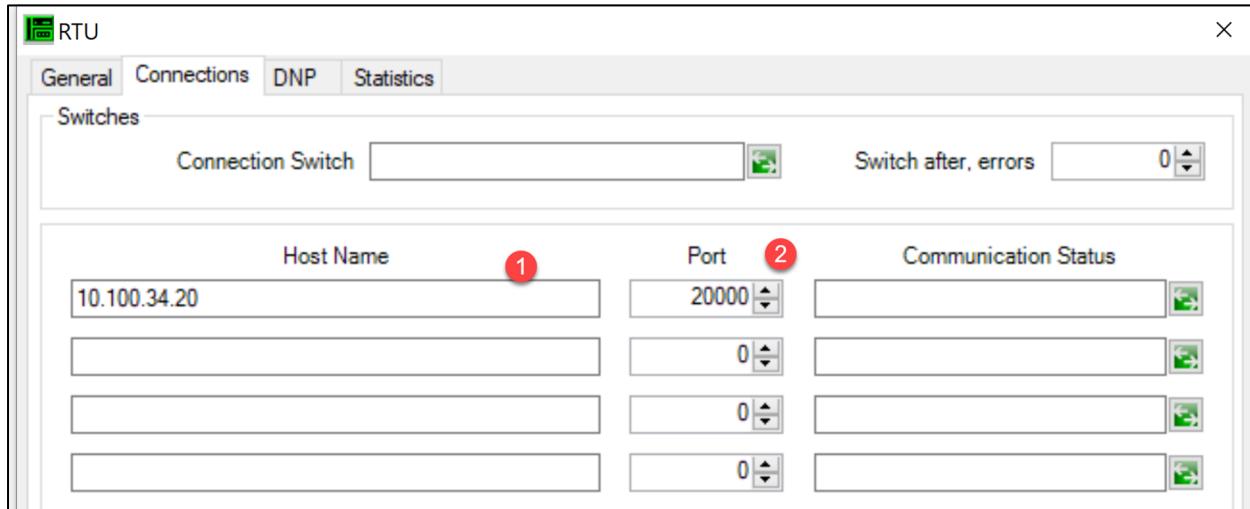
The RTU Type (4) won't be configured going forward. It was intended for RTUs that Survalent manufactured in the past.



3.22 Completing the General Tab

Since our RTUs can be configured individually, we chose that setting when configuring the Communications Line. This is the location (1) where we enter the TCP/IP address of the RTU.

20000 is the default port (2) for DNP 3.0.

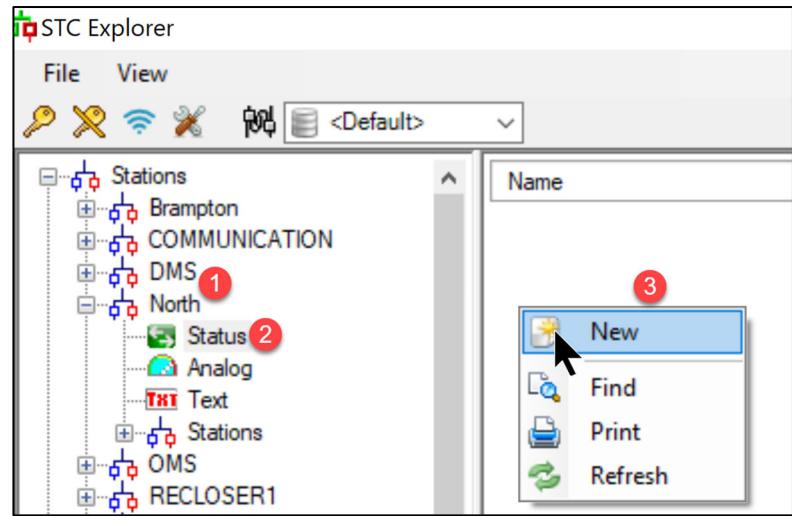


3.23 RTU TCP/IP Connection Settings

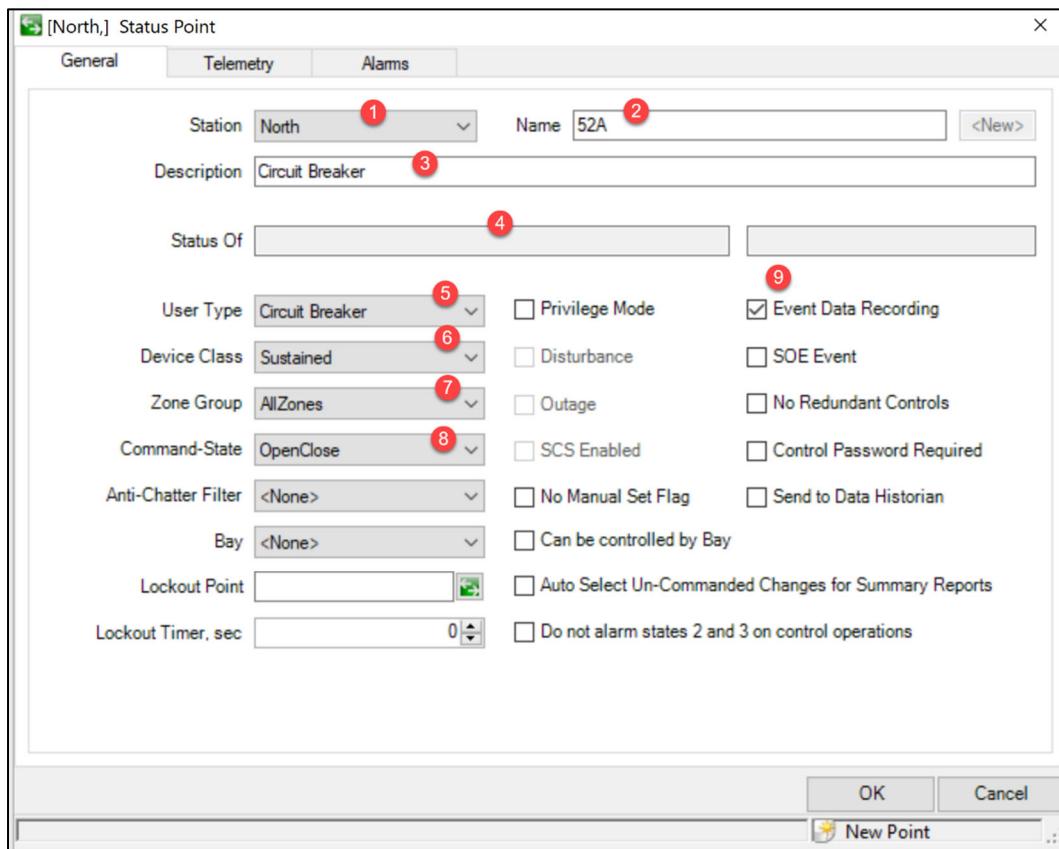
Creating Status Points

If we want to create a point representing the opening and closing of a circuit breaker in our North station, we would:

- Select the Station (1).
- Click Status (2).
- Right-click on the right window and select New (3).



3.24 Creating a New Status Point



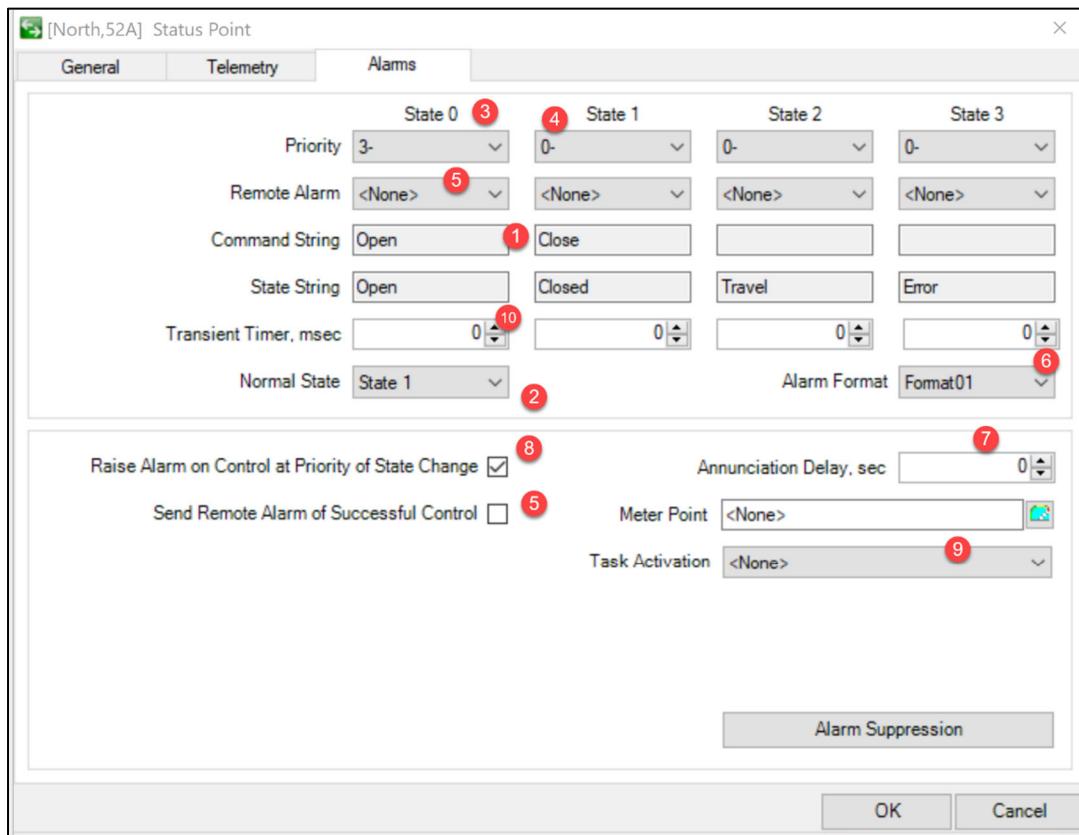
3.25 Configuring Status Point – General Tab

The settings here are similar to the Health points we created in an earlier section.

- The station defaults to North (1) because we had the North station selected when we clicked to create the new point.
- Here we provided the name of the point (2). We choose the IEEE convention for a breaker but what we put here is a preference (e.g. another common name is BRK or Mechanism 3PH).
- You can place more details in the description (3).
- This area fills in after we create the point (4).
- We must choose a User Type (5). Recall the options were entered by us in Module 1 (User Point Types) and that this field has no impact on functionality.
- Here we choose to have Sustained alarms (6).
- Here you can initiate your Zone strategy but, for now, let's choose All Zones (7).

- Choose the state (8) Open and Close (there are only 2 states for our breaker, some may have 4).
- Check Event Data Recording (9) so that we can report all the times this point changes state.

Because the Alarm tab is also similar to the Alarm tab for the points we configured for the Health points, we will look at that next before we get into the Telemetry settings.



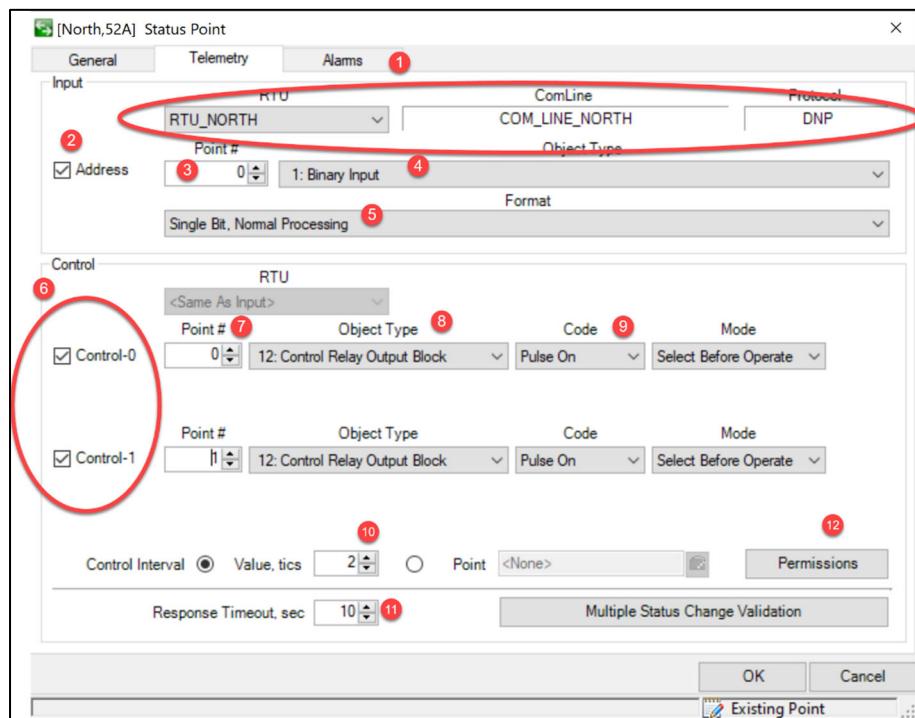
3.26 Alarm Settings for our Breaker

- We choose the Open and Close (1) command string since we will not be capturing travel and error states. We chose “Open and Close” instead of “Close and Open” because it’s a common convention to have Open line up with State 0. A way of remembering the convention is to think of the similarity of the letter “O” or open and the numeral “0” in State 0.
- Here we declare that this point should be closed (State 1). That is, closed is the normal state (2).
- If it Opens, we can raise a Priority 3 alarm (3).
- After, when it closes again, we are choosing to not raise an alarm (4) that must be acknowledged (defined here as Priority 0).

- We will be covering Remote alarms (5) such as emails, phone calls, and text messages in a later section in this module so we will not enter anything at this point.
- This specifies the wording of the alarm (6) that will be seen by the Operators (we looked at setting this option in Module 1).
- Here (7), we could delay the propagation of the alarm to the Operators (mostly used if we feel it will quickly go back to normal state).
- Checking this box (8) means that the point will still have to be acknowledged even if an operator issues a control to put the point into an alarm state.
- This is used if we want to create a special Command Sequence or Task to launch when the alarm goes into an Alarm state (9).

When we configured the Health Point, we did not fill in the Telemetry tab. This was because the point was not directly influenced by a change in state from field equipment. It was the Survalent software that triggers changes in state.

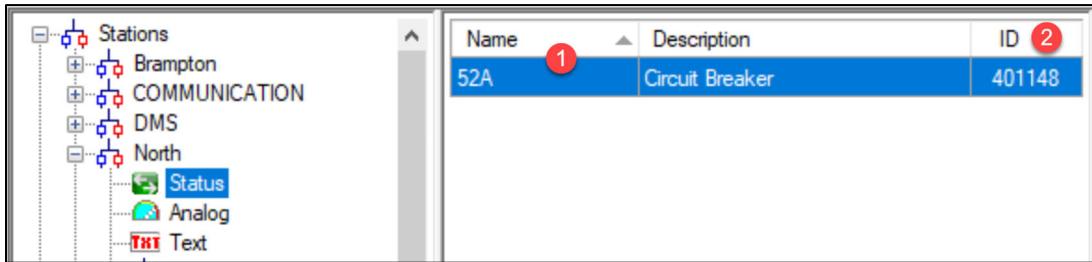
A device like a breaker is dependant on Telemetry.



3.27 Telemetry Configuration

- Here we state which RTU communicates with the point (1). When we select our RTU_North, the Communication Line and Protocol associated with the RTU gets populated. In this case it's DNP so the dropdown settings are going to be customized for DNP.
- The checkbox here means that we do want to obtain data from this point (2).
- Since we checked (2), we now must state where in the RTU does this information reside (3). You will have this information when you run your RTU mapping application. In our case, it's Point 0.
- How will we receive the information? This is dependant on the RTU you are using. In our example, we'll take the very common option of Binary Input (4).
- Similar to (4), how will we process the information (5). Single bit, normal processing is a common option selection.
- If we intent to issue controls to Open (0) and Close (1) this point, these boxes must be checked (6).
- The Open and Close point IDs also come from a mapping in the RTU (7).
- Option 12 – Control Relay Output Block (8) is the most common set of rules for issuing commands.
- The code for opening and closing is also dependant on type of RTU you have (9).
- How much time to you want the control (10) to run? If the RTU has an internal value of 500 milliseconds and you enter 2 ticks, you will be allowing the control to have 500 X 2 milliseconds or 1 second of control.
- For Response Time (11), how much time to you want to wait for the Control to start?
- This option (12) puts extra restrictions on opening and closing.

After entering all the settings and saving, our point 52A has been created. It's important to know that 52A (1) is not the true name of the point. Please turn the page for more information.



3.28 Short and Proper Names of our Point

Even though we named the point 52A and it appears under the name, the true name of the point is not 52A. There could (and should) be multiple points sharing this name.

There could be multiple points with the name 52A because the true, full name of the point is North,52A. This is the combination of the station plus the name we gave the point. The 52A is sometimes called the short name of the point. You could also think of it as a last name with the station being the first name. This allows multiple 52A points to exist. For example, there could be a South,52A which is a completely different point.

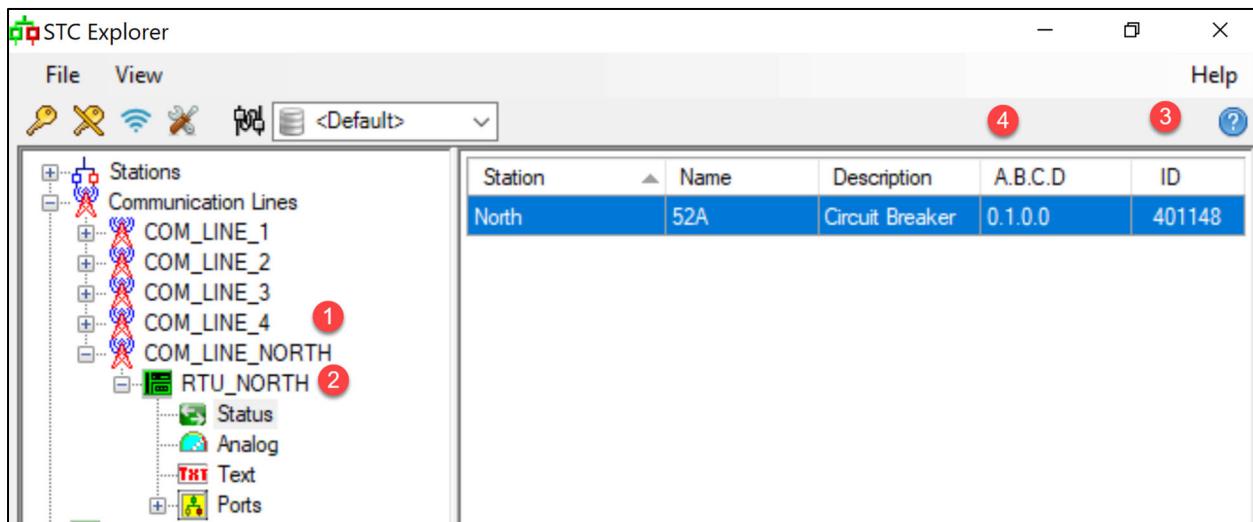
There should be multiple short names if you have multiple RTUs or IEDs of the same type. Multiple short names allow us to use tools that automate the process we just went through for creating a point. These tools include the IED Wizard, Control Panels, Template PMacros, and the Dump/Load functions. We will cover these tools in later modules.

Note: In addition to duplicating short names to take advantage of the tools mentioned in the paragraph above, another good idea is to just name the point after the function. That is, don't include geography or any other attributes.

i.e. Name the point 52A and not North_52A. Let the station name handle distinctions such as North.

So, there may be multiple 52A points in the system but there is no duplication because the station names are different. You cannot have duplicate names within a station. Looking at label (2), you see that a Point ID created by the system keeps things in order. The point we created is 401148 which is its unique identifier.

Also, recall the Station name we created is just a name we provided. We gave our station the name North but we could have named it after anything we wanted. It wouldn't make sense but we could even put it under Communications. Using stations makes it easier to logically or virtually plan points. However, the truth path of the point would follow the communication line and the RTU.



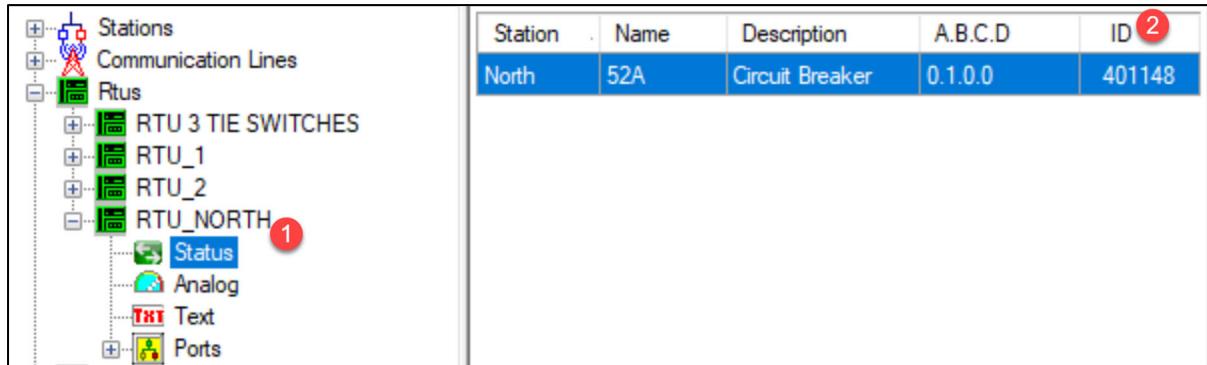
3.29 The Truth Point Location

If you follow a path from COM_LINE_NORTH (1) through RTU_NORTH you will find all the Status Points in RTU_NORTH (2).

Note the point ID (3) for the point shown is exactly the same as the ID in image 3.28 (2). The point, then, appears in multiple places but it's just a different path to the exact same point. This path is more accurate since it follows the communication line and not a made-up station name.

Also note in (4) that the DNP point settings we gave this point appear. We configured these same selections through the drop-down configuration boxes in image 3.27. For example, the A value represents the point number we entered. **Survalent System specialists often prefer this view because they can easily see points mapped to the RTU that have not been selected.**

Note image 3.30 below, we can also reach the same point by going directly through the RTU menu (1). It's the same Point ID number (2).



3.30 Same Point in RTU Menu

Creating Analog Points

Similar to Status points, we can create Analog points manually; however, by using short names we will be able to automate this process later in this module.

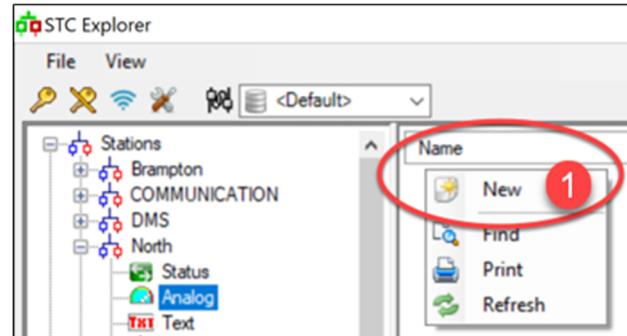


Exercise

In-class exercise: In Module 1, we saw some point types that were defined (e.g. Breaker, Switch). These settings don't provide functionality but they make identifying points user-friendly in reports.

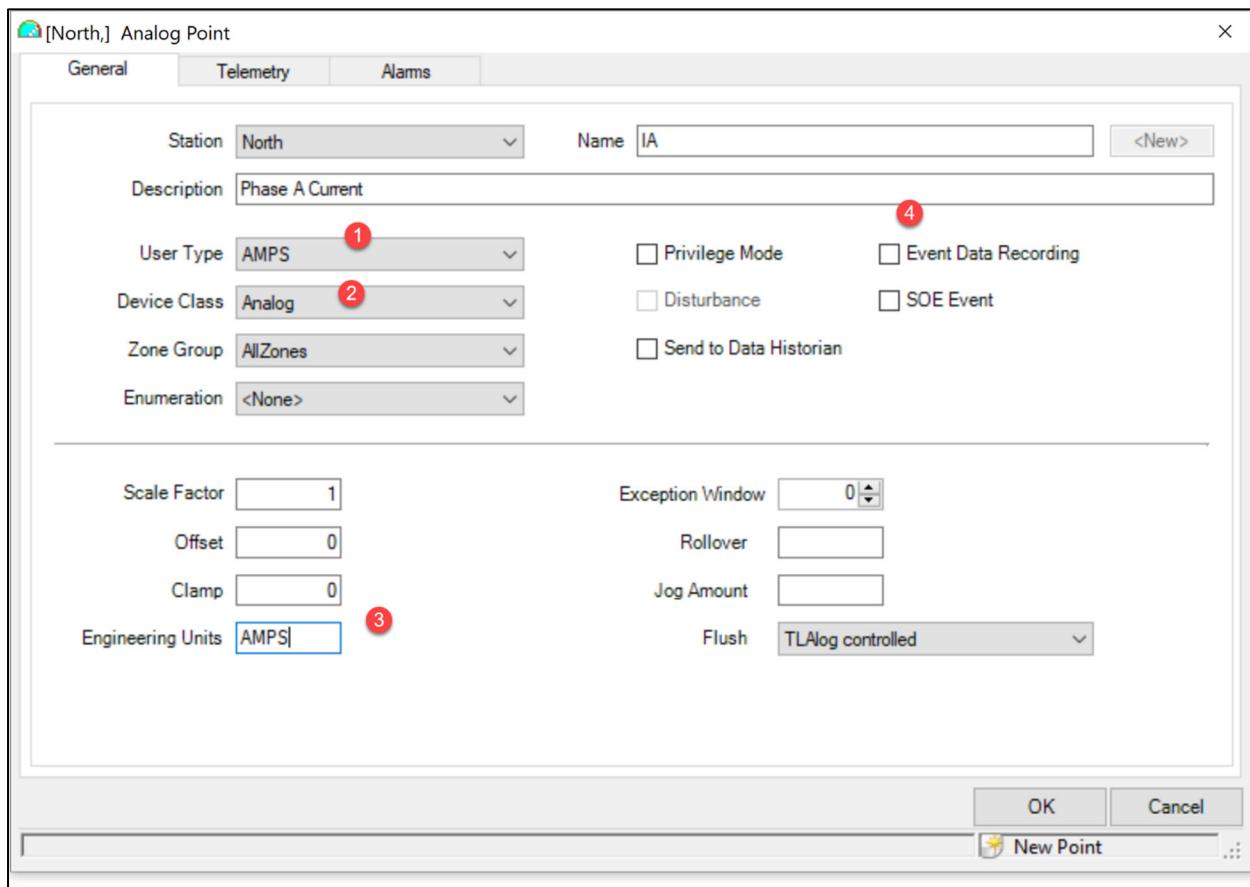
Before adding our first analog point, please add a User Point Type called AMPS.

Similar to creating other items in the database, we start by selecting the element (Analog), right-clicking in the right window, and selecting New (1).



3.31 Creating a New Analog Point

On the next page, you will find the important fields that we will be covering in the Level 1 course that pertain only analog points.

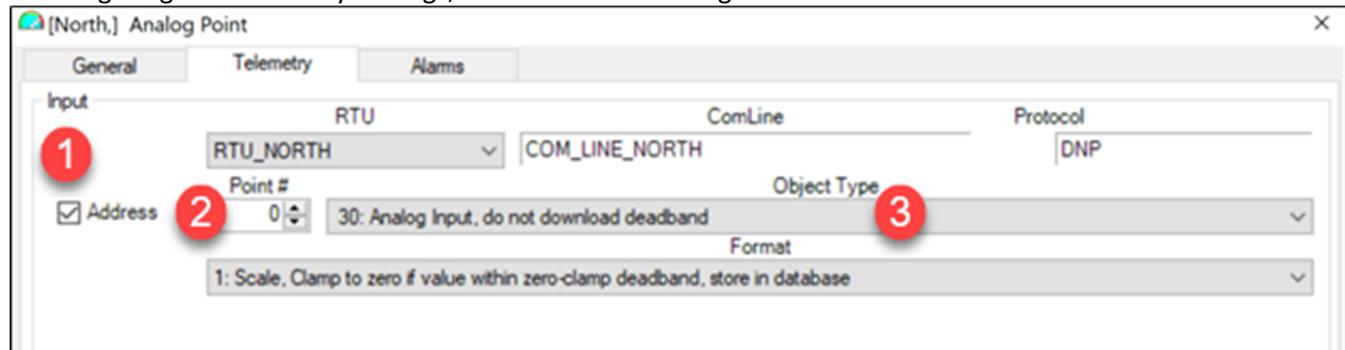


3.32 Analog Configuration Fields

- This is the point type (1) that you just created in the exercise on page 27.
- Analog point values (2) change frequently and require a different type of alarm management which we will cover in the Alarms tab.
- Entering in the Engineering Type (3) will give us some additional options when we cover Pmacros in later sections.
- We used Event Data Recording (4) for Analog Points so we have a record whenever they changed state. This would create too much information with respect to analog points as their values change frequently.

Even though we don't cover the other fields in Level 1, you can always look them up quickly using the F1 key.

In configuring the Telemetry settings, we start with choosing the RTU.



3.33 Analog Telemetry Points

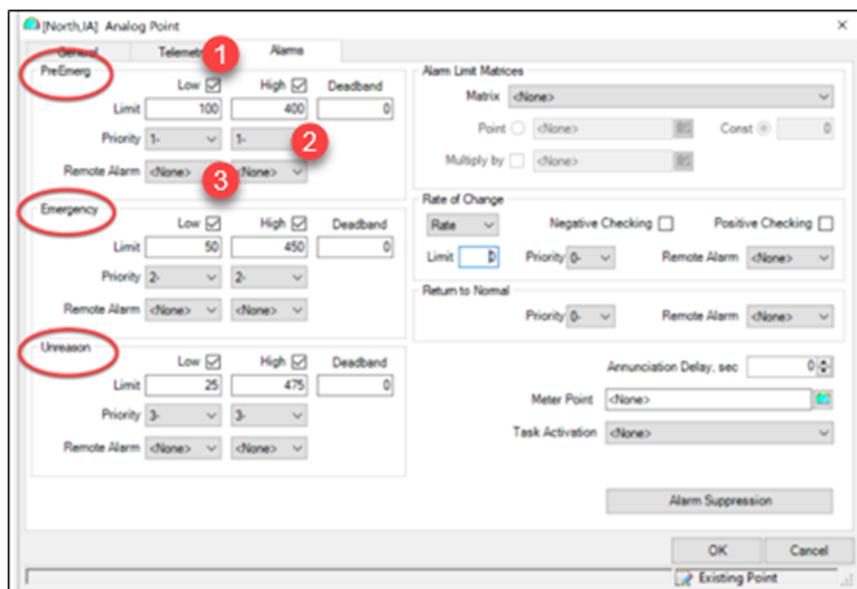
Once we select the RTU, the Communications Line and Protocol follow suit.

Similar to the status point, we check the Address box (1) and enter an available address in the RTU (2).

The Object Type of 30 (3) is popular for saving bandwidth as default deadband (distortion) values are used instead of an RTU having to download individual deadband values.

The Format setting of 1 where a value will be considered 0 if it's within a deadband range is also most common. E.g. if deadband is set to 3 and value is 2 then value will be considered to be 0.

For this course, we are going to work on the left side of the Analog Point Alarms settings.



3.34 Alarm Settings

Using 3.34 on the previous page as an example, let's look at how alarms have been set to work with this point. There are 3 sections – Pre-Emergency, Emergency, and Unreasonable.

The assumption that we are making in this example that this utility is happy with this point's performance as long as its value is higher than 100 units and less than 400 units.

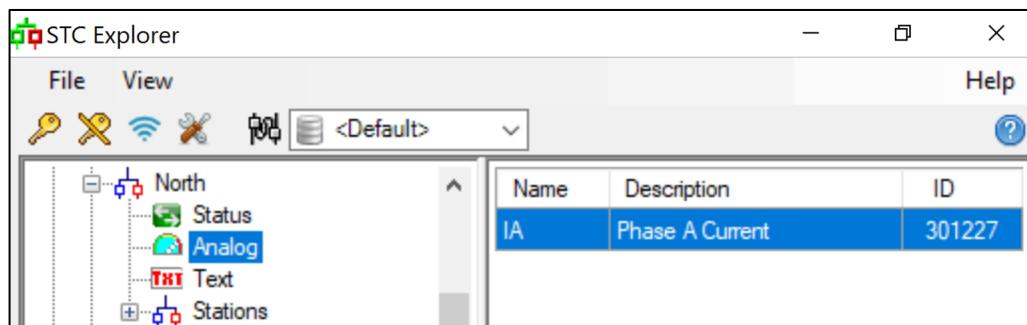
You see this in the section called PreEmerg:

- Both the Low and High Boxes have been checked (1).
 - The numbers 100 and 400 mean that the utility wants to be warned when the values go to 100 or below and 400 or above. They are not considering this to be an Emergency but rather a warning or Pre-Emergency.
- When these alarm values are hit, they have set a Priority 1 Alarm to be raised (2).
- No remote alarms (e.g. Emails, Texts, Phone Calls) have been set for this point (3).
- No deadband has been set (4). For example, if a deadband of 3 was set than values from 97 (Low Setting +3) to 103 (Low Setting -3) and 397 (High Setting +3) to 403 (High Setting -3) would not raise alarms.

You can now do the same analysis on Emergency and Unreasonable (extreme emergency) situations.

For some points, you may not want to specify any alarm settings. For others, maybe you only care if the values go high. You can choose which settings (if any) you require to be set up for alarms.

Our analog point now is in the database. The same best practices and rules for naming status points apply to analog points.



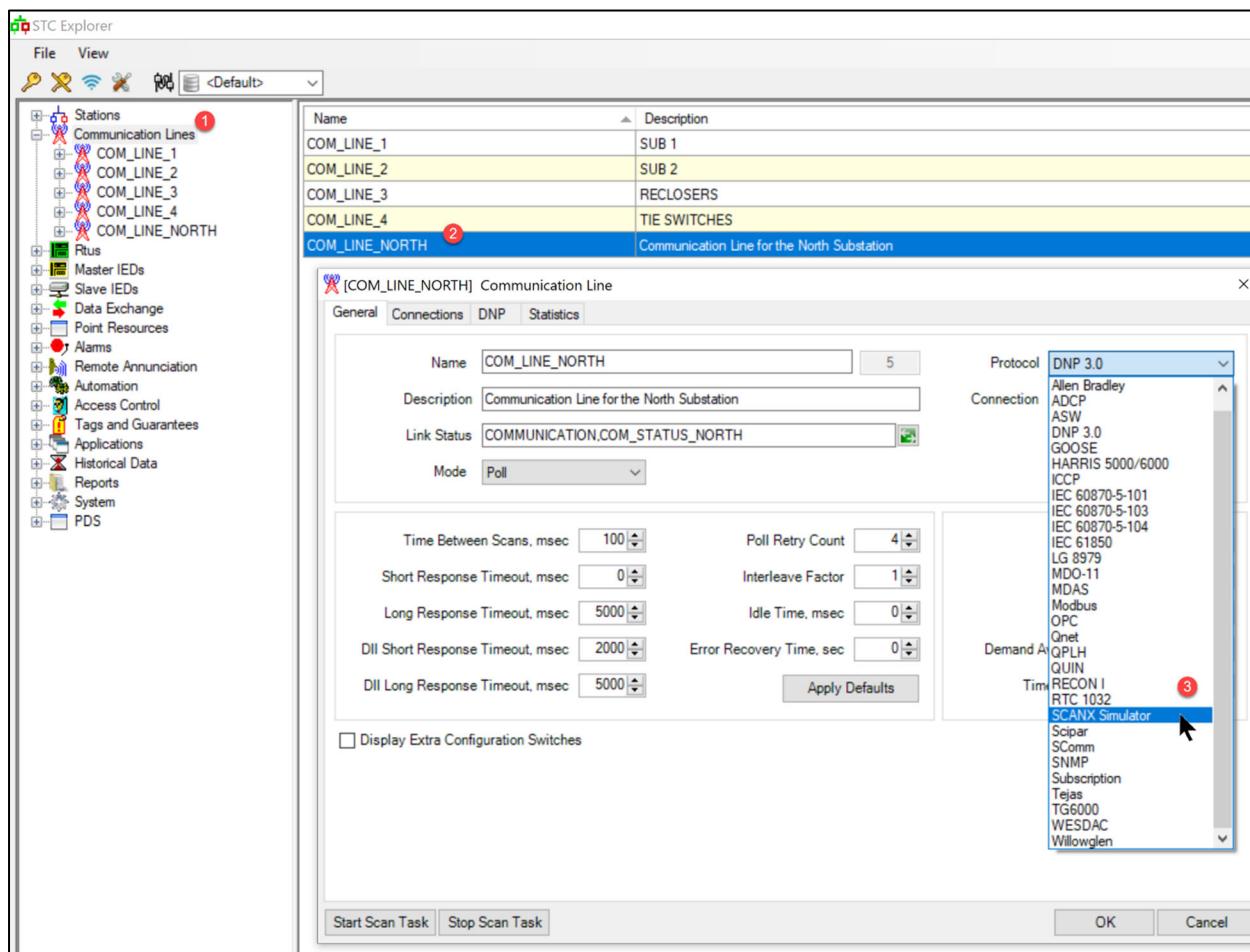
3.35 Analog Point Entered in System

Note: Analog points begin with the number 3 and Status points begin with the number 4.

Working with our Points in a Training Environment

When we created our Communications Line, we chose a protocol that gets used in real distributions – DNP 3.0. Since we are in a training environment and don't have real points running through real RTUs and Communication lines, our points will fail.

One way we can get around this would be to go back to the communication line by selecting Communication Lines (1), choosing our COM_LINE_NORTH (2), and opening the Protocol selection box (3).

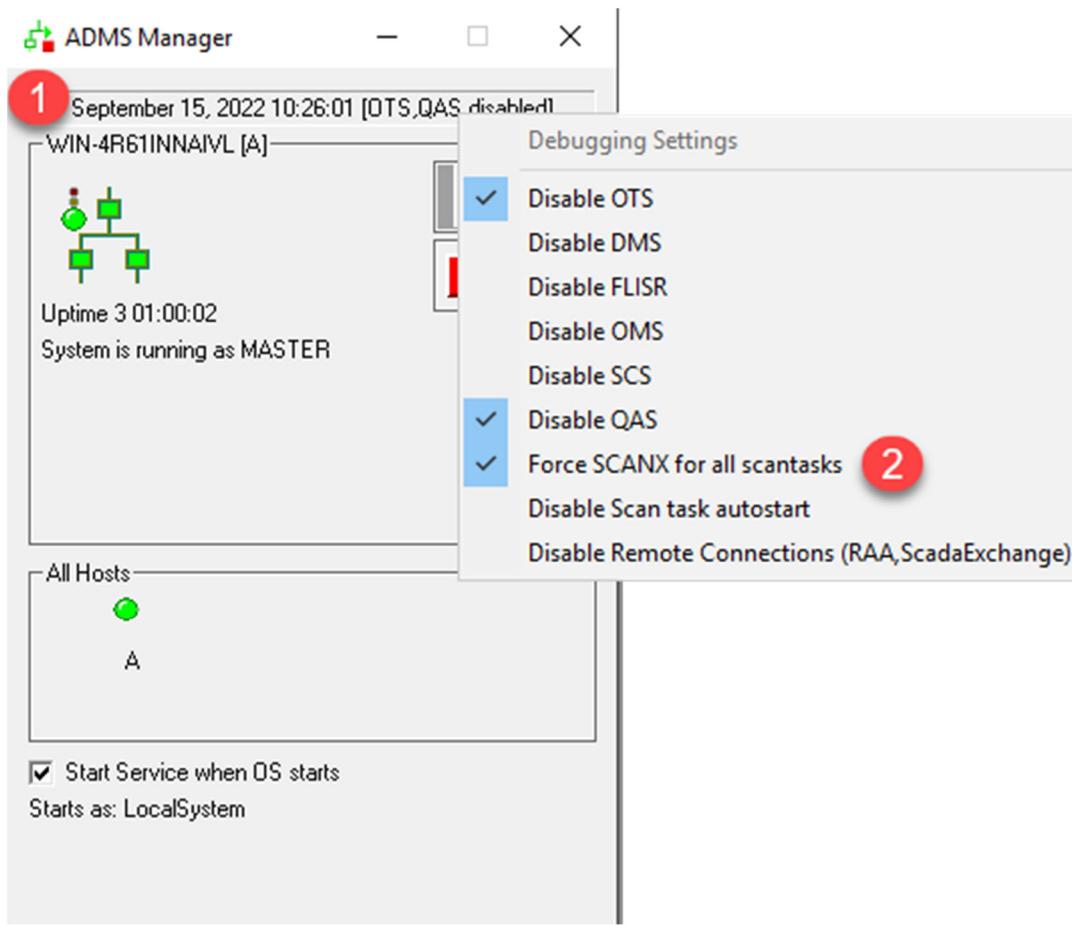


3.36 SCANX Simulator

The Survalent SCANX Simulator protocol will let us issue controls to equipment even though we don't have the field equipment installed; however, **don't change to this protocol**. Keeping the DNP 3.0 protocol also has advantages for our session. For example, programs like IED Wizard will provide errors because there are no IED providers making their equipment to work with SCANX!

A better way to keep both the Controls benefits of SCANX Simulator and the real-world advantages of DNP 3.0, is to treat DNP 3.0 as SCANX. This can be done by:

- Launching ADMS Manager.
- Holding down the Shift + Control keys while simultaneously clicking on the date (1).
- Clicking on Force SCANX For All Scantasks (2).
- Adjusting the other options to match the image below.
- Stopping and Restarting ADMS Manager.

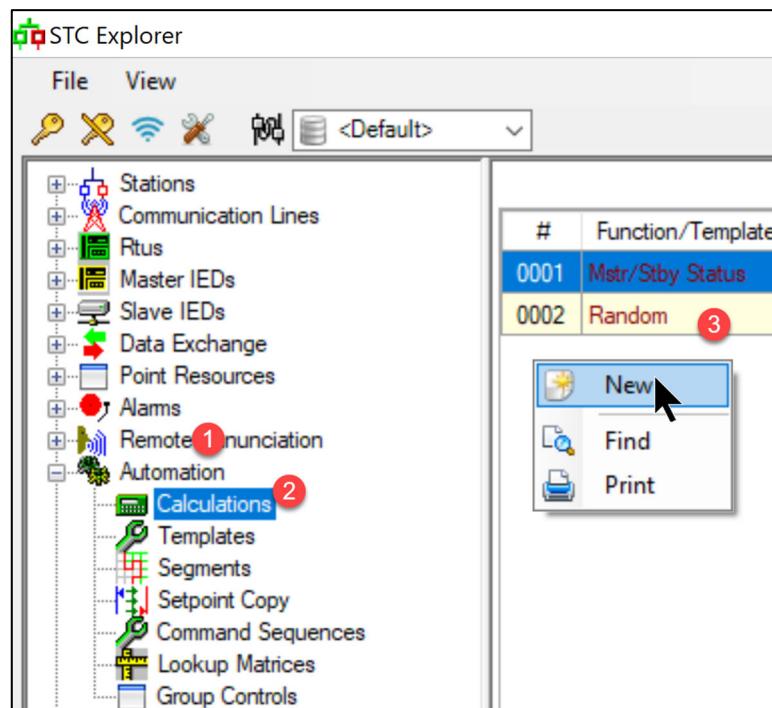


This change will work nicely for status points.

For analog points, we will have to simulate numerical values. There is a built-in function we can use to apply to our point.

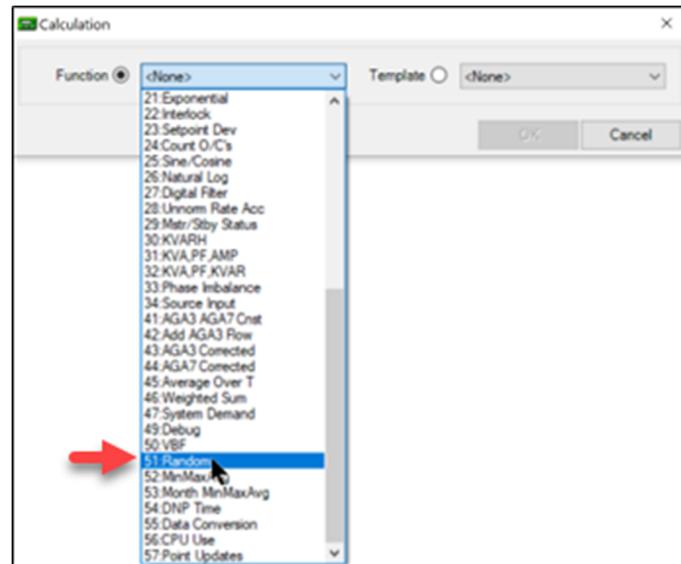
To set up the simulation in STC Explorer:

- Select Automation (1).
- Calculations (2)
- Right-click in the right window and select New (3).



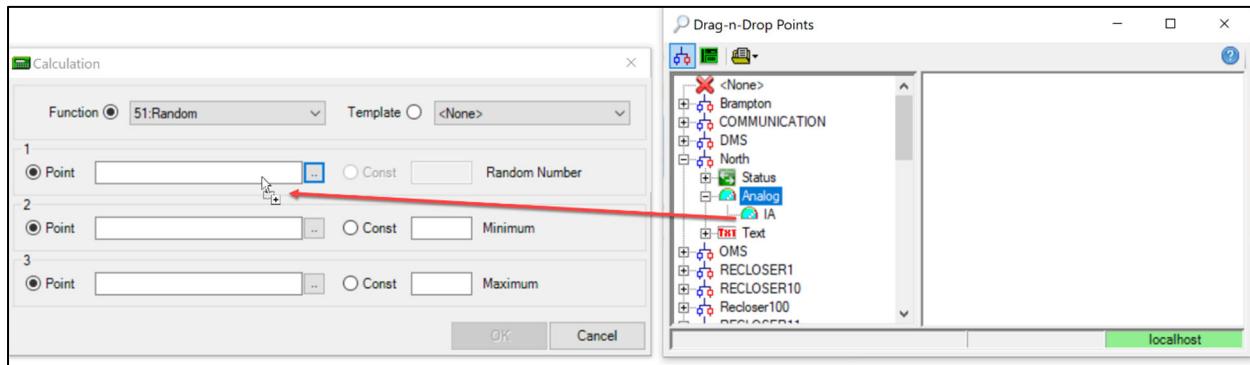
3.38 Setting Up an Analog Simulation

From the list of functions, select the Random Function (51).



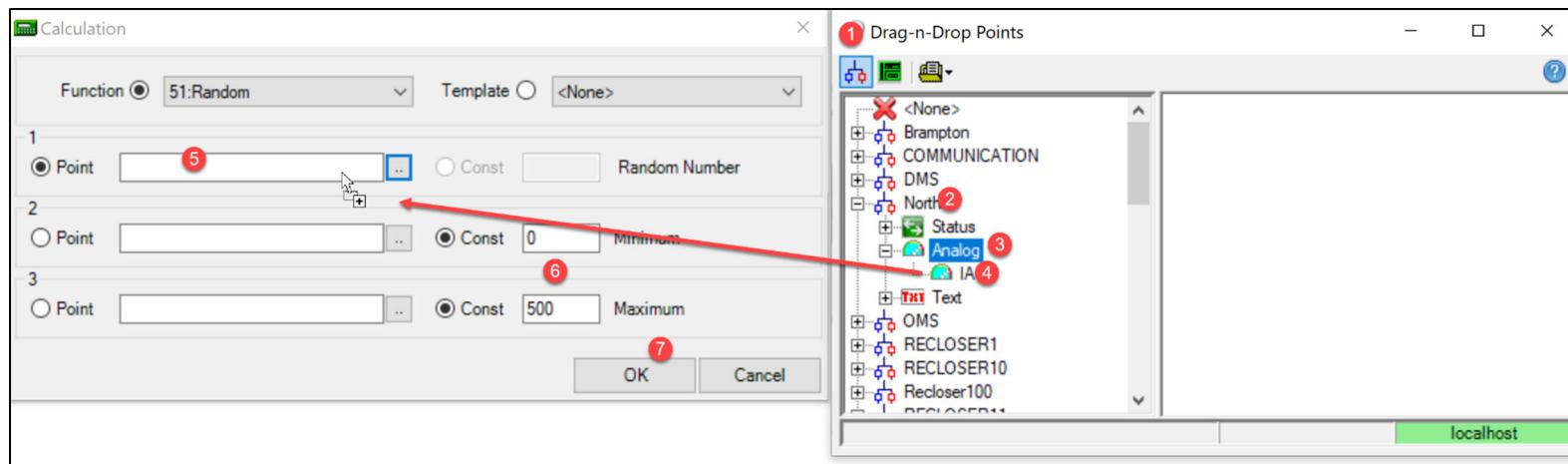
3.39 Selecting the Random Function

We will now proceed to drag the necessary points that are going to have values simulated using SCANX. Use Images 3.40 and 3.41 for detailed instructions on how to perform this task.



3.40 Dragging our Point to the Function Box

Using Image 3.41 as a guide, complete the steps below.



3.41 Setting Up the Simulation

- Click the station icon (1).
- Select the North Station (2).
- Select Analog Points (3).
- Select our point IA (4).
- Drag the point to the top box (5).
- Constrain the value to between 0 and 500 (6) by entering the numbers in the Constant boxes.
- Click OK (7).

Even though we've clicked OK and we see our saved Function, **we still must hit the Update and Commit buttons.** The reason for the extra step is sometimes Functions are set up for future use (1). Update (2) and Commit (3) enables the function.

Calculations							
#	Function/Template	Par1	Par2	Par3	Par4	Par7	Par8
0001	Mstr/Stby Status	SVSE MasterA	SVSE MasterB				
0002	Random	RECLOSER2,IIPhaseA					
0003	Random		#0	#500			

...

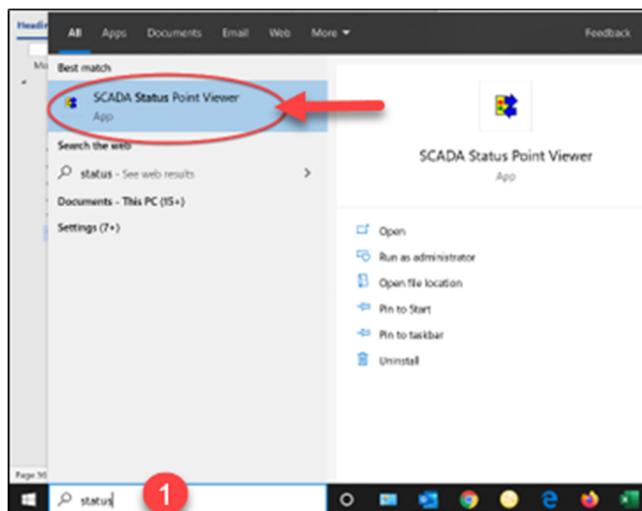
3 COMMITTED 2 UPDATE

3.42 Updating and Committing

Testing the Status Point Using the Status Point Viewer

Now that we've adjusting the protocol and simulated some values, we can test our points. We don't need SmartVU to see and control points. Instead, we can use point viewers.

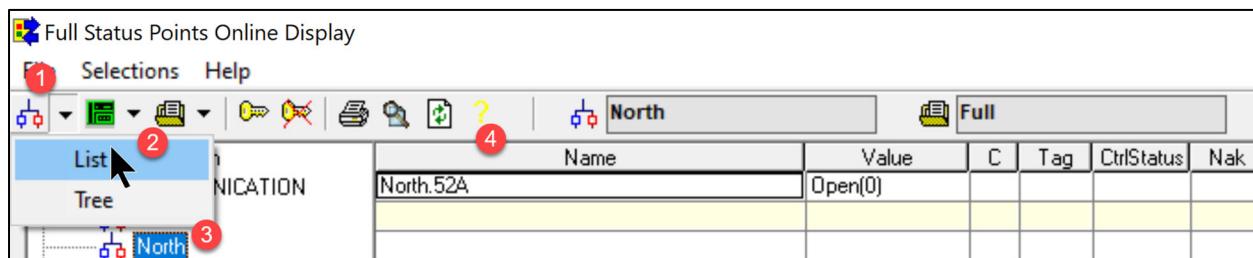
You could look for the SCADA STATUS POINT VIEWER in the list of programs we installed in Module 1 but you can typically launch it much quicker by typing Status in the Windows Program Search box (1) and selecting the program from the results section.



3.43 Launching the SCADA Status Point Viewer

We can find our breaker by:

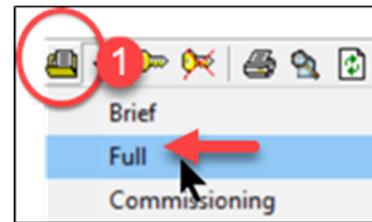
- Clicking on the Station icon (1).
- Selecting List (2).
- Choosing our North Station (3).
- Finding North,52A (4) which is the full name of the point.



3.44 Locating our STATUS Point

A few notes before proceeding.

The first one is that there are more and less detailed views of the point possible. For Level 1, we will select the full view (1).



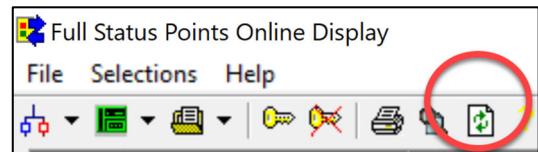
3.45 Different Status Point Viewer Views

Secondly, there are usually hundreds of points showing and we often need to search. You will see the search box at the top of the screen. It works with the asterisk wildcard as shown. Hit the refresh button to execute the search. Don't forget to remove your searches or you'll wonder where all the points went.



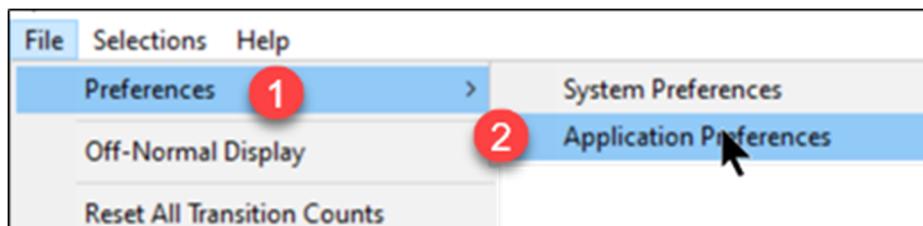
3.46 Searching for a Point

Finally, in moment we will be opening and closing the breaker and applying tags etc. If you don't see the changes right away, you may have to hit this refresh button.



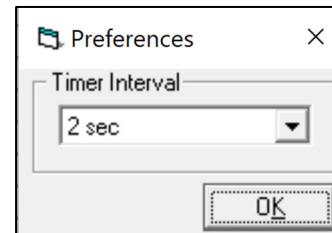
3.47 Refresh Button

If you constantly have to hit the refresh button, you made need to change a setting in Application Preferences (2) under Preferences (1).



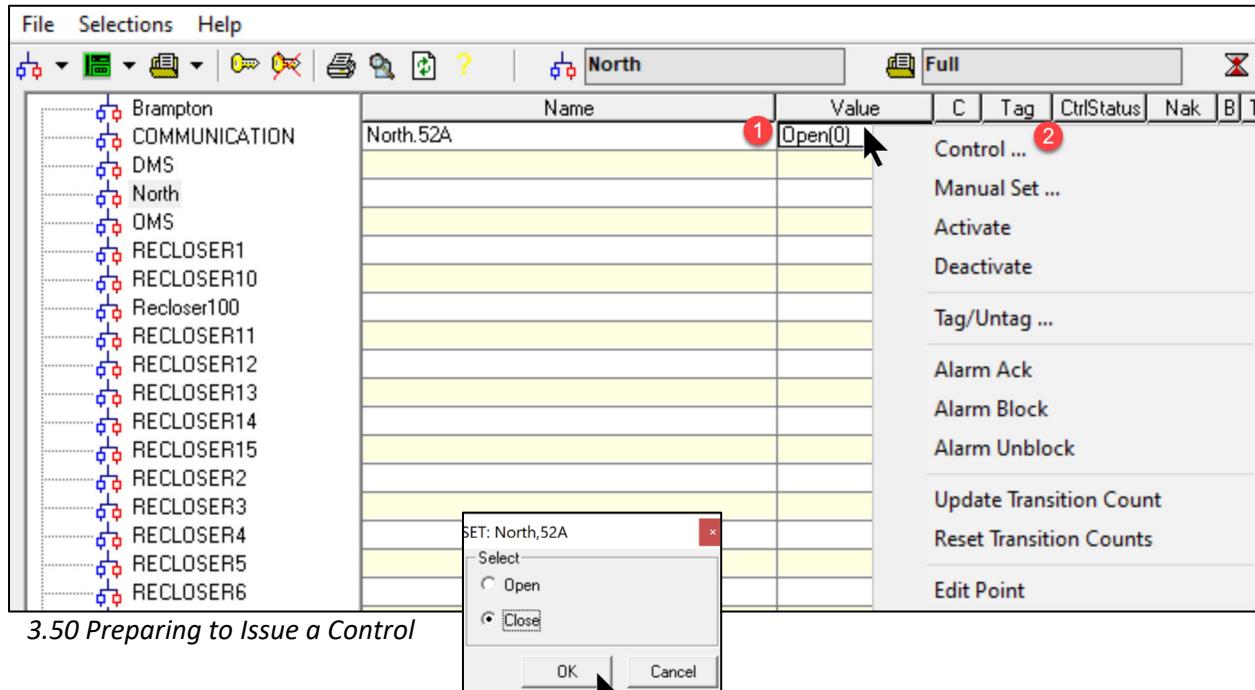
3.48 Application Preferences

Upon selecting Application Preferences, you will see a Timer Interval. A value of 0 won't let the program refresh properly so check to make sure the setting is at least 2 seconds.



3.49 Timer Interval

To issue a control, (1) right-click anywhere along the point and select Control (2). Note all the other available functions such as Tagging etc.



3.50 Preparing to Issue a Control

Select Close and then tap OK.

3.51 Issuing a Close Command

You will see the new state (1) as Closed and the time of the command (2) was issued.

Name	Value	C	Tag	CtrlStatus	Nak	B	TA	Time
North.52A	Closed[1]	1						2019-12-10 19:40:04.038

3.52 Point Now Closed

Here's what the other headers indicate:

- **C:** This will show the condition of the point (e.g. an M would mean manually set).
- **Tag:** There would be an abbreviation indicating a tag has been applied.
- **CtrlStatus:** This will show that a change in status is in progress.
- **NAK:** There is an unacknowledged alarm raised against this point.
- **B:** Alarm is Blocked
- **TA:** We have set a Telemetry Address to monitor this point.
- **Time:** The last time there was a change to any of the fields.

Continuing on across the top.

CO	C1	Zones	TrnCnt	Description	Dev.Class	
+	+	AllZones	3	Circuit Breaker	Sustained	Circuit Breaker

3.53 Remaining Fields of Status Point Viewer

- **CO:** Point has been configured to issue State 0 commands (e.g. Open).
- **C1:** Point has been configured to issue State 1 commands (e.g. Close).
- **TrnCnt:** How many updates (transitions) to the point have been counted.
- **Description:** This is the description we gave the point.

- **Dev. Class:** What alarm type did we select for the point.
- The last field is the User Point Type we defined.



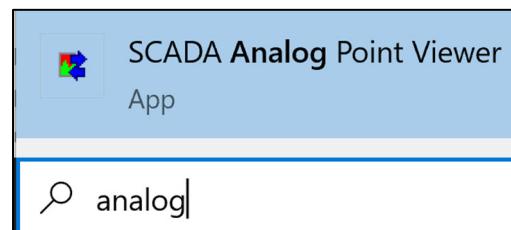
Exercise

In-class exercise: When we right clicked to issue a Control, we saw that there were 11 other functions that could be run from this Point Viewer.

Familiarize yourself with the functionality by trying all 11.

Testing the Analog Point Using the Analog Point Viewer

We can launch the Analog Point Viewer in a manner similar to the Status Point Viewer.



3.54 Launching the Analog Point Viewer

The Analog Point Viewer functions similar to the Status Point Viewer; however, the Value changes much more frequently.

Name	Description	Value
North.IA	Phase A Current	202.37

3.55 Analog Point Viewer

Note: The built-in simulation should change the value every 15 seconds. If this is not happening, before returning to the Calculations we created, remember the refresh settings we discussed for the Status Point Viewer (the same rules apply regarding values refreshing and updating). See image 3.49.



Exercise

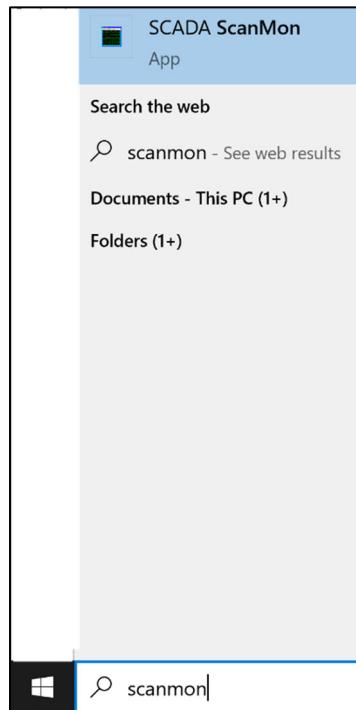
In-class exercise: Similar to the Status Point exercise, try out all the right-click options for our Analog Point.

Using ScanMon

The Status and Analog point viewers show us the performance of every point in the system. They are also excellent for detecting problems in the map because, if the map in SmartVU seems to be giving us incorrect or no values, we can confirm the point values and statuses using the point viewers.

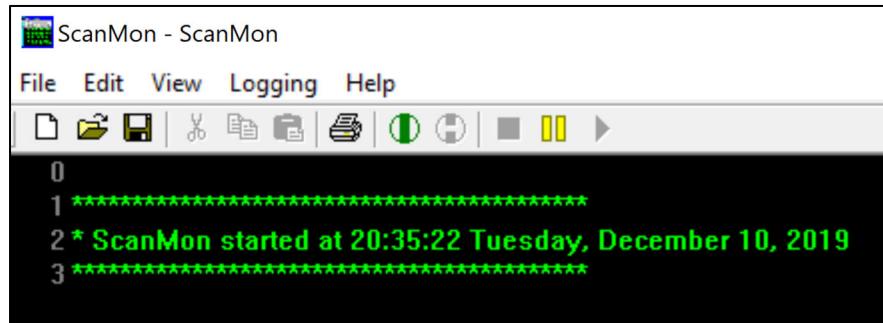
We can also use another tool for troubleshooting point behavior now. ScanMon not only shows if the points are responding but it also time stamps the scanning done by the system. As such, it can help detect if there are lags in the system.

ScanMon can be launched in a manner much similar to the Status and Analog Point Viewers.



3.56 Launching ScanMon

We see a text-based interface when ScanMon is launched.



3.57 ScanMon Launched

Before we can use ScanMon, we must note 3 settings:

- The ID (2) of the Communication Line (1) that contains the points we wish to troubleshoot.
- If we want to drill down to a specific RTU or IED, we must note its address.
- The protocol.

Let's gather these up for our scenario.

Name	Description	Protocol	Autostart	Active	Restart	ID
COM_LINE_1	SUB 1	SCANX Simulator	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
COM_LINE_2	SUB 2	SCANX Simulator	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2
COM_LINE_3	RECLOSERS	SCANX Simulator	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	3
COM_LINE_4	TIE SWITCHES	SCANX Simulator	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	4
COM_LINE_NORTH	Communication Line for the North Substation	DNP 3.0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	5

3.58 Communication Line ID

We know the Communication Line we want to troubleshoot is COM_LINE_NORTH but ScanMon is going to require the ID which is 5.

When we look at the RTU (1) ScanMon is going to require the address (2) and **NOT** the ID (3).

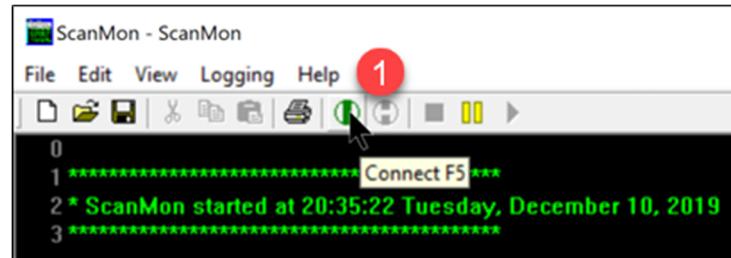
Address	Name	Description	ComLine	Protocol	ID
3	RTU 3 TIE SWITCHES	RTU 3	COM_LINE_4	SCANX Simulator	22
2	RTU_1	RTU 1	COM_LINE_1	SCANX Simulator	1
2	RTU_2	RTU 2	COM_LINE_2	SCANX Simulator	3
100	RTU_NORTH	RTU in North Substation	COM_LINE_NORTH	DNP 3.0	X1

3.59 ScanMon Wants the RTU Address NOT the ID

Also, in the real world, we would be using DNP 3.0 as the protocol but we are overriding it and will need to use SCAN X Simulator protocol.

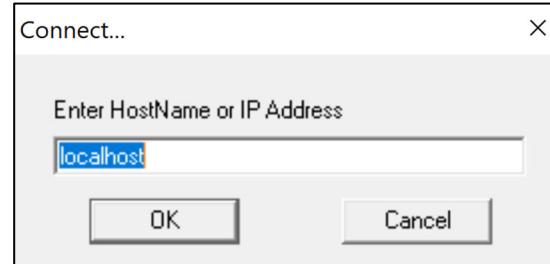
We are now ready to connect to ScanMon and monitor our points.

To connect, click on the green icon at the top (1) or click your F5 key.



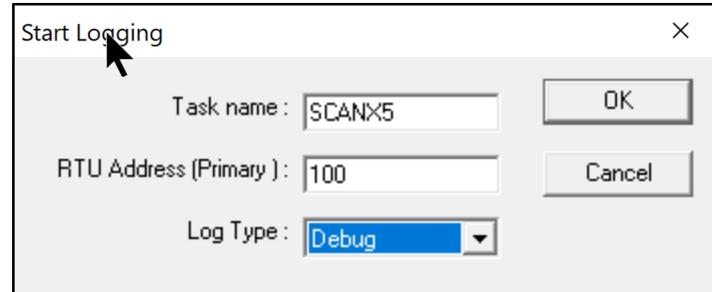
3.60 Connecting to ScanMon

We are then asked to enter in the address of the SCADA Master (the server). For training this will be localhost.



3.61 Providing the Server Address

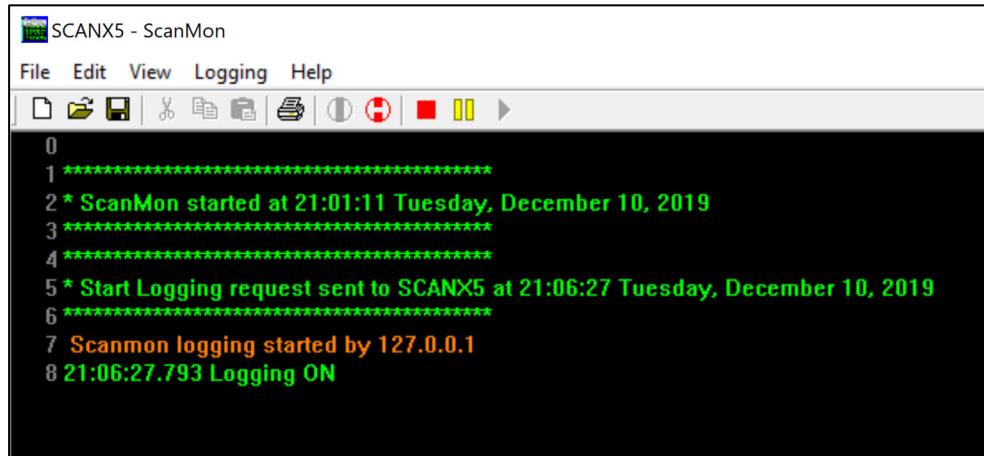
Here is where we use the information we gathered. We enter the protocol followed by the Communication Line ID. We also enter in the address of 100 for the RTU.



3.6A Information Required for ScanMon

Note 1: Normally you will be using ScanMon while working with Survalent Support. Support usually prefers Debug mode but you will notice other modes as well when you use the dropdown arrow.

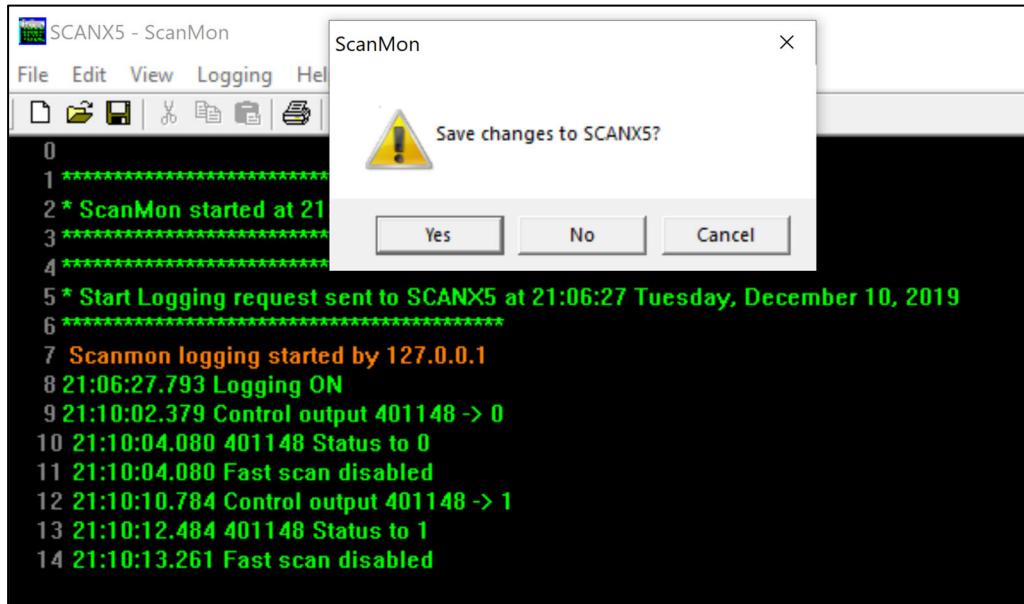
Note 2: If you wish to monitor all the RTUs on a communication line, you can set the RTU value to 0.



3.62 ScanMon Running

ScanMon is now running. If you were at your utility, you would likely see information populating quickly down the screen.

To simulate this, recall how we opened and closed the breaker using the SCADA Status Point Viewer. Open and Close the breaker again and then return to ScanMon.



3.63 Changes Logged

ScanMon times and logs the changes. When you are finished using ScanMon, you can save your changes to a text file that can be sent to support. Launching and running ScanMon concludes our module.