Lonmark & Lonworks

Standard Engineering Practices

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LONMark and LONWorks

SNVT Indexing (MNL-800)

With the release of the MNL-800, we have the ability to create as many SNVTs as we need for any application we have. The MNL-800 is not a LONMark approved controller due to its flexibility in SNVT usage. When an MNL-800 controller program is compiled, an XIF file is created. This XIF file contains information about the type and quantity of SNVTs used and indexing information. Indexing is required because you can have multiple SNVTs of the same type. LONMaker uses the XIF file as part of a template for binding and data transfer.

When programming an MNL-800 controller, the SNVTs you create are set to automatically index themselves. The "–1" in the index field determines that the SNVTs will be auto indexed. When compiled, the auto index SNVTs will assign index numbers randomly. That is, the index number for a SNVT could change each time. This poses issues with LONMaker bindings and the LNC controller. The DATA string field in the SIM block needs to match the indexes of the device.

Manual indexing is required whenever programming an MNL-800. Indexing starts at "0" (zero) and increments by 1. No gaps in index numbers can exist. If the MNL-800 has *firmware version 1.2 or later*, start with the communication and timing SNVTs first (quantity of 17), and then index the extra SNVTs (discussed later) next. On previous firmware revisions, ***the Heartbeat SNVTs MUST BE the last 10 SNVTs indexed***. Placing the timing and communication SNVTs anywhere but at the beginning or ending of the index range has been noted to potentially cause intermittent update problems with bound variables. See Invensys Bulletin 01-28 and 01-146 for more information on index issues. After that index the SNVTs used inside of the program. You will always have the same quantity of timing, communications and extra SNVTs, but the number of other SNVTs will vary. This way, when SNVTs are added, you will not need to adjust the timing, communication or extra SNVTs index numbers.

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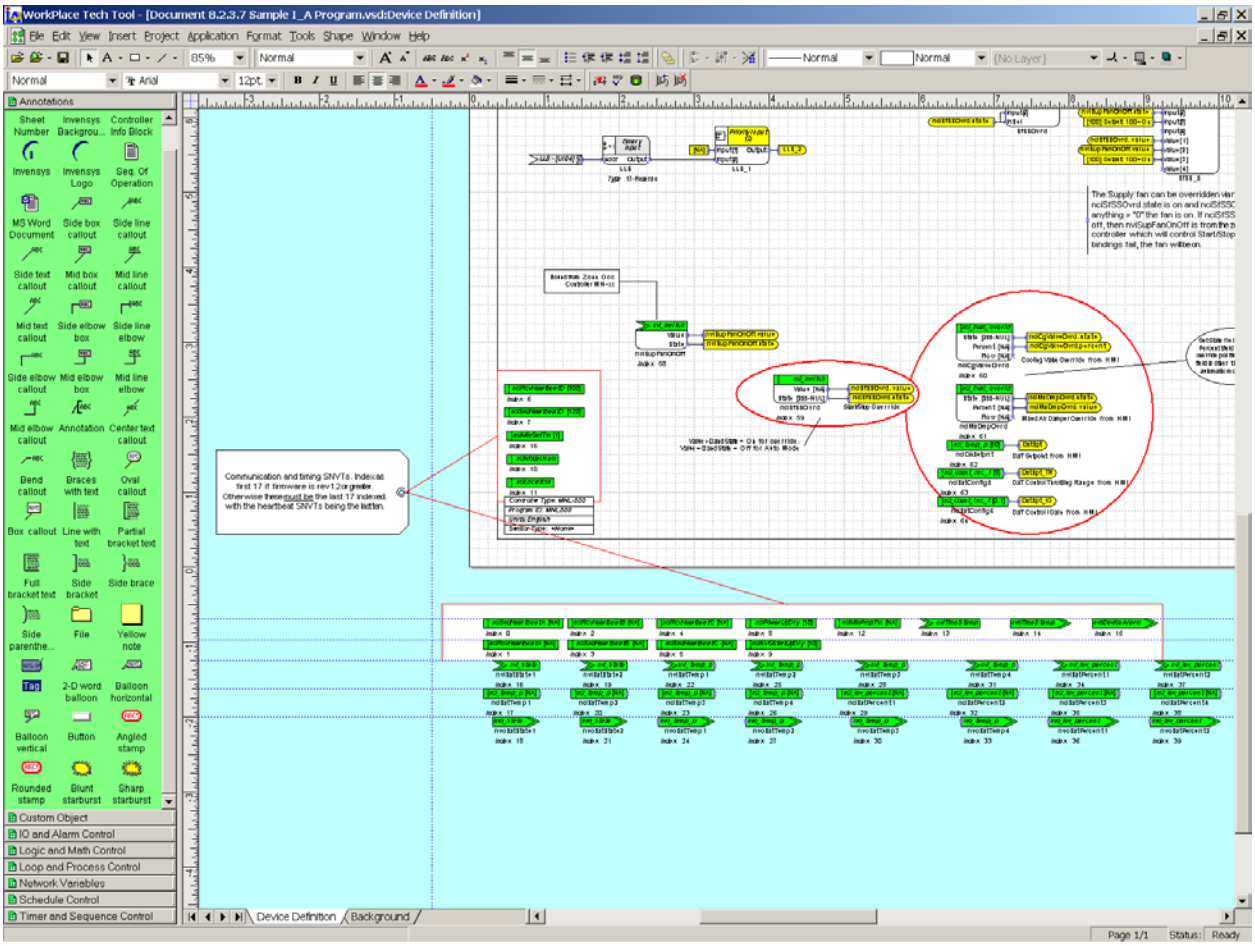

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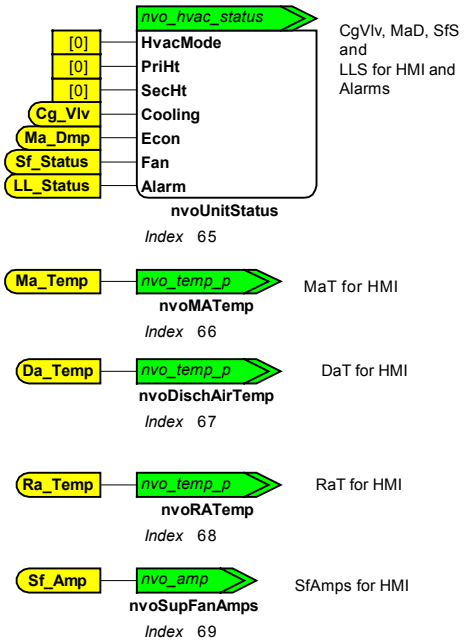
SNVT Naming

Since the MNL-800 provides us with the opportunity to create and individually name SNVTs however we choose, it is best that SNVT names and usage try to conform to LONMark standards and the naming conventions used in our other I/A products. The SNVTs name will be preceded with a lowercase "nvo" for output class, lowercase "nvi" for input class, and lowercase "nci" for configuration class. Then a name appended onto the prefix describing function. The body of the SNVT name is comprised mostly of lower case letters. An uppercase letter separates sections of the name and makes the name easily read. The SNVT name needs to be 16 characters or less total, including the "prefix".

For example you create a SNVT to show the position of a chilled water valve. The analog output name would be "CgVlv", as determined in the hardware portion of this document; therefore the SNVT name would be "nvoCgValve". See the attached document "SNVT names for use with MNL-800s" for a list of commonly used names that follow closely to the LONMark standard SNVT usage.



Above is an example of SNVT naming to closely match LONMark standards.

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Due to issues with LONMaker, the length (in characters) for the name for any SNVT needs to be 16 characters or less.

SNVT type usage

LONMark requires a set minimum number and type of SNVTs be available for a given profile (ex rooftop profile). Each SNVT has a particular function and purpose. More SNVTs can be created, but never less than the minimum required. LON is, by default, setup to transmit data in SI format (metric) and it is dependant upon the controller(s) to convert the data to the correct unit of measure. This poses some issues with Niagara in that Niagara wants to use the SI format. While it is possible to let Niagara do the conversions, it also uses resources. If it is possible, use a SNVT from the I/A controller that does not use engineering units. A few examples of data that needs conversion are:

- Temperature (typically shows in °C)
- Pressure (typically shows in PASCAL's not PSI)
- Flow (typically shown in Liters/sec and not CFM)

Some SNVTs are enumerated where an integer represents a set of predefined states or conditions.
Ex. SNVT_occupancy defines "occupancy" conditions with a possible value from 0 to 3.

- 0 equals OC_OCCUPIED
- 1 equals OC_UNOCCUPIED
- 2 equals OC_BYPASS
- 3 equals OC_STANDBY
- 255 equals OC_NULL.

Any other values are not applicable and may cause issues with bindings or control if misapplied.

Some SNVTs are structured. A structured SNVT has multiple elements (multiple values).

Ex. SNVT_switch has two fields

- Value represented as a percentage (0-100%) and
- State represented as a binary value

Data exchanged using a structured SNVT exchanges all values in a single communication transfer. Some structured SNVTs have multiple data field types inside or may contain Enumerated elements and/or simple elements. In a Flat LON configuration, all data fields need to have values sent for the SNVT to function properly. Although Niagara and the LNC will allow sending only an individual field, it is good practice to send all fields to ensure proper end results.

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Please refer to the WorkPlace Tech Tool Engineering Guide for more information on SNVT formats and intended usage.

Many times, a project requires more data be exchanged from a controller than SNVTs exist. At this time, alternate SNVTs need to be used in unconventional ways. The following lists a few Do's and Don'ts.

- Try not to use a temp_p type for exchanging binary data. Some systems may limit the temp_p to a minimum output of 32 (0°C =32°F). A zero (0) or "Off" value could be construed as a 32 and vica-versa.
- Always use all elements in a Structured SNVT. Sometimes the data will not transmit if a NA exists in one of the element fields. Remember that if this value is bound to multiple controllers, all elements are seen at the receiving controller(s).
- Enumerated SNVTs can be used for accomplishing a task, but exercise caution when applying this SNVT. If a value you are trying to send or receive is out of the range or incorrect for the SNVT used, unexpected results may happen.
- Don't use configuration type SNVTs (NCI) for items that change frequently. There is a finite amount of write cycles available (approximately 10,000).
- Use a NCI when a value needs to be sent to a controller (and not frequently updated) and is not bound to another controller or global controller. A value sent as an NVI will eventually return to its default if not periodically updated.
- Any SNVT capable of sending a percent value (SNVT_lev_percent, SNVT_switch, SNVT_hvac_status, etc) will work well for sending binary data (On = 100 Off = 0). Some of the SNVTs listed are structured and may have enumerated values contained inside. Consult with the Workplace Tech Engineering Guide for proper usage of SNVTs.
- Always test the SNVTs prior to sending to the field for installation and startup to see if that SNVT will work for your application. And refer to the Workplace Tech Tool Engineering Guide for SNVT information. This information is located toward the back of the manual in the appendixes.
- Create correct SNVTs as needed for MNL-800 applications.

<u>LNSDDE (Flat LON)</u>

With any HMI using a flat LON topology, it is very important that you use NCIs for setpoints, overrides, and binary control points. This applies only to values that need sent from the HMI to the controller. Values that are bound from another controller use NVIs to receive values and NVOs to send values.

Never use a temp_p type for digital or binary operations.

<u>LNC</u>

With any HMI using a LNC, you can use NCIs for setpoints (NVIs work as well), overrides, and binary control points. The LNC understands not to send a NCI value if there is no change. If this is a concern, use NVIs instead.

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This applies only to values that need sent from the LNC to the controller. Values that are bound from another controller use NVIs to receive values and NVOs to send values.

Never use a temp_p type for digital or binary operations.

Niagara (UNC's)

When using any Niagara UNC, use NCIs for setpoints. NVIs work for overrides of both analog and binary control points. This applies only to values that need to be sent from the UNC to the controller. Values that are bound from another controller use NVIs to receive values and NVOs to send values.

Never use a temp_p type for digital or binary operations.

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