Operating Instructions

ATevo SERIES

Microprocessor-Controlled
Float Battery Charger

IEC-61850
Communications Gateway

Document No.
JA5133-00

USER NOTES

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1 INTRODUCTION

The ATevo microprocessor-controlled battery charger can provide IEC-61850 communications via a separate module (ordering p/n **EJ5309-54**). This module is contained within a small wall-mounted enclosure, and can be field installed for connection to an existing charger. For physical installation of the IEC-61850 module, and interconnection with the ATevo charger, refer to user instruction (**JD5073-00**) for details.

http://www.atseries.net/PDFs/JD5073-00.pdf

The IEC-61850 interface is implemented via a Novatech OrionMX gateway. When the ATevo charger is ordered with the IEC-61850 communications option, the OrionMX gateway will be installed, pre-configured and tested at the factory. To establish the IEC-61850 connection simply enter the Ethernet connection configuration (set the IP address, netmask, and gateway parameters) and plug in the Ethernet connection. Refer to **Section 2 –"ATEVO IEC-61850 QUICK START GUIDE"** for step-by step instructions.

Advanced users may wish to customize the IEC-61850 interface. An accessory bag is included with IEC-61850 option which includes drawings detailing the gateway's physical connection, software configuration files for both the gateway and SCADA configurations, and a USB cable to connect to the OrionMX service port. Refer to **Section 3 –"SOFTWARE SECTION"** of this manual for details on the files provided.

The ATevo IEC-61850 hardware will be installed, and pre-configured at the factory. Refer to **Section 4 –"HARDWARE SECTION"** of this manual for details of the ATevo connections and configuration.

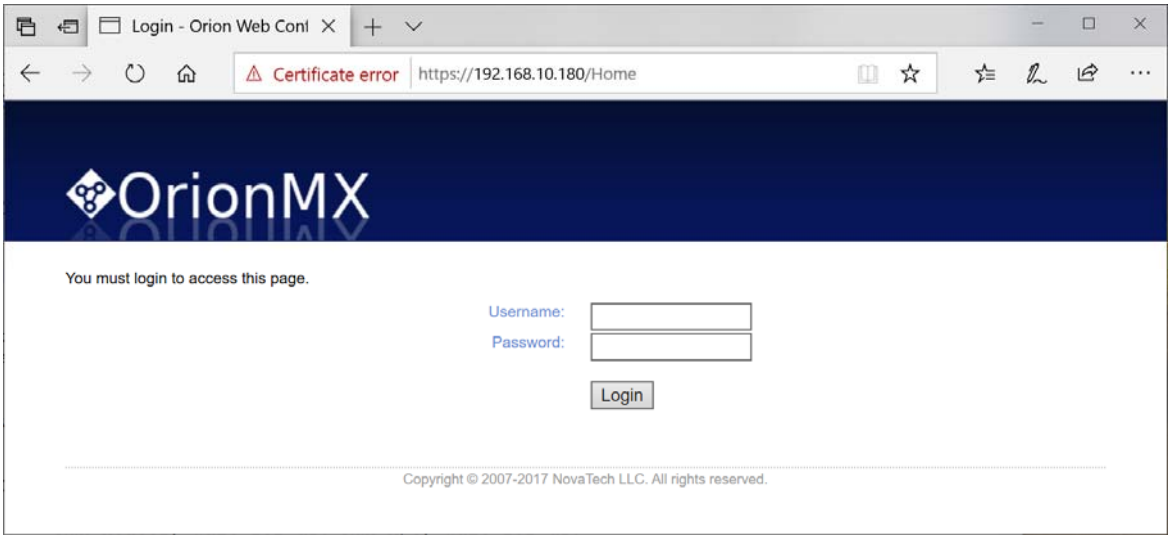
Several Appendixes are included at the end of the manual that detail the IEC-61850 Configuration Workflow, the Available Data Points, the Complete Set of Data Object, and Steps to Modify the Configuration.

2 ATEVO IEC-61850 QUICK START GUIDE

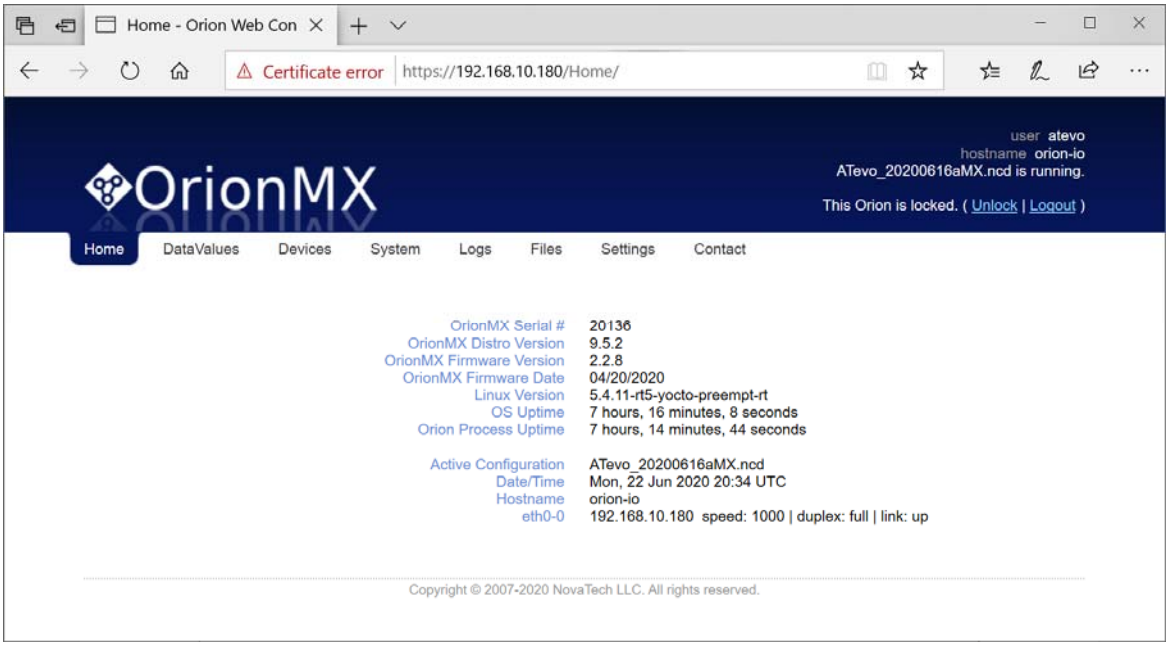
2.1 Connect to the Gateway's Configuration Console

1. Power on the gateway and wait for the green "Active" LED to illuminate.
2. Connect an Ethernet cable from the gateway's Eth0-0 port to your PC. Configure your PC's IP address to 192.168.10.x, where $1 < x < 255$ and $x \neq 180$. For Windows instructions, refer to https://support.microsoft.com/en-us/help/15089/windows-change-tcp-ip-settings.
3. Direct your web browser to the gateway's IP address. Always include "**https://**" before the IP address. By default, the address is https://192.168.10.180.

4. Navigate past the certificate warning by clicking “Details” or “Advanced” (depending on your browser) and continue on to the device’s login page.

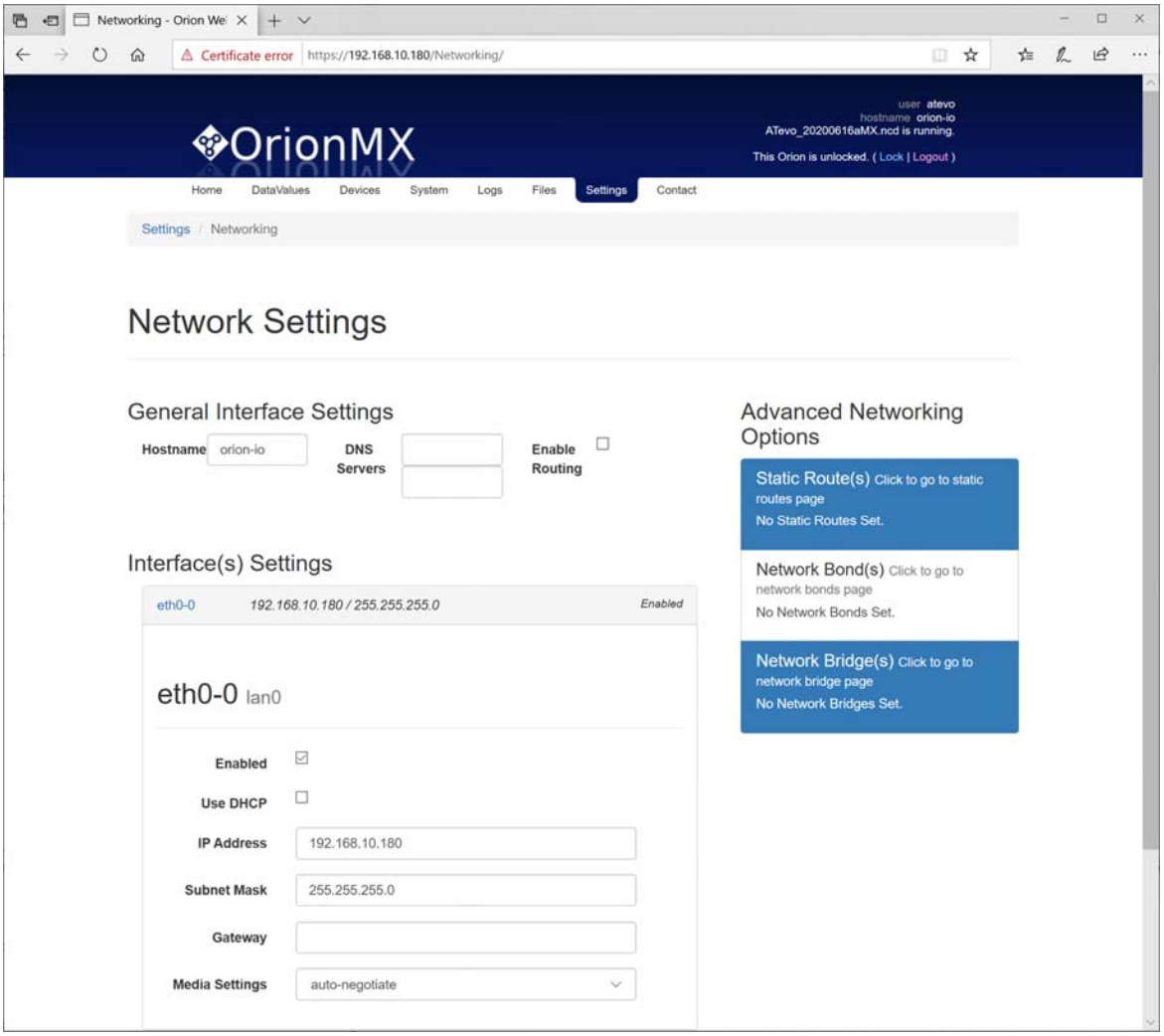


5. Log in with the default credentials: atevo / atevo



2.2 Change Gateway's IP Address

1. Connect to the gateway's configuration console (refer to section 2.1).
2. Navigate to Settings > Networking. You must enter the password once more to unlock the gateway.
3. Click on eth0-0 to show the IP address and other network settings.



4. Enter desired settings and click the Save button. Settings take effect immediately.

2.3 Change the Password

Changing the default password makes your gateway more secure.

1. Connect to the gateway's configuration console (refer to section 2.1).
2. Navigate to Settings > Users
3. Click on user "atevo" from the User List
4. Enter a new password in the "New Password" box, and retype it in the "Verify Password" box. Password complexity rules can be modified or disabled from the Settings > Authentication Rules page.
5. Click the "Save Settings" button.

2.4 Add a User Account

User accounts can be created, which allows all users to have their own passwords and permission levels.

1. Connect to the gateway's configuration console (refer to section 2.1).
2. Navigate to Settings > Users
3. Click on the "Add new user" link under User List
4. Enter a username and password for the user. Password complexity rules can be modified or disabled from the Settings > Authentication Rules page.
5. A time limit may optionally be placed on the account in the "Days valid" box.
6. The "Login Type" can be left as "Menu" (refer to Orion MX User Manual for additional details).
7. Check the boxes of each item the user will have permission to change (refer to Orion MX User Manual for additional details).
8. Click the "Add User" button.

3 SOFTWARE SECTION

3.1 Summary of Protocol Conversion Software Files

A set of configuration files is provided that enables an OrionMX to convert Modbus Serial to 61850. "Convert" is defined as the ability for the end users' 61850 Client to obtain real time and static data from the ATevo using 61850 data transfer mechanisms (Report Blocks, GOOSE message or polling). The set of files include:

- ATevo<date>.ncd file Includes points mapping instructions and setup of OrionMX as a 61850 Server
- ATevo<date>.lua file Math and Logic file for scaling and data manipulation to support conversion
- ATevo<date>.ncz file Zipped version of the CID file (same as ICD file by IED is named "ATEVO")
- ATevo<date>.icd file The self-description "IED Capability Description (ICD) "TEMPLATE" file

3.2 NCD File

The NCD performs the following:

- Defines the type of Orion device (OrionMX or OrionLXm or …)
- List of Database points used by LUA logic, list of point defined by LUA logic
- Mapping of database and logic points to 61850 objects
- Serial port parameters such as baud rate and stop bits (but not 232 vs. 485 or terminators, etc.)
- Mapping of Modbus point addresses / function codes to Orion database points
- Scaling of data represented by the Modbus registers into the Orion database

3.3 LUA (Advanced Math and Logic) File

The LUA File performs the following:

- Declares the execute once procedure (named “DefaultStartFunction”)
    - This sets up the gateway-specific (Orion) 61850 objects such as UTC-offset-in-minutes) in the Logical Node named “LD0”
    - (Note: these are NOT the points in the main Logical Device named “ATEVO”)
- Declares cyclic timer-based functions (example, “every 60 seconds do …”)
    - Update 61850 from polled Modbus values stored in database
    - Performs deadband calculations and updates deadbanded values when needed
- Declare event-based procedures (ex: when input changes do this)
    - Used to update the system clock from the Orion time

3.4 NCZ (Compressed 61850 CID/IID) File

- Specifies the device IP addressing parameters (ignored by the Orion 61850 server but used by clients)
- Specifies the GOOSE publish addressing parameters
- Provides a system-wide unique name corresponding to the IP address
- Defines the gateway Logical Device (LD0) and Charger Logical Device (ATEVO)
- Defines constants used in the configuration (limits, string values, unit designators, etc.)
- Declares DataSets and their contents (FCDA elements).
    - One DataSet shared between reports and a second DateSet for the GOOSE
- Declares Report Control Blocks (both buffered=BRCB and unbuffered=URCB reports)
    - Buffered report named brcb01
    - Unbuffered report named urcb01
- GOOSE control block named gcb01

3.5 Default ICD TEMPLATE File

This pre-configured file is identical to the contents of the NCZ file except the device is named TEMPLATE

Figure 1 below shows the initially configured Functional Constraints, DataSets, RCBs and GOOSE message. The steps to edit this file are detailed in Appendix C. These will be shared with the users, along with instructions to convert this into a CID file.

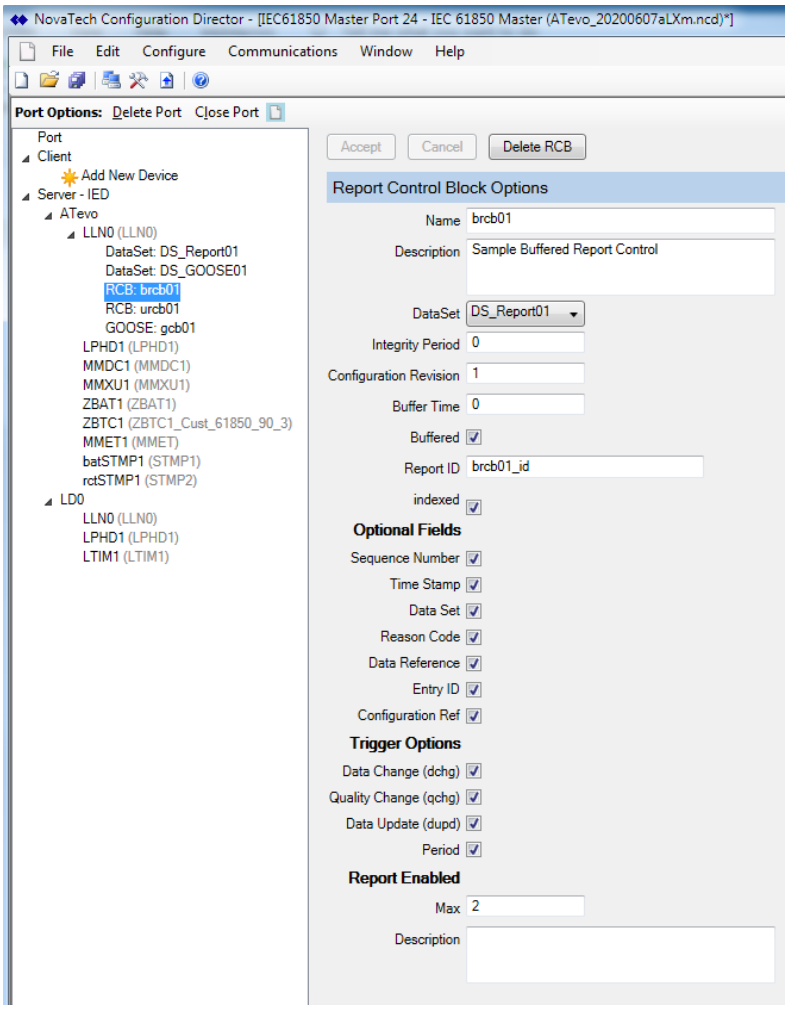


Figure 1 – Initially configured Functional Constraints, DataSets, Report Control Blocks and GOOSE

3.6 Available Data Points to be Accessed by the Users' 61850 Client

See Appendix B.

4 HARDWARE SECTION

4.1 The OrionMX Gateway Protocol Converter

ORIONMX-IO-WR-DINR-04-99-103

- IO - Discrete I/O (8 in / 3 out)
- WR - Wide Range Power Supply, 24-250V dc, 120-240V ac
- DINR - DIN Rail Mount

Master / Client (IED):

- 04 - Modbus Serial Master

Software:

- 99 - Advanced Math and Logic
- 103 - IEC 61850 Client Server GOOSE

4.2 OrionMX Quick Start Guide

The OrionMX gateway will be pre-configured at the factory to operate with the ATevo. If you prefer to change any of these pre-configured settings refer to the OrionMX Quick Start Guide provided on the CD enclosed in the accessory package that shipped with the ATevo. The OrionMX Quick Start Guide provides steps detailing:

- How to obtain a username and password to the Orion Support Site
- How to obtain additional copies of NovaTech Configuration Director software ("NCD") from the Orion Support Site
- How to install NCD
  Once NCD is installed, the following items are available on the PC:
  - NCD3 configuration software application (Windows only)
  - OrionMX User Manual describing the OrionMX hardware, NCD, MMI, and webpages
  - Software manuals describing the setup of various modules such as logic, archiving, one-line pages
  - Protocol manuals describing the specific setup of each protocol
  - Tech Notes describing application and integration solutions
  - PC USB serial driver (for USB connection between your PC and the OrionMX console)
- How to make an initial connection to the OrionMX to the front maintenance port
- How to enable the OrionMX Ethernet port(s) and how to set the OrionMX IP address
- How to connect to the OrionMX using a browser (Firefox, Chrome or Edge)
- How to load configuration files into the OrionMX

4.3 Loading Software to OrionMX

Once NCD is loaded onto a PC, follow the above steps to establish an initial connection and set the IP address. After the IP address has been configured, additional files can be loaded. The OrionMX will be pre-configured with IP Address: 192.168.10.180

4.4 Additional Settings

The following OrionMX serial settings, shown in Figure 2 below, will be pre-configured at the factory prior to shipping to the end user.

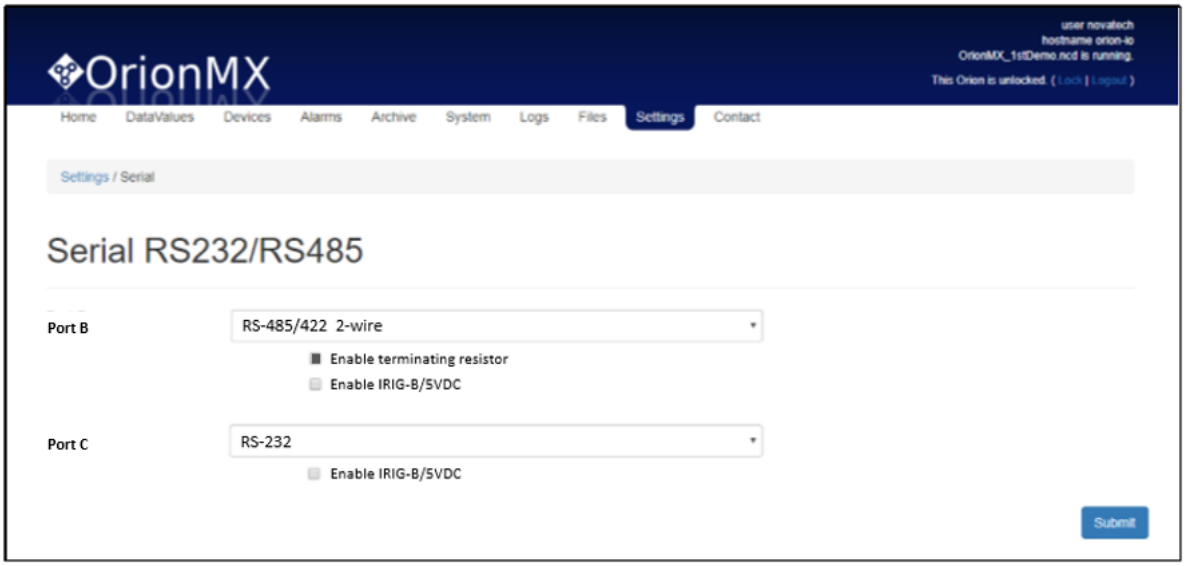


Figure 2 – Serial settings for the OrionMX

Some of the optional settings below, all accomplished through a secure browser interface, may be desired by end user. These include operational features and security features that are typically set up by, or in cooperation with, an IT department.

- Time Synchronization: IRIG-B, UTC/Local, Modulated/Unmodulated, NTP Time Source, Time Zone
- User Management: Manage users, set rights, allowed services, allowed operations, clearances
- Authentication: Lockout rules, password rules, LDAP setup, Remote Root Login
- Networking: Set host name, DNS, DHCP, Gateway, IP, Subnet, Media
- Firewall: Set input, output, and forwarding rules, start firewall
- VPN: Start option, client/server, TCP/UDP, port, cipher, key, server IP address, clients
- Key Management: Create and manage key, certificates Services: Allow/Disallow Telnet, FTP, HTTP

The final 61850 configuration steps are dependent upon the users' specific 61850 architecture, the users' preference for how and when data should be transferred (Report Blocks, deadbands, GOOSE, etc), and the users' preference for the specific data points to be accessed from the ATevo charger. This final 61850 configuration – which converts the provided ICD TEMPLATE file into a Configured IED Description (CID/IID) file - are performed by the user and include:

- Editing the DataSets and Report Blocks provided by HindlePower in the default ICD TEMPLATE file
- Naming the IED
- Setting the IP address

4.5 Physical Connections: OrionMX to the ATevo Charger

Figure 3 below shows the connections between the OrionMX and the HindlePower ATevo charger IED. These connections will be pre-wired and tested at the factory before shipping.

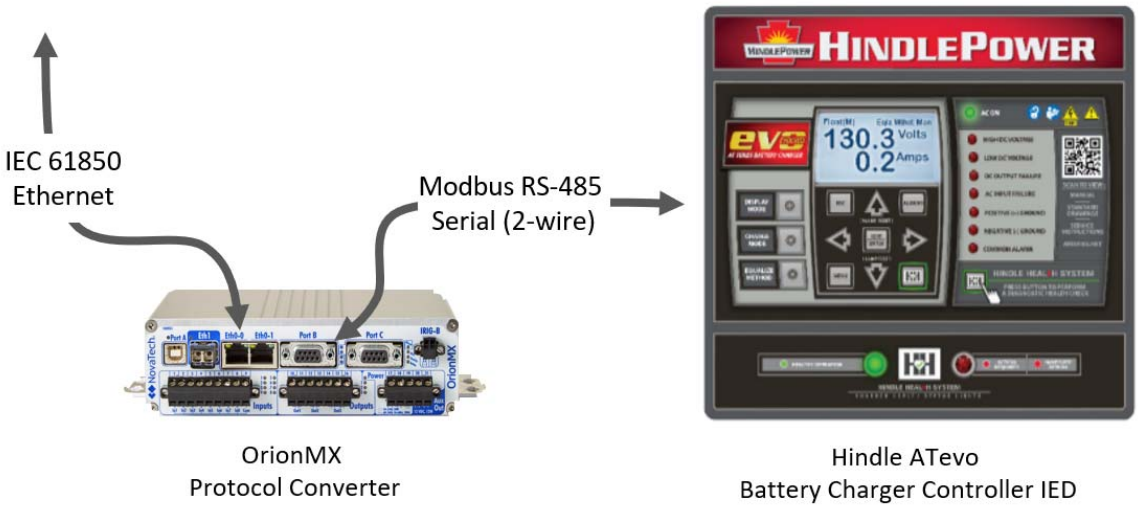
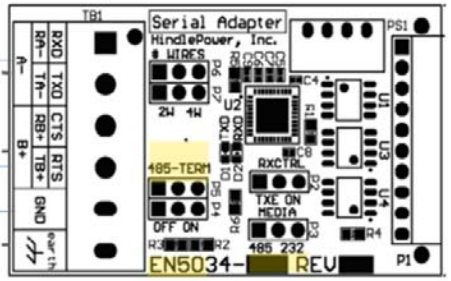


Figure 3 - Connections between Orion Protocol Converter the ATevo charger

The OrionMX is the Modbus Master and is configured for 9600 baud. The ATevo charger is the Modbus Slave at address "1". Termination resistors are required.

DB9 Pin Number	Signal	RS-485 with SEL Pinout	Description
1	NC	+5V dc	Not connected
2	TX/RX+	TX/RX+	TX/RX+
3	NC	NC	Not connected
4	NC	IRIG-B	Not connected
5	Ground	GND	Ground
6	NC	IRIG-B GND	Not connected
7	NC	NC	Not connected
8	TX/RX-	TX/RX-	TX/RX-
9	NC	NC	Not connected



RS-485 Half Duplex Pinout on OrionMX Serial Port

RS-485 Serial Port Pinout on Hindle ATevo Battery Charger Controller

Figure 4 – RS-485 2-wire Connections between Orion Protocol Converter and ATevo charger

4.6 Initial Status of Hardware and Configuration (from Factory)

- OrionMX will be loaded with the configuration files
- OrionMX and ATevo serial ports will be pre-configured
- Orion will be connected to the ATevo and communicating properly
- Test report will be included showing proper communication
- Configuration files will be provided on some form of media (memory stick, CD, etc)

5 APPENDIX A: IEC 61850 Configuration Workflow

IEC 61850 system configuration generally follows one of two paths: top-down or bottom-up.

5.1 Top Down Configuration

For top-down engineering, the requirements of the *system* determine the configuration. This generally means that a tool known as a System Configuration Tool (SCT) contains the overall system design and the configuration of the end devices is performed as decomposition of the design requirements. The SCT constructs the single-line diagram of the system with the desired physical components and functions. These functions are then assigned to IEDs and the individual IEDs are configured using the ICD file as a template for the final configuration. The resulting SCD file contains all of the configuration for every IED in the system.

Workflow is as follows: The ICD file is provided by NovaTech to the SCT which generates a SCD file for import by the NovaTech tools. The NovaTech tool, NCD3, may perform further configuration and send an IID file (Ed2) back to the SCT for re-integration with the SCD file. At some point, NCD3 is used to send the configuration to the Orion.

5.2 Bottom Up Configuration

Bottom-up engineering proceeds on a different path. The requirements for the system "are made known to the user" who adjusts an existing IED configuration to meet system requirements. The new configuration is then exported as an IID (ED2) file to the SCT which may perform further configuration. If needed, the SCT can export a SCD (or confusingly a CID) back to NCD for re-integration. At some point, NCD3 is used to send the configuration to the Orion.

Some liberties have been taken with file extensions in the past, so definition of IID and CID and ICD can blur. In the pure form, an ICD file contains a single device named "TEMPLATE" and other file types contain a differently named device. The term for the file which flows from the vendor-specific IED Configuration Tool (ICT), for example NCD3, to the SCD has been whimsically named "X-factor".

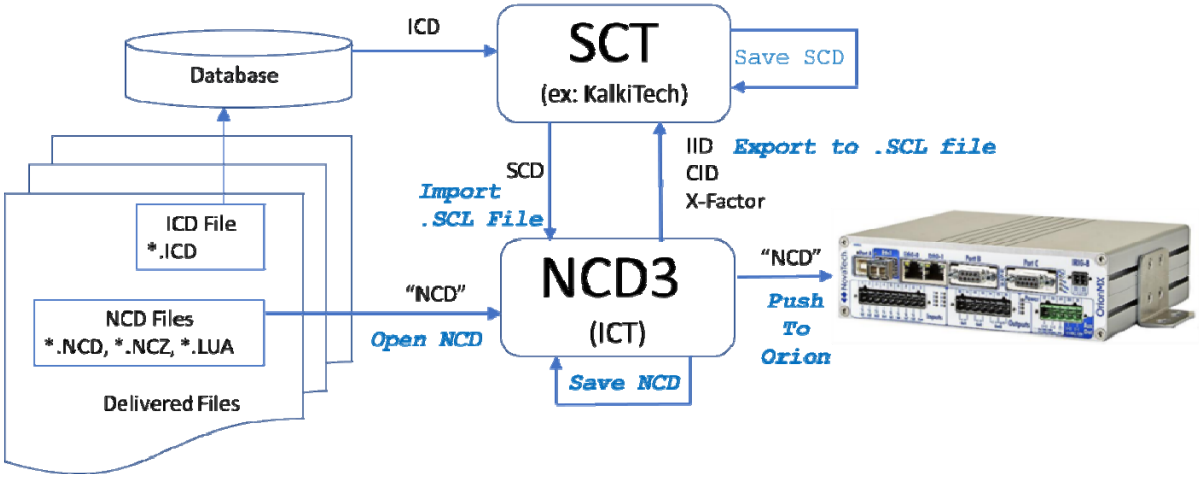


Figure 5 – IEC 61850 Configuration Workflow

6 APPENDIX B: Available Data Points to be Accessed by the Users' 61850 Client

Note that datasets members may only be FC MX (Measurements) or ST (Status).
Datasets for event-driven reports need to ensure that attributes of TrgOp=dchg (i.e. stVal and mag and cVal) are included because changes in these "dchg" values are the contents of the reports. Reports sent with reason=Integrity always include the entire dataset.

The following tables declare the top-level data (Data Objects) in each Logical Node. The detailed contents of the Common Data Class named MV1 is explained as well as the enumerations used for SIUnits. Details of the other Types and Enumerations can be found in the Model Implementation Conformance statement (MICS) files.

6.1 Logical Node ATEVO/LLN0:

DATA	Type	Description
NamPlt.swRev	LPL1	ATevo Firmware Version
Beh	ENS1	Behavior of Logical Node: 1=On
Health	ENS1	Health of Logical Node: 1=OK, 2=Warn, 3=Alarm
Mod	ENS1	Mode of Logical Node: 1=On

6.2 Logical Node ATEVO/MMDC1:

DATA	Type	Description
Beh	ENS1	Behavior of Logical Node: 1=On
Amp	MV1	Charger output
Vol	MV1	Charger output
VolPsGnd	MV1	Volts positive-to-ground
VolNgGnd	MV1	Volts negative-to-ground
RisPsGnd	MV1	Resistance positive-to-ground
RisNgGnd	MV1	Resistance negative-to-ground

6.3 Logical Node ATEVO/MMXU1:

DATA	Type	Description
Beh	ENS1	Behavior of Logical Node: 1=On
Hz	MV1	AC input frequency
PhV.PhsA	CMV1	AC A Phase to Neutral voltage
PhV.PhsB	CMV1	AC B Phase to Neutral voltage
PhV.PhsC	CMV1	AC B Phase to Neutral voltage
A.PhsA	CMV1	AC A Phase Current
A.PhsB	CMV1	AC B Phase Current
A.PhsC	CMV1	AC C Phase Current

6.4 Logical Node ATEVO/ZBAT1:

DATA	Type	Description
Beh	ENS1	Behavior of Logical Node: 1=On
BatLo	SPS1	End of Discharge
Vol	MV1	Battery Voltage
LoBatVal	ASG1	End of Discharge low voltage limit
BatTyp	ENG1	Battery type (1=Lead-acid,3=Nickel-cadmium)
BatEFPs	SPS1	Battery Earth Fault positive to ground
BatEFNg	SPS1	Battery Earth Fault negative to ground
BatEFZSpt	ASG1	Battery Earth Fault Critical impedance limit

6.5 Logical Node ATEVO/ZBTC1:

DATA	Type	Description
NamPlt.vendor	LPL1	Vendor name
NamPLt.swRev	LPL1	Software version
Beh	ENS1	Behavior of Logical Node: 1=On
BatChaMod	ENG1	Charger Mode: -1=Test in Progress, 2=Float, 3=Equalize
ChaV	MV1	Charging voltage
ChaA	MV1	Charging current
AutoEq	SPC1	Auto-Equalize Timer Method
VRtg	ASG1	DC Current rating

ARtg	ASG1	DC Current rating
CompTmpEna	SPG1	Battery charge voltage temperature compensation enabled
VFSpt	ASG1	Float voltage setpoint
VEqSpt	ASG1	Equalize voltage setpoint
ALimSt	SPS1	Charger running in current limit
ALimSpt	ASG1	DC Current limit setpoint
CompTmpSig	SPG1	Battery temperature probe enable
ParOpMod	ENG1	Loadshare mode (1=none,2=primary,3=secondary
ParOp	SPC1	Load sharing enabled as primary or secondary
FailACAlm	SPS1	No AC input detected
FailDCAlm	SPS1	DC output below setpoint but is not in current limit
VolRplAlm	SPS1	Ouptut ripple exceeds setpoint
VolRplSpt	ASG1	Output ripple alarm setpoint
EqSt	SPS1	Equalize Mode
VDCLimOvAlm	SPS1	High DC Voltage
VDCLimOvSpt	ASG1	High Voltage DC Setpoint
VDCLimUnAlm	SPS1	Low DC Voltage
VDCLimUnSpt	ASG1	Low Voltage DC Setpoint
OpnDCBreaker	SPS1	Open DC Breaker
VACLimUnWrn	SPS1	Low AC Supply
DCPwrFailAlm	SPS1	DC Supply Failure
MemFailPwr	SPS1	Power Board EEPROM Failure

6.6 Logical Node ATEVO/ZAXN1:

DATA	Type	Description
Beh	ENS1	Behavior of Logical Node: 1=On
SdDCVOvEna	SPG1	HVDC Shutdown Enable
BatASenEna	SPG1	Battery Discharge Enable
FbExEna	SPG1	Remote Sense Enable
BatTestEna	SPG1	Auto Run Battery Open Test Enable

BatTestSt	SPG1	Battery Test Ran
ALimCompEna	SPG1	Dynamic Current Limit Enable
CommonAlm	SPS1	Common Alarm
SdDCVOvSt	SPS1	High DC Voltage Shutdown
SdACVUnSt	SPS1	Low AC Voltage Shutdown
FbOpnEx	SPS1	Open External Feedback
FbOpnIntn	SPS1	Open Internal Feedback
DCOutFail	SPS1	Open DC Output
DCVOvHWAlm	SPS1	High Level Detect
DCVUnHWAlm	SPS1	Low Level Detect
SdDCVOvHwSt	SPS1	HLD Shutdown
RelayOutFail	SPS1	Relay Failure
HMIFail	SPS1	UI Processor Failure
BatTestPrs	SPS1	Battery Open Alarm
ParOpCommAlm	SPS1	Loadshare Communication Failure
ParOpIndpSt	SPS1	Loadshare Independent Mode
ParOpFail	SPS1	Loadshare Not Ready
BatADschSt	SPS1	Battery Discharging
BatImbWrnSt	SPS1	Vgnd Imbalance Warn
BatEFPsWrn	SPS1	Positive Ground Fault Warn
BatEFNgWrn	SPS1	Negative Ground Fault Warn
ALimCompSt	SPS1	Dynamic Current Limit
PotFailAlm	SPS1	Hardware Level Detect Digital Pot Fail
OpnACBreaker	SPS1	Open AC Breaker
EqRemainTms	MV1	Equalize Time Setpoint
BtCnt	MV1	Heartbeat
EqSptTms	ASG1	Equalize Time Setpoint
SdDCVOvSpt	ASG1	High Level Detect Setpoint
SdDCVUnSpt	ASG1	Low Level Detect Setpoint
BatEFZWrn	ASG1	Ground Fault Warn Setpoint

BatEFVWrn	ASG1	Vgnd Imbalance Warn Setpoint
BatTestIntv	ASG1	Battery Open Test Frequency
BatTestDur	ASG1	Battery Open Test Duration
BatTestVSpt	ASG1	Battery Open Test Setpoint

6.7 Logical Node ATEVO/MMET1:

DATA	Type	Description
Beh	ENS1	Behavior of Logical Node: 1=On
Health	ENS1	Ambient temperature probe status(1=Ok,2=Warning,3=Alm)
EnvTmp	MV1	Ambient Temperature

6.8 Logical Node ATEVO/batSTMP1:

DATA	Type	Description
Beh	ENS1	Behavior of Logical Node: 1=On
EEHealth	ENS1	Battery temperature probe status(1=Ok,2=Warning,3=Alm)
Alm	SPS1	Battery Overtemp Alarm
Tmp	MV1	Battery temperature probe status
TmpAlmSpt	ASG1	Battery temperature

6.9 Logical Node ATEVO/rctSTMP1:

DATA	Type	Description
Beh	ENS1	Behavior of Logical Node: 1=On
Health	ENS	Rectifier temperature probe status(1=Ok,2=Warning,3=Alm)
Alm	SPS1	Rectifier Overtemp Alarm
Tmp	MV1	Rectifier temperature

6.10 Enumeration Definition SIUnit:

SIUnit values used are numeric over the wire and alphabetic in SCL files:

Enum string	Value	Description
	1	No unit
s	4	seconds
A	5	Amps
°C	23	Degrees Celcius
V	29	Volts
ohm	30	resistance
Hz	33	Frequency
min	85	minutes

6.11 Objects of Type MV1 Attributes:

Attribute	Type	FC	Description	TrgOp	R/W(value)	Config in SCL?
Measurand						
instMag.f	FLOAT32	MX	instantaneous		RO	
mag.f	FLOAT32	MX	deadbanded	dchg	RO	
q	Quality	MX	Quality bits	qchg	RO	
t	Timestamp	MX	timestamp		RO	
Configuration, Description						
Units.SIUint	SIUnit	CF	see Annex A	dchg	RO	
db	INT32U	CF	0 … 100 000		RW	Yes
rangeC.min	FLOAT32	CF			RO	
rangeC.max	FLOAT32				RO	
d	VisString255	DC	Text		RO	

6.12 Summary of Common Data Classes (Types of DataObjects)

SPS – Binary (status) input
MV – Analog input (floating point) with deadbands
CMV – same as MV but attributes named differently (instCVal and cVal)
ENS – enumerated (short integers) input
SPC – SPS with optional output control capability
ASG – Analog setting (read with optional write)
ENG – enumerated setting (read with optional write)

6.13 Logical Nodes Contained in the Orion Server:

Logical Device	Logical Node	Description
LD0	LLN0	Name, software version, serial number, model of the Orion
LD0	LPHD1	Hardware version of the Orion
LD0	LTIM1	TimeZone.UTC offset and DST in effect and DST in this timezone
ATevo	LLN0	Name, sw version, datasets, report blocks, GOOSE blocks
ATevo	LPHD1	Proxy indicated as “True”, user-defined device name (PhyNam$d)
ATevo	MMDC1	Basic DC volts, amps, resistance
ATevo	MMXU1	Basic AC volts, amps, frequency
ATevo	MMET1	Ambient temperature
ATevo	batSTMP	Battery temperature and associated alarm
ATevo	rctSTMP	Rectifier temperature and associated alarm
ATevo	ZAXN	Charger data unique to HindlePower ATevo implementation
ATevo	ZBAT1	Battery data specified in IEEE 2405 draft 6
ATevo	ZBTC1	Charger data specified in IEEE 2405 draft 6

Note that writes to 61850 data objects are presently intentionally disabled.

7 Appendix C: Complete Set of Data Objects

The complete set of data object available for a user to select and place in DataSets is below:

LD0/LLN0:
"NamPlt" type="LPL_LLN0" .vendor=NovaTech
LD0/LPHD1:
"PhyNam" type="DPL1" .vendor=NovaTech; .hwRev=xxx; .name= Modbus-61850 Gateway
"Proxy" type="SPS1" .stVal=FALSE
LD0/LTIM1
"TmDT" type="SPS1" .stVal=TRUE if currently in Daylight Savings Time offset
"TmOfsTmm" type="ING1" .setVal=number of minute offset from UTC
"TmUseDT" type="SPG1" .setVal=TRUE if configured time zone uses DST during the year
ATevo/LLN0:
"NamPlt" type="LPL_LLN0" .vendor=Hindle Power
(Note: This is where DataSets and Report/GOOSE Control Blocks reside)
ATevo/LPHD1:
"PhyNam" type="DPL1" .vendor= Hindle Power; hwRev=00-48; name=Physical Device Name
"Proxy" type="SPS1" .stVal=TRUE
ATevo/MMDC1:
"Amp" type="MV1" .instMag/mag=Charger amps; .db=deadband; .rangeC.min/max = db range
"Vol" type="MV1" .instMag/mag=Charger volts; .db=deadband; .rangeC.min/max = db range
"VolPsGnd" type="MV1" .instMag/mag=+ to gnd volts; .db=deadband; .rangeC.min/max = db range
"VolNgGnd" type="MV1" .instMag/mag=- to gnd volts; .db=deadband; .rangeC.min/max = db range
"RisPsGnd" type="MV1" .instMag/mag=+ to gnd ohms; .db=deadband; .rangeC.min/max = db range
"RisNgGnd" type="MV1" .instMag/mag=- to gnd ohms; .db=deadband; .rangeC.min/max = db range
ATevo/MMXU1:
"Hz" type="MV1" .instMag/mag=AC Freq; .db=deadband; .rangeC.min/max = db range
"PhV" type="WYE1"
phsA.instCVal.mag.f=AC A-to-neutral volts; phsA.db=deadband, phsA.rangeC.min/max=db range
phsB.instCVal.mag.f=AC B-to-neutral volts; phsB.db=deadband, phsB.rangeC.min/max=db range
phsC.instCVal.mag.f=AC C-to-neutral volts; phsC.db=deadband, phsC.rangeC.min/max=db range
"A" type="WYE1"
phsA.instCVal.mag.f=AC A-phase amps; phsA.db=deadband, phsA.rangeC.min/max=db range
phsB.instCVal.mag.f=AC B-phase amps; phsB.db=deadband, phsB.rangeC.min/max=db range
phsC.instCVal.mag.f=AC C-phase amps; phsC.db=deadband, phsC.rangeC.min/max=db range
ATevo/ZBAT1
"BatLo" type="SPS1" .stVal=TRUE is voltage is below ATevo/ZBAT1.LoBatVal.setMag
"Vol" type="MV1" .instMag/mag=Charger volts; .db=deadband; .rangeC.min/max = db range
"LoBatVal" type="ASG1" .setMag=lower limit for ATevo/ZBAT1.BatLo alarm; .minVal, maxVal=allowed range
"BatTyp" type="ENG_BatTyp_Cust_61850_90_3" .setVal=1=lead-acid; 3=NiCad
"BatEFPs" type="SPS1_Cust_Hindle" .stVal=TRUE if ATevo/MMDC1.RisPsGnd < ATevo/ZBAT1. BatEFZSpt
"BatEFNg" type="SPS1_Cust_Hindle" .stVal=TRUE if ATevo/MMDC1.RisNgGnd < ATevo/ZBAT1. BatEFZSpt
"BatEFZSpt" type="ASG1_Cust_Hindle" .setMag.f=lower limit for ATevo/ZBAT1/BatEFPs, BatEFNg;.minVal, maxVal=allowed range

ATEVO/ZBTC1

"NamPlt" type="LPL_Cust_61850_90_3" .lnNs=(Tr)IEC 61850-90-3:2016A to show base standard
"BatChaMod" type="ENG_BatChaMod_Cust_Hindle" .setVal=-1 in test;2=floating;3=Equalizing
"ChaV" type="MV1" .instMag/mag=Charger volts; .db=deadband; .rangeC.min/max = db range
"ChaA" type="MV1" .instMag/mag=Charger amps; .db=deadband; .rangeC.min/max = db range
"AutoEq" type="SPC1_Cust_Hindle" .stVal=TRUE if equalize starts upon AC power restoration
"VRtg" type="ASG1_Cust_61850_7_4" .setMag.f=rated output voltage; .minVal, maxVal=range
"ARtg" type="ASG1_Cust_61850_7_4" .setMag.f=rated output current; .minVal, maxVal=range
"CompTmpEna" type="SPG1_Cust_Hindle" .setVal=TRUE if voltage temperature compensation enabled
"VFSpt" type="ASG1_Cust_Hindle" .setMag.f=Float voltage setpoint
"VEqSpt" type="ASG1_Cust_Hindle" .setMag.f=Equalize voltage setpoint
"ALimSt" type="SPS1_Cust_Hindle" .stVal=TRUE if output it running at current limit
"ALimSpt" type="ASG1_Cust_Hindle" .setMag.f=setpoint for current limit
"CompTmpSig" type="SPG1_Cust_Hindle" .setVal=TRUE if battery temperature probe enabled
"ParOpMod" type="ENG_ParOp_Cust_Hindle" .setVal:Parallel Operations mode, 1=none,2=pri,3=sec)
"ParOp" type="SPC1_Cust_Hindle" .stVal=TRUE if Parallel operation are enabled
"FailACAlm" type="SPS1_Cust_Hindle" .stVal=TRUE if no AC input detected
"FailDCAlm" type="SPS1_Cust_Hindle" .stVal=TRUE if DC output fail and not current limit
"VolRplAlm" type="SPS1_Cust_Hindle" .stVal=TRUE if output ripple exceeds limit
"VolRplSpt" type="ASG1_Cust_Hindle" .setMag.f=setpoint for ripple alarm

ATevo/MMET1

"Health" type="ENS_Health1" .stVal=TRUE if ambient temperature probe has failed
"EnvTmp" type="MV1" .mag.f=Ambient temperature (celcius)

ATevo/batSTMP1

"EEHealth" type="ENS_Health1" .stVal=TRUE if batery temperature probe has failed
"Alm" type="SPS1" .stVal=TRUE if ATevo/batSTMP1.Tmp.instMag.f > ATevo/batSTMP1.TmpAlmSpt
"Tmp" type="MV1" .instMag/mag=battery temp; .db=deadband; .rangeC.min/max = db range
"TmpAlmSpt" type="ASG1" .setMag.f=upper limit for ATevo/batSTMP1.Alm

ATevo/rctSTMP1

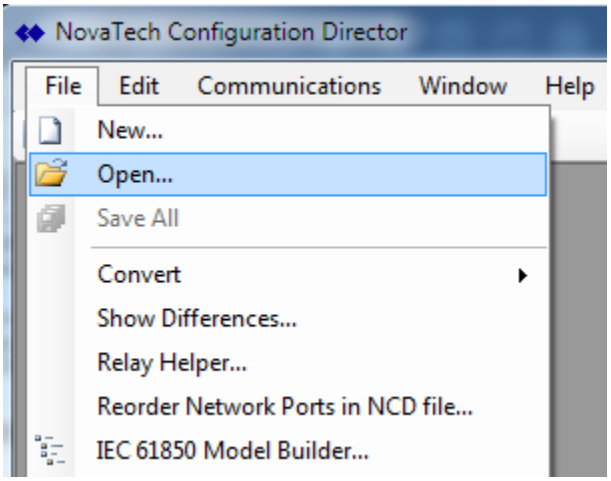
"Health" type="ENS_Health1" .stVal=TRUE if rectifier temperature probe has failed
"Alm" type="SPS1" .stVal=TRUE if ATevo/rctSTMP1.Tmp.instMag.f > internal limit
"Tmp" type="MV1" .instMag/mag=rectifier temp; .db=deadband; .rangeC.min/max = db range

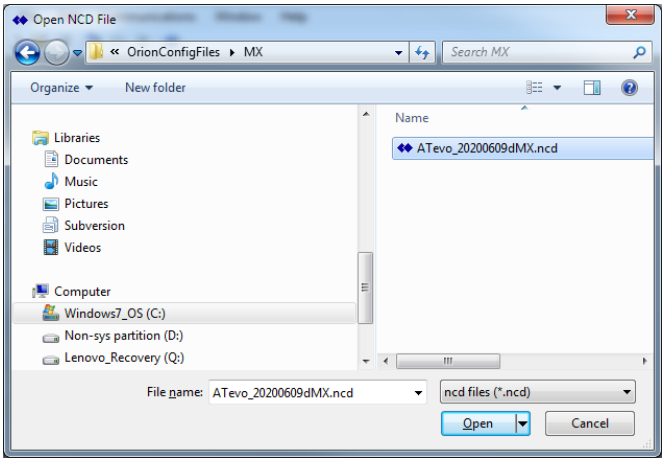
8 Appendix D: Steps to Modify Configuration

1) Open NCD file
2) Menu/Configure/<Device>/Network/…61850…
3) For top-down engineering:
   a) Rename the IED to match the imported name
   b) Perform the import, selecting “merge points”
   c) Verify that the “merge points” was successful
4) Configure the name of the charger with a project-wide unique name
5) Configure Datasets and Reports and GOOSE content
   a) To modify existing DS, Select DS then FCDA
   b) To Modify RCB, select RCB and make changes
   c) To Modify GOOSE, select GCB and make changes
   d) To create new DS/RCB/GOOSE, select LLN0 then “Add xxx” then chg
   e) To Set GOOSE addressing, Modify GOOSE as above, to set “MAC Address”
6) To set device IP addressing, select “Server – IED” then Communication
7) To create a CID file, select “Server – IED” then “Export to SCL File”
   (This allows a SCT or Client to import the configuration)
8) To save the NCD file, Menu/Save As/xxx… then enter name
   NCD and LUA and NCZ files are all saved to the target folder name

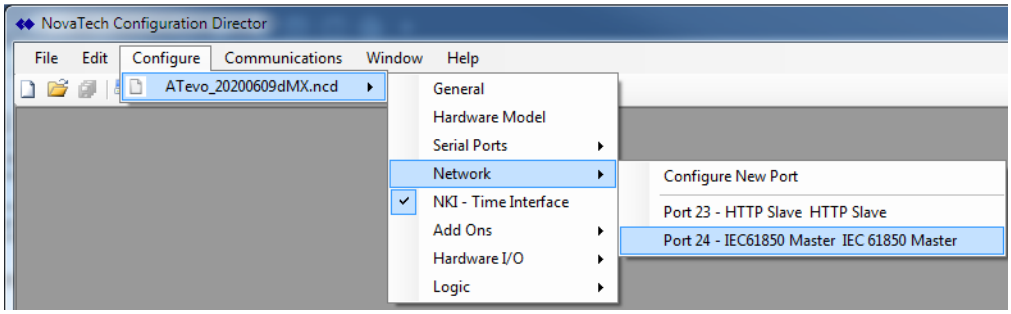
Start with: Hindle NCD file (xxx.ICD) and pointlists for GOOSE and URCB and BRCB (unbuf/buf Reports)

1. Open an existing NCD configuration: Menu:File Open …, navigate to the file and “Open”

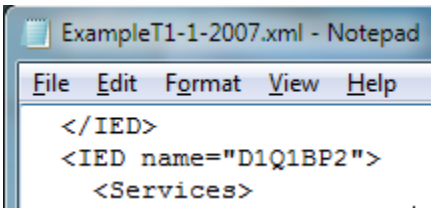




2. Open the 61850 Configuration pane: Menu: Configure/<Name>/Network/IEC61850

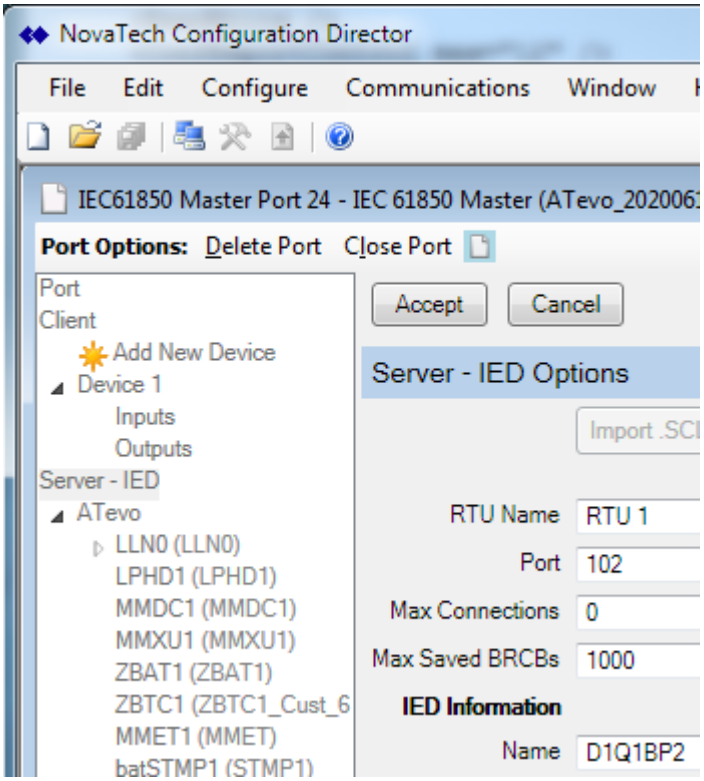


3. For top-down engineering
    a. Locate the SCL file (*.SCD or *.CID or …) and determine the IED name
    Open file in text editing package (for example, Notepad), locate the IED name as shown below then close the text editor.

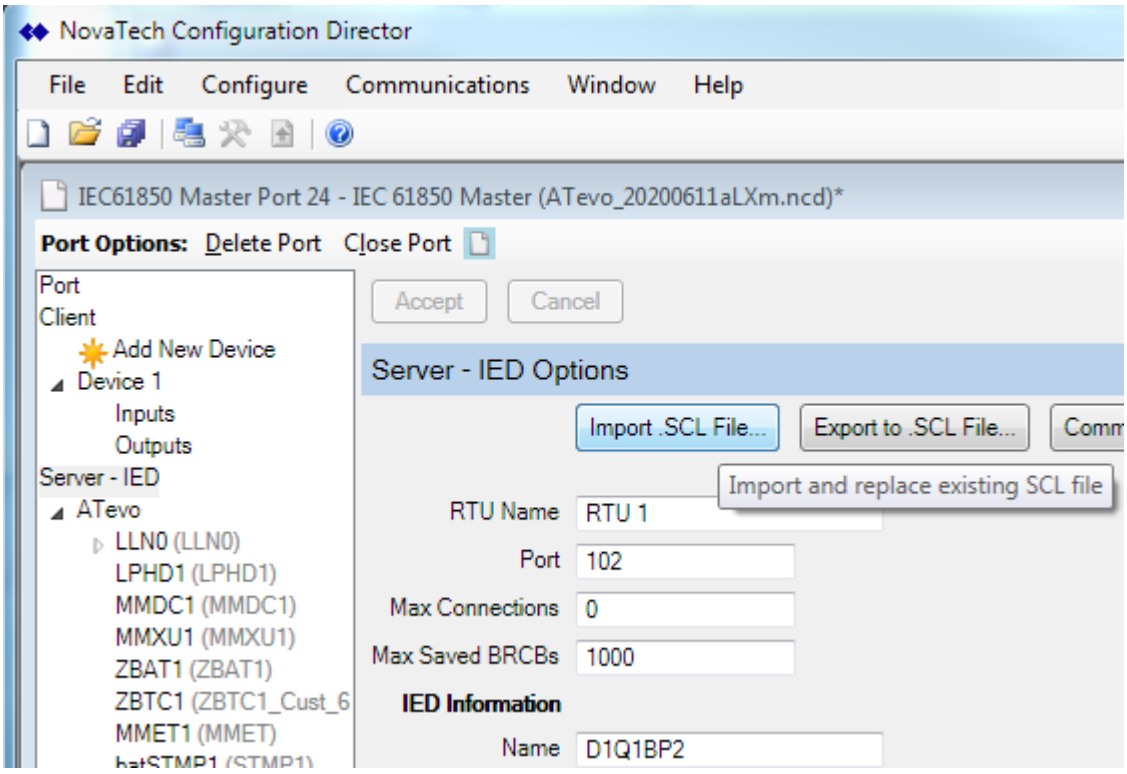


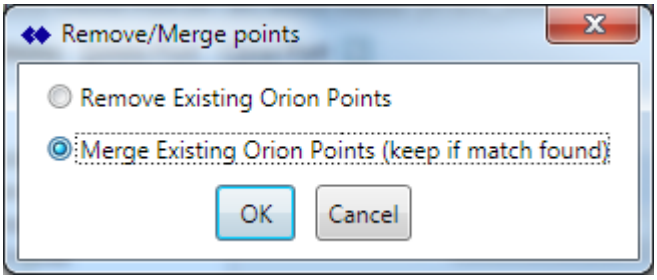
In the above example, the name would be “D1Q1BP2”

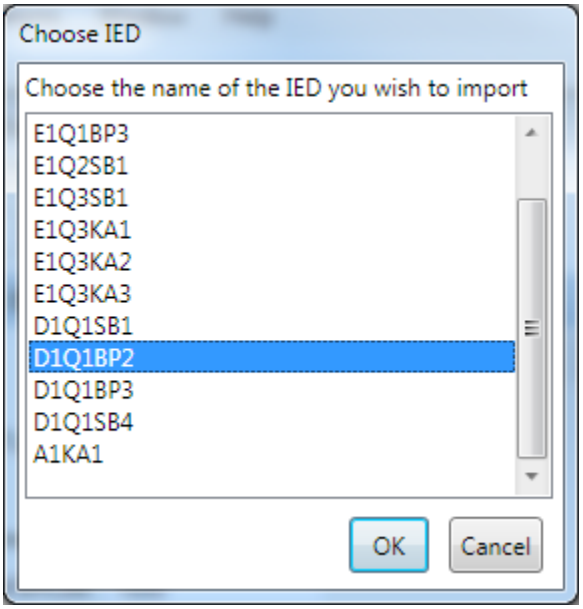
    b. Rename the IED within the TEMPLATE file to match the SCL file and press “Accept”



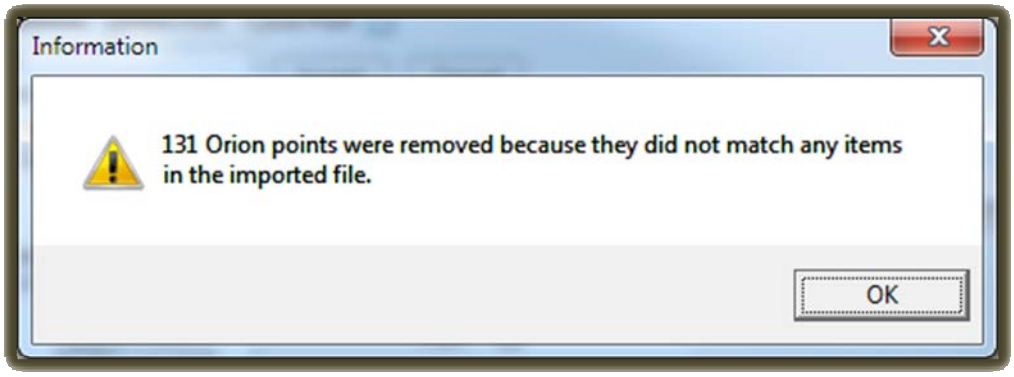
c. Import the configuration from the SCL file using the “Import .SCL File” function. At the prompt, select “Merge Existing Orion Points”. If the SCL file contains more than one IED then NCD3 will prompt for the correct IED.





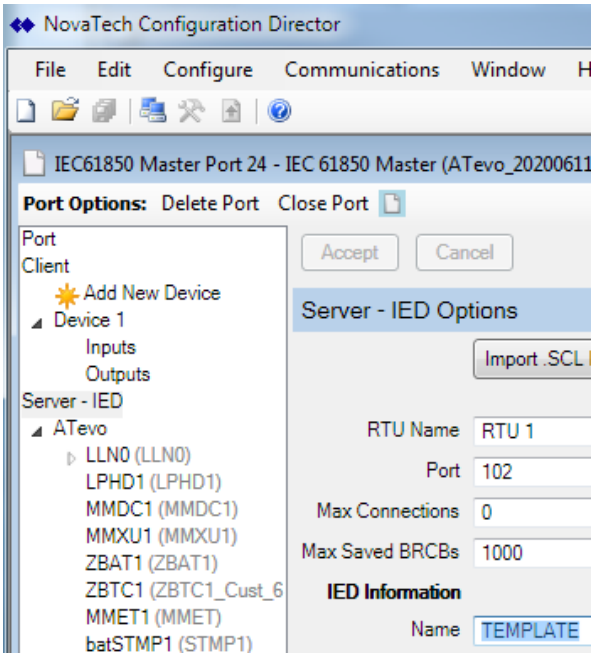


d. Ensure that the following messages **DOES NOT** appear. It indicates that the chosen IED is not appropriate for this gateway.



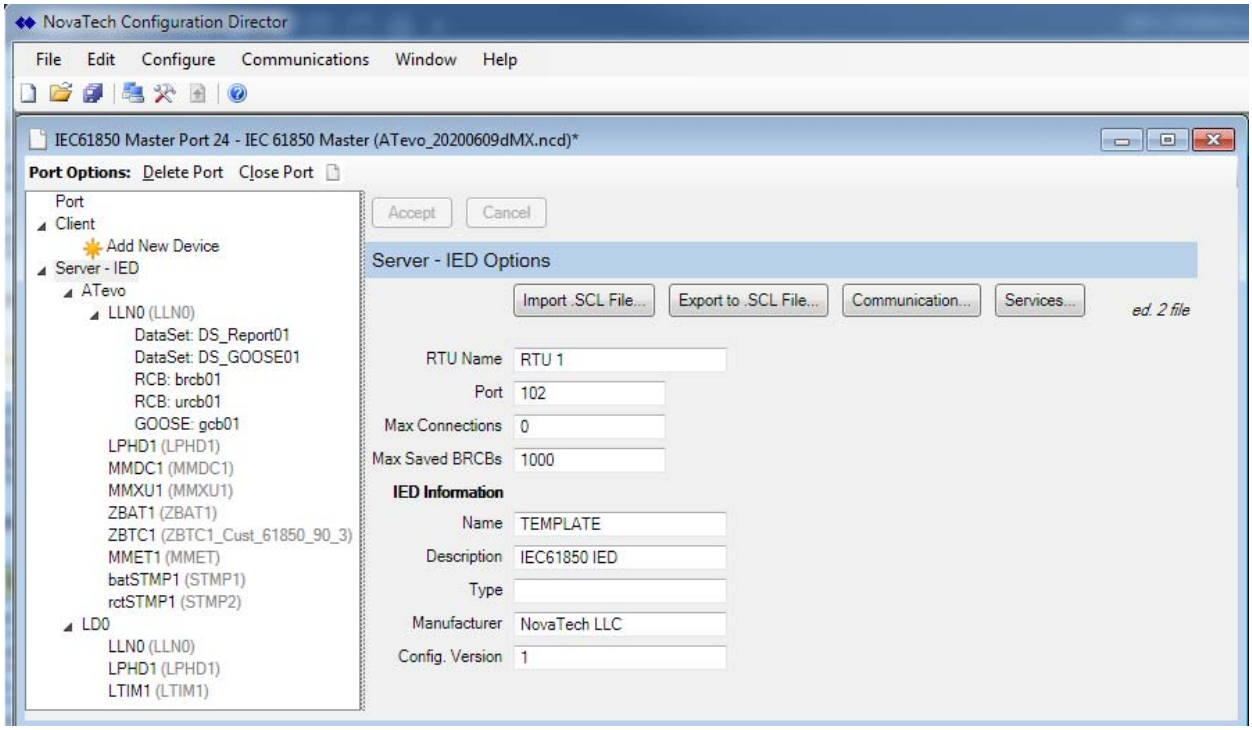
Continue with the general workflow to make any needed adjustments to the configuration

4. Configure the IED name with a unique value. Note that “TEMPLATE” is not unique.
   Select “Server – IED” and edit the name inside “IED Information”.

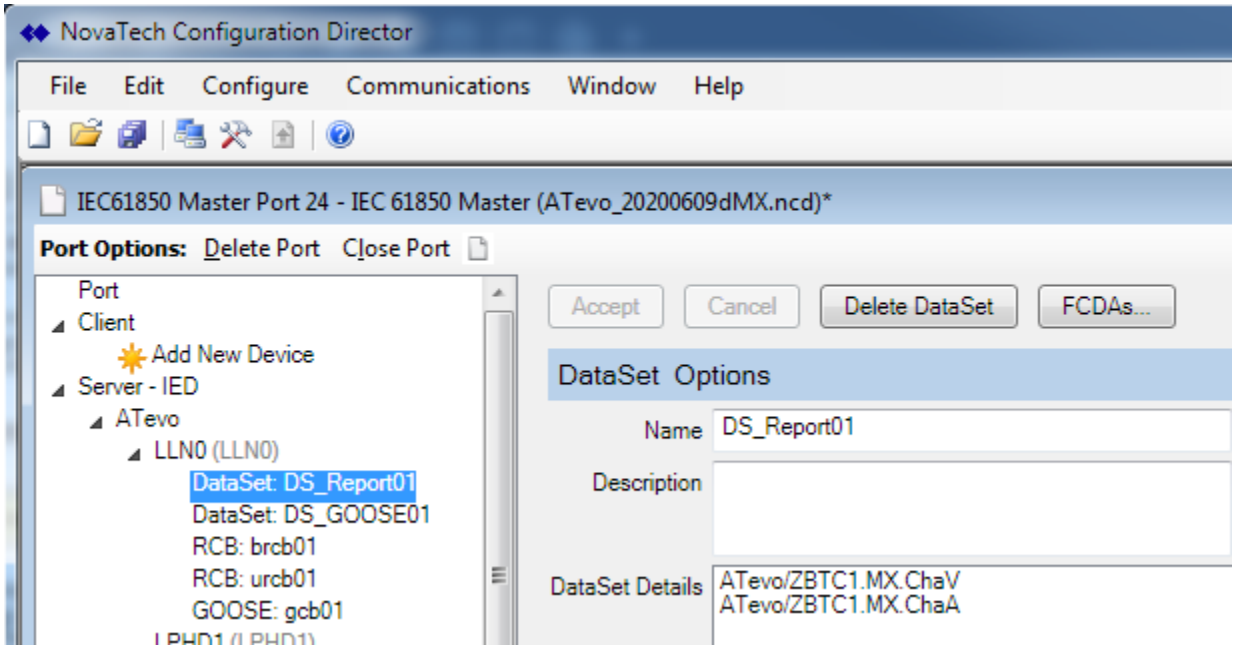


   Accept the request to update the RTU.

5. Configure the datasets and reports and GOOSE content as needed
   Select Server - IED, Expand ATevo, expand LLN0 to view existing contents

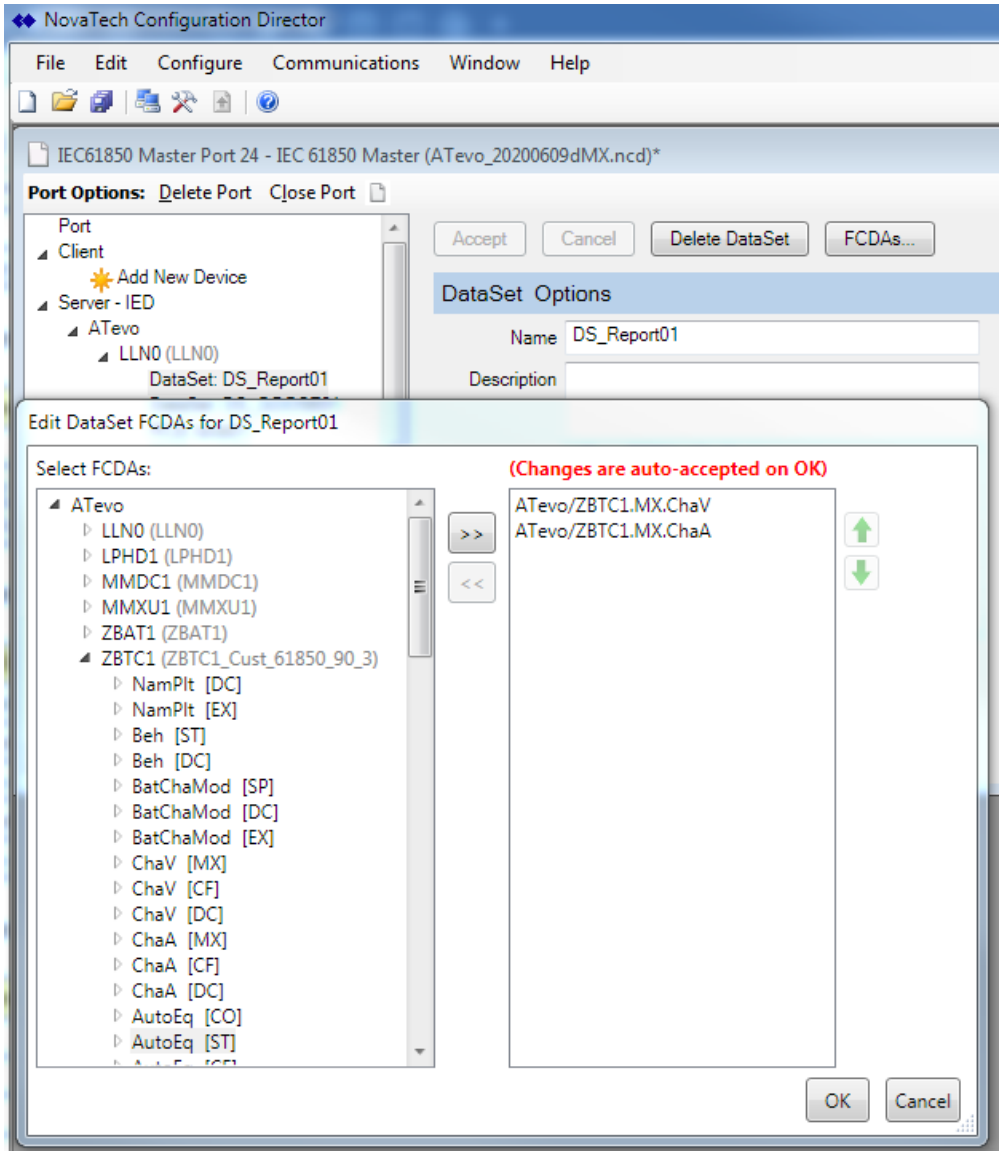


The default file has 2 datasets, a buffered RCB, an unbuffered RCB, and a GOOSE.
Click on DataSet or RCB (Report Control Block) or GOOSE to view.
For example, select the dataset appropriate for a report (DS_Report01):



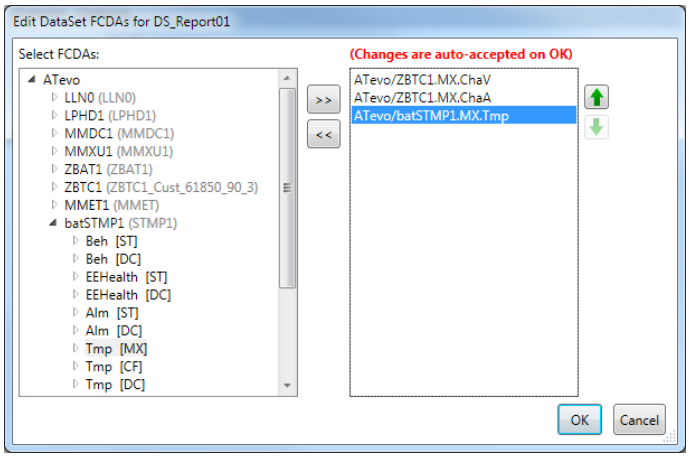
Here we see 2 elements in the dataset, the battery charger output voltage and current.
Note that only the Data Object names (ChaV and ChaA) have been selected which means every attribute of the Functional Constraint MX for both Data Objects will be included in the report.
You can create a new Dataset by selecting LLN0 then “Add Dataset” or simply add/remove DataSet members using “FCDAs” (Functionally Constrained Data Attributes).

Selecting “FCDAs…” then expanding ATEVO/ZBTC1 shows the following screen:



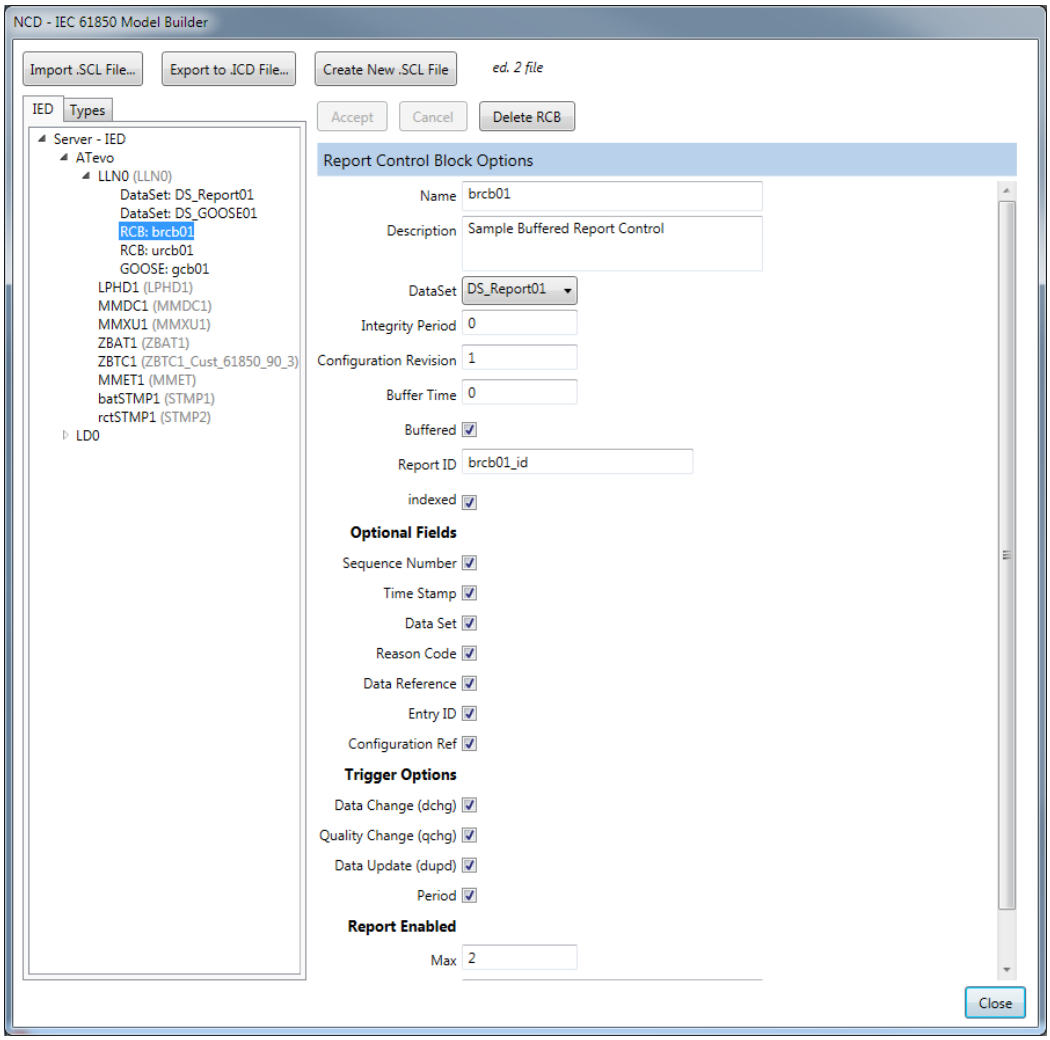
This shows that “AutoEq (ST) has been selected and pressing the “>>” key would add it to the DataSet. Similarly, an object on the right pane could be selected then “<<” to remove it from the dataset. The number of elements in a DataSet is limited to 250 elements for a Report and possibly fewer for GOOSE (limited by the maximum Ethernet packet size).

To re-order the dataset elements, select the element then press (Up) or (Down).

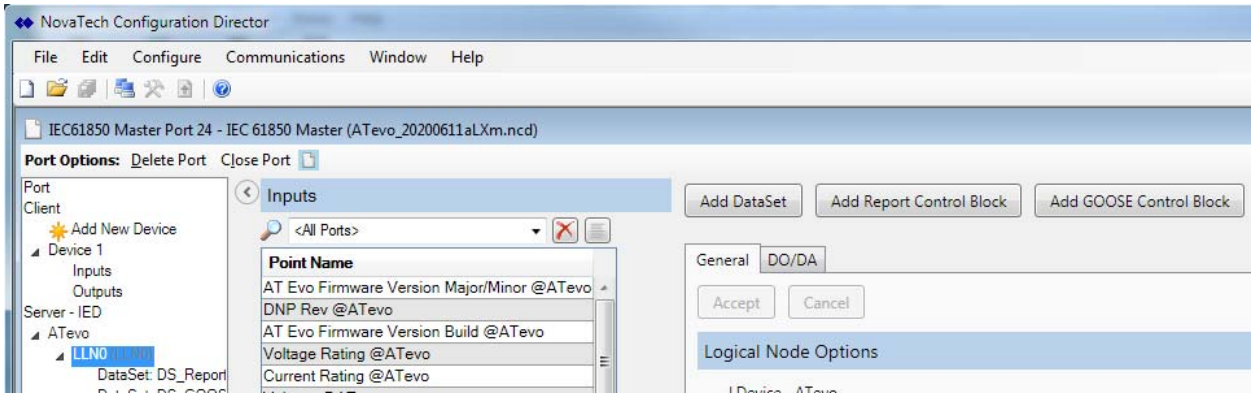


When done, then press OK.

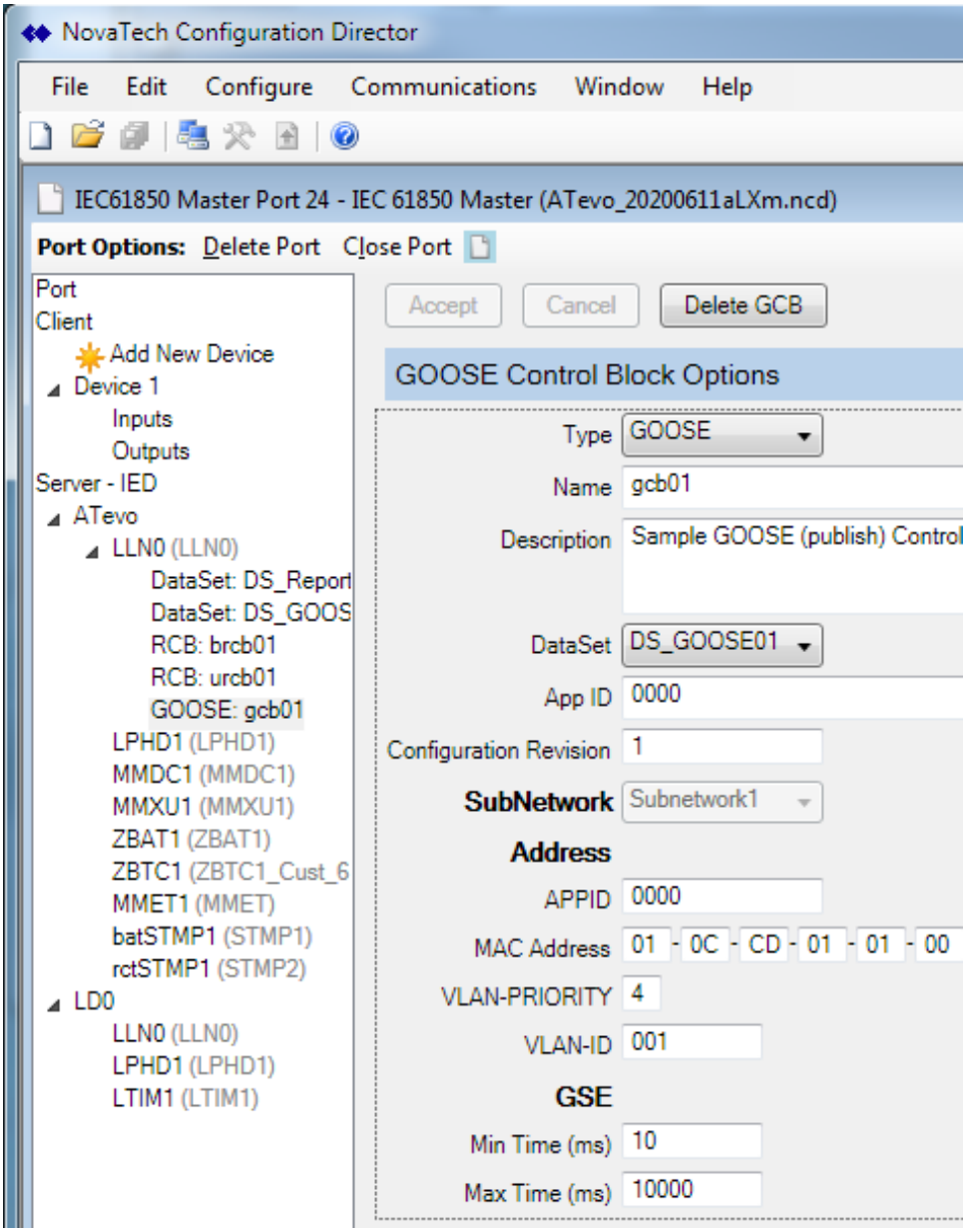
To modify a Report Control Block, select one of the “RCB” under ATEVO/LLN0 and perform edits



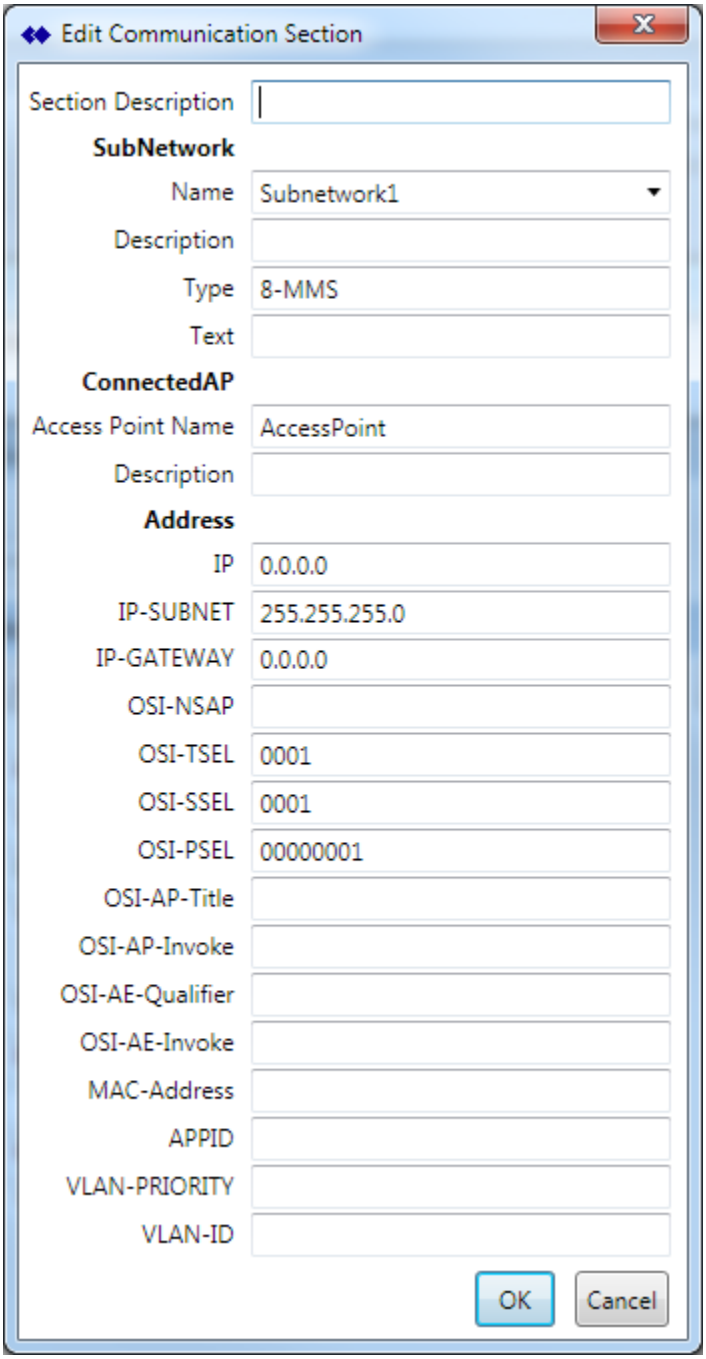
To create a new Dataset or Report Control of GOOSE, select the ATEVO/LLN0 and click the selection:



Note that GOOSE “addressing” is configured when ATEVO/LLN0/“GOOSE:” is selected.
The Destination (GOOSE multicast) address is indicated by “MAC Address”. The APPID is the value 2-byte value inside GOOSE Ethertype header. The “App ID” is the name of the GOOSE (also known as GOOSE ID or GoID). VLAN-ID also needs to be configured to match the subscriber expectation.



6. Configure IP address if needed (for top-down, IP address was already imported)
   Choose “Server – IED” then “Communications”
   Modify IP, IP-SUBNET, and IP-GATEWAY (sometime called “router” address)



7. If needed, save the configured IED file as either *.CID or *.IID depending upon your system needs. Open “Server – IED” then “Export to .SCL file …” and choose a name

8. Save the Orion configuration files using Menu: File then Save As

end
(print date 3/23/2022 3:59 PM)

BACK COVER