2nd Annual Users Group Meeting

Little Rock, AR

October 26, 2016

SCADA Selection and Implementation – Siloam Springs Arkansas

CITY OF
Siloam Springs
ELECTRIC DEPARTMENT

City of Siloam Springs – Municipal Owned Electric Utility

- 7,500 Customers
- 4 Substations
- 69 KV transmission – 12,470 / 7200 distribution
- 23.4 Square miles of service territory
- 27 Employees
- 60 MW summer peak
- Industrial / Commercial / Residential load

Need for SCADA

- Small System – recognized need for SCADA well over 10 year ago
- Budget Restraints

- Fiber optic communications installation each substation
- Mechanical relay replacement
- Using serial to Ethernet devices – eventually achieved connection to most relays

- 2014 requested budgetary quotations for a complete system from 3 companies
  - NovaTech one of the companies
  - Funding was approved for SCADA within the 2015 City Budget

Bid Process and Selection

- Bid Specifications – Challenge
- Approved and sent to vendors May 2015
- In house demonstration from 3 vendors – 2 web demonstrations
  - Impressed by NovaTech demonstration– web sever approach, simplicity of system
- 6 acceptable bidders

- NovaTech not the least expensive .....
- Least expensive bid nearly $20K less
- All of the bids over the funds budgeted for the project

Selection Factors

- Closer evaluation between NovaTech and lowest bidder
  - Traditional system vs Web server system
  - Contacted references
  - All NovaTech references very happy with their systems, support and service
  - Traditional SCADA mostly happy
    - Software updates; Windows updates; Man-hours to keep system operating
    - Hardware – Warranty
    - Ability to connect to our current devices / protocols
    - Software maintenance costs
    - Alarms.....

Decision - NovaTech

- Felt comfortable with their approach
- Traditional system would cost more in just a few years – adding annual software maintenance fee – (decided to subscribe to the Ncare program)

- Hardware warranty
- Expandable
- Willing to work with us .....
- Assurance could work with our existing devices and protocols
- Ability to access devices with manufacturer software for settings and events
- Alarms
- Presented our project to City Board on 7/22/15 – approved for entire project

Challenges

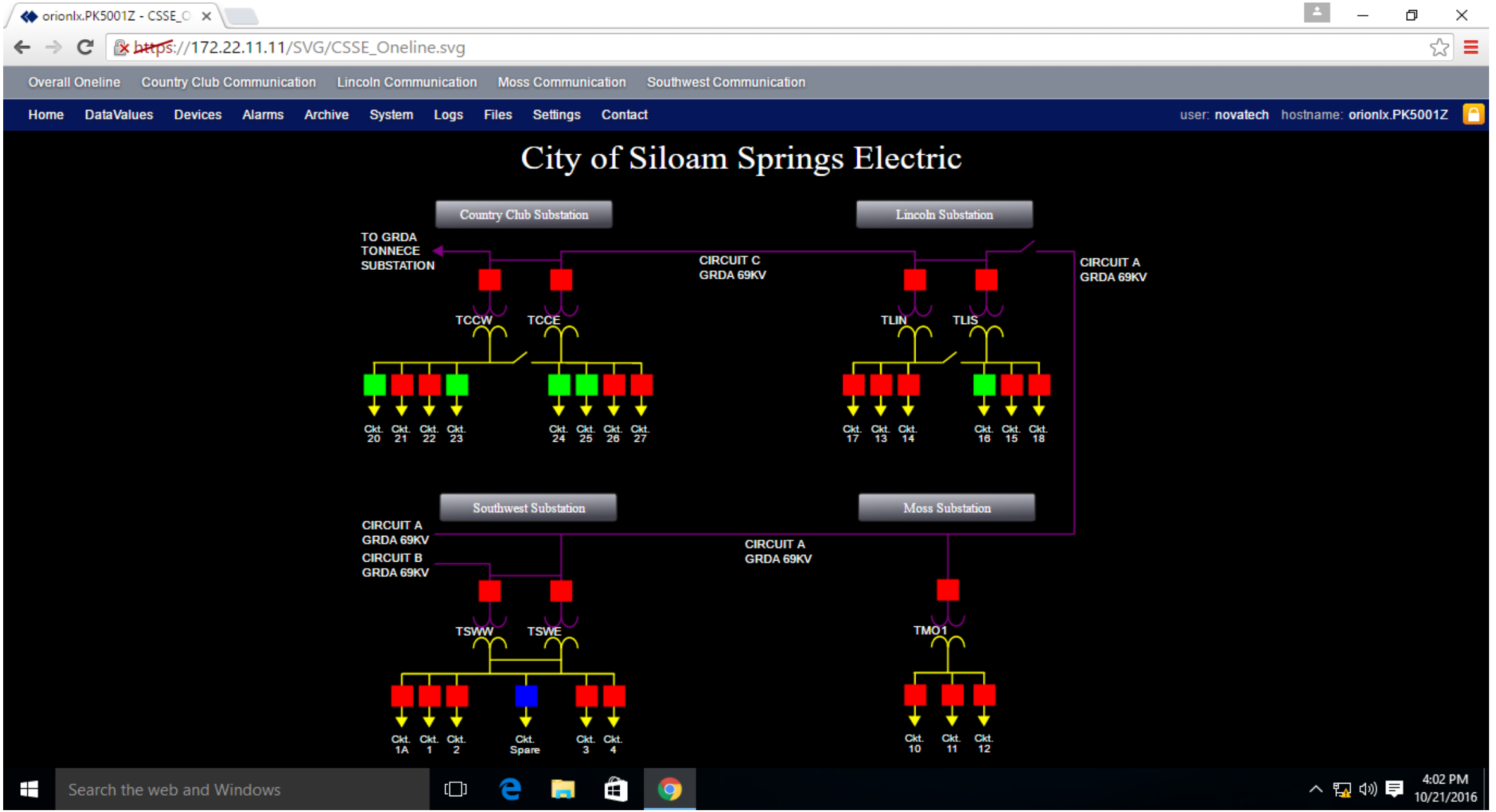
- Multiple equipment manufacturers / Multiple protocols
  - Transformer KWhr meters
  - Southwest station feeder relays
  - LTC controllers
  - Alarms – DDIO – Alarm cable
  - Communication type
  - IT department??

  - Development and Installation
    - NovaTech – Systematically sent screen shots, IP addresses, SCADA points – for review and approval
    - SSEL installed all hardware and cabling; Set IP addresses and communication settings; Orions LX's shipped programmed from the factory and installed by SSEL before commissioning


NovaTech
Orion DDIO
24 Input
SER-111
NovaTech
OrionLX
2016


SEL-351S
14
17
BREAKER
TRIP
CLOSE
NovaTech
OrionLX


East Transformer
West Transformer
NovaTech
Orion DDIO
SEL-735
SEL-501
SEL-587
NovaTech
OrionLX
SEL-735
SEL-501
SEL-587


orionlx.PK5001Z - CSSE_O
https://172.22.11.11/SVG/CSSE_Oneline.svg
Overall Oneline
Country Club Communication
Lincoln Communication
Moss Communication
Southwest Communication
Home
DataValues
Devices
Alarms
Archive
System
Logs
Files
Settings
Contact
user: novatech
hostname: orionlx.PK5001Z
City of Siloam Springs Electric
Country Club Substation
Lincoln Substation
TO GRDA TONNECE SUBSTATION
CIRCUIT C GRDA 69KV
CIRCUIT A GRDA 69KV
TCCW
TCCE
TLIN
TLIS
Ckt. 20
Ckt. 21
Ckt. 22
Ckt. 23
Ckt. 24
Ckt. 25
Ckt. 26
Ckt. 27
Ckt. 17
Ckt. 13
Ckt. 14
Ckt. 16
Ckt. 15
Ckt. 18
Southwest Substation
Moss Substation
CIRCUIT A GRDA 69KV
CIRCUIT B GRDA 69KV
CIRCUIT A GRDA 69KV
TSWW
TSWE
TMO1
Ckt. 1A
Ckt. 1
Ckt. 2
Ckt. Spare
Ckt. 3
Ckt. 4
Ckt. 10
Ckt. 11
Ckt. 12
Search the web and Windows
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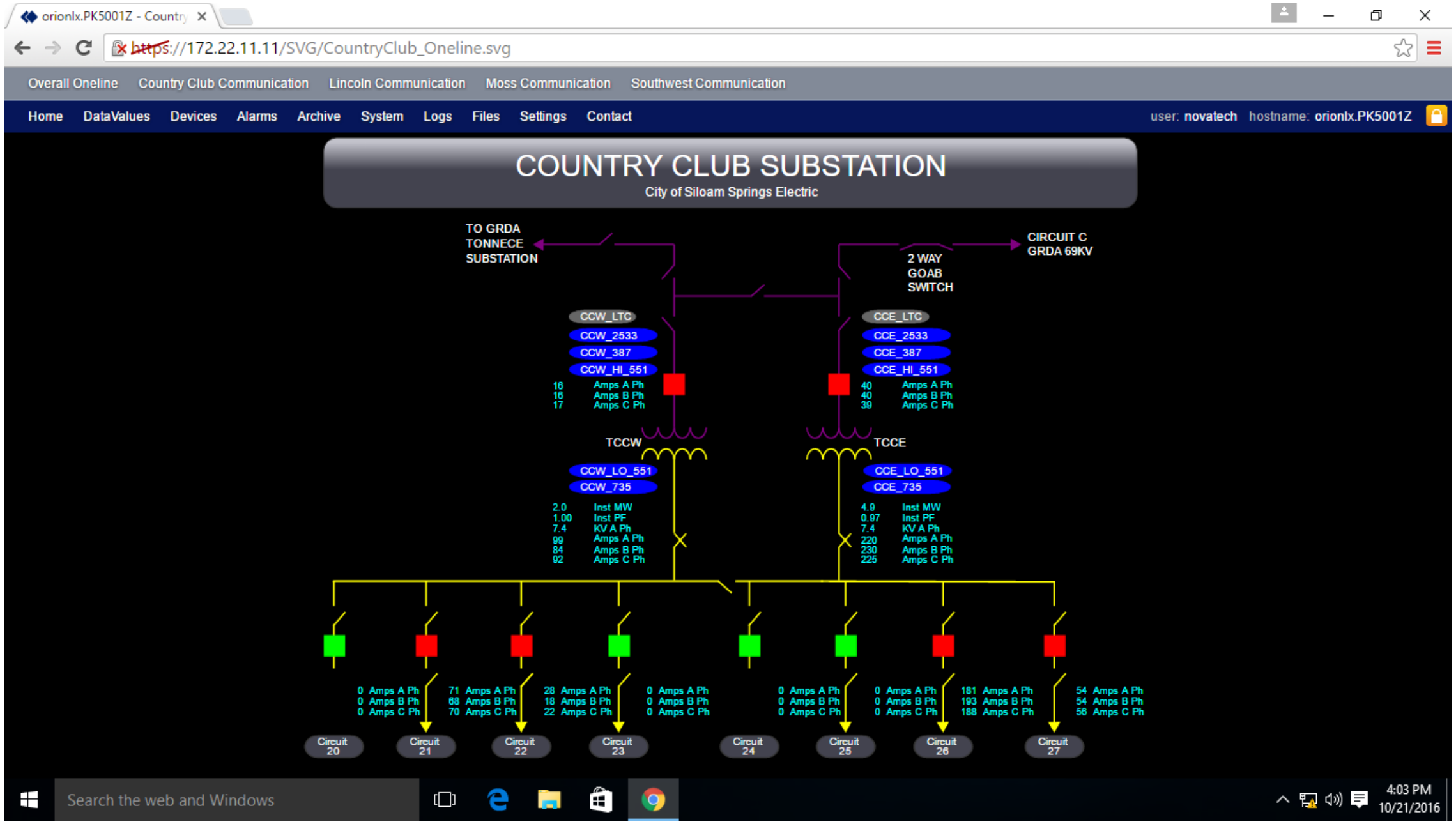
10/21/2016


orionlx.PK5001Z - Country
https://172.22.11.11/SVG/CountryClub_Oneline.svg
Overall Oneline
Country Club Communication
Lincoln Communication
Moss Communication
Southwest Communication
Home
DataValues
Devices
Alarms
Archive
System
Logs
Files
Settings
Contact
user: novatech
hostname: orionlx.PK5001Z
COUNTRY CLUB SUBSTATION
City of Siloam Springs Electric
TO GRDA
TONNECE
SUBSTATION
CIRCUIT C
GRDA 69KV
2 WAY
GOAB
SWITCH
CCW_LTC
CCW_2533
CCW_387
CCW_HI_551
16 Amps A Ph
16 Amps B Ph
17 Amps C Ph
CCE_LTC
CCE_2533
CCE_387
CCE_HI_551
40 Amps A Ph
40 Amps B Ph
39 Amps C Ph
TCCW
TCCE
CCW_LO_551
CCW_735
2.0 Inst MW
1.00 Inst PF
7.4 KV A Ph
99 Amps A Ph
84 Amps B Ph
92 Amps C Ph
CCE_LO_551
CCE_735
4.9 Inst MW
0.97 Inst PF
7.4 KV A Ph
220 Amps A Ph
230 Amps B Ph
225 Amps C Ph
0 Amps A Ph
0 Amps B Ph
0 Amps C Ph
71 Amps A Ph
68 Amps B Ph
70 Amps C Ph
28 Amps A Ph
18 Amps B Ph
22 Amps C Ph
0 Amps A Ph
0 Amps B Ph
0 Amps C Ph
0 Amps A Ph
0 Amps B Ph
0 Amps C Ph
0 Amps A Ph
0 Amps B Ph
0 Amps C Ph
181 Amps A Ph
193 Amps B Ph
188 Amps C Ph
54 Amps A Ph
54 Amps B Ph
56 Amps C Ph
Circuit 20
Circuit 21
Circuit 22
Circuit 23
Circuit 24
Circuit 25
Circuit 26
Circuit 27
Search the web and Windows
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orionlx.PK5001Z - COUNT
https://172.22.11.11/SVG/COUNTRYCLUB_COMM_STATUS.svg
Overall Oneline
Country Club Communication
Lincoln Communication
Moss Communication
Southwest Communication
Home
DataValues
Devices
Alarms
Archive
System
Logs
Files
Settings
Contact
user: novatech
hostname: orionlx.PK5001Z
COUNTRY CLUB COMMUNICATION STATUS
MAIN
MASTER ORIONLX to CCSS_ORIONLX NORMAL
SUBSTATION
CCE_LTC (BECKWITH) NORMAL
CCE_735 (SEL-735) NORMAL
CC_FDR_24 (SEL-351S) NORMAL
CC_FDR_25 (SEL-351S) NORMAL
CC_FDR_26 (SEL-351S) NORMAL
CC_FDR_27 (SEL-351S) NORMAL
CCE_2533 (SEL-2533) NORMAL
CCE_387 (SEL-387) NORMAL
CCE_HI_551 (SEL-551) NORMAL
CCE_LO_551 (SEL-551) NORMAL
CCW_LTC (BECKWITH) NORMAL
CCW_735 (SEL-735) NORMAL
CC_FDR_20 (SEL-351S) NORMAL
CC_FDR_21 (SEL-351S) NORMAL
CC_FDR_22 (SEL-351S) NORMAL
CC_FDR_23 (SEL-351S) NORMAL
CCW_2533 (SEL-2533) NORMAL
CCW_387 (SEL-387) NORMAL
CCW_HI_551 (SEL-551) NORMAL
CCW_LO_551 (SEL-551) NORMAL
Search the web and Windows
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orionlx.PK5001Z - CF6_zoo
https://172.22.11.11/SVG/CF6_zoom.svg?SSDEVICE=SW_FDR_1A&SSOLX=SWSS_ORIONLX
Overall Oneline
Country Club Communication
Lincoln Communication
Moss Communication
Southwest Communication
Home
DataValues
Devices
Alarms
Archive
System
Logs
Files
Settings
Contact
user: novatech
hostname: orionlx.PK5001Z
CONTROL OK
CONTROL POWER
CONTROL LOCKOUT
RECLOSER OPEN
RECLOSER CLOSED
A PHASE FAULT
B PHASE FAULT
C PHASE FAULT
GROUND FAULT
SENSITIVE GND
ALARM
ABOVE MIN TRIP
INDICATOR 1
INDICATOR 2
INDICATOR 3
A PH VOLTAGE
B PH VOLTAGE
C PH VOLTAGE
FREQ TRIP
VOLTAGE TRIP
INDICATOR 4
INDICATOR 5
INDICATOR 6
INDICATOR 7
INDICATOR 8
METERING
RESET TARGETS
EVENTS
LAMP TEST
SETTINGS
OPER COUNTER
ALARMS
CHANGE
F1
F2
F3
F4
MENU
ENTER
RS232 Data Port
COOPER Power Systems
KYLE F6 Reclose Control
TRIP
CLOSE
(LOCKOUT)
CLOSE CIRCUIT DISABLE
ON
OFF
HOT LINE TAG
GND TRIP BLOCKED
NON RECLOSING
SUPERVISORY OFF
ALTERNATE PROFILE #1
ALTERNATE PROFILE #2
ALTERNATE PROFILE #3
OPTION #1
OPTION #2
OPTION #3
SW_FDR_1A
METERING
INST AMPS A 36.3
INST AMPS B 41.2
INST AMPS C 25.6
INST VOLTS A 7284
INST VOLTS B 7330
INST VOLTS C 7310
INST KWatt A 269
INST KWatt B 292
INST KWatt C 169
INST KVar A -33
INST KVar B -40
INST KVar C -75
POWER FACTOR A 0.992
POWER FACTOR B 0.990
POWER FACTOR C 0.912
BREAKER
TRIP
CLOSE
NON RECLOSING
ON / OFF
HOTLINE TAG
ON
OFF
GROUND TRIP
ON / OFF
Search the web and Windows
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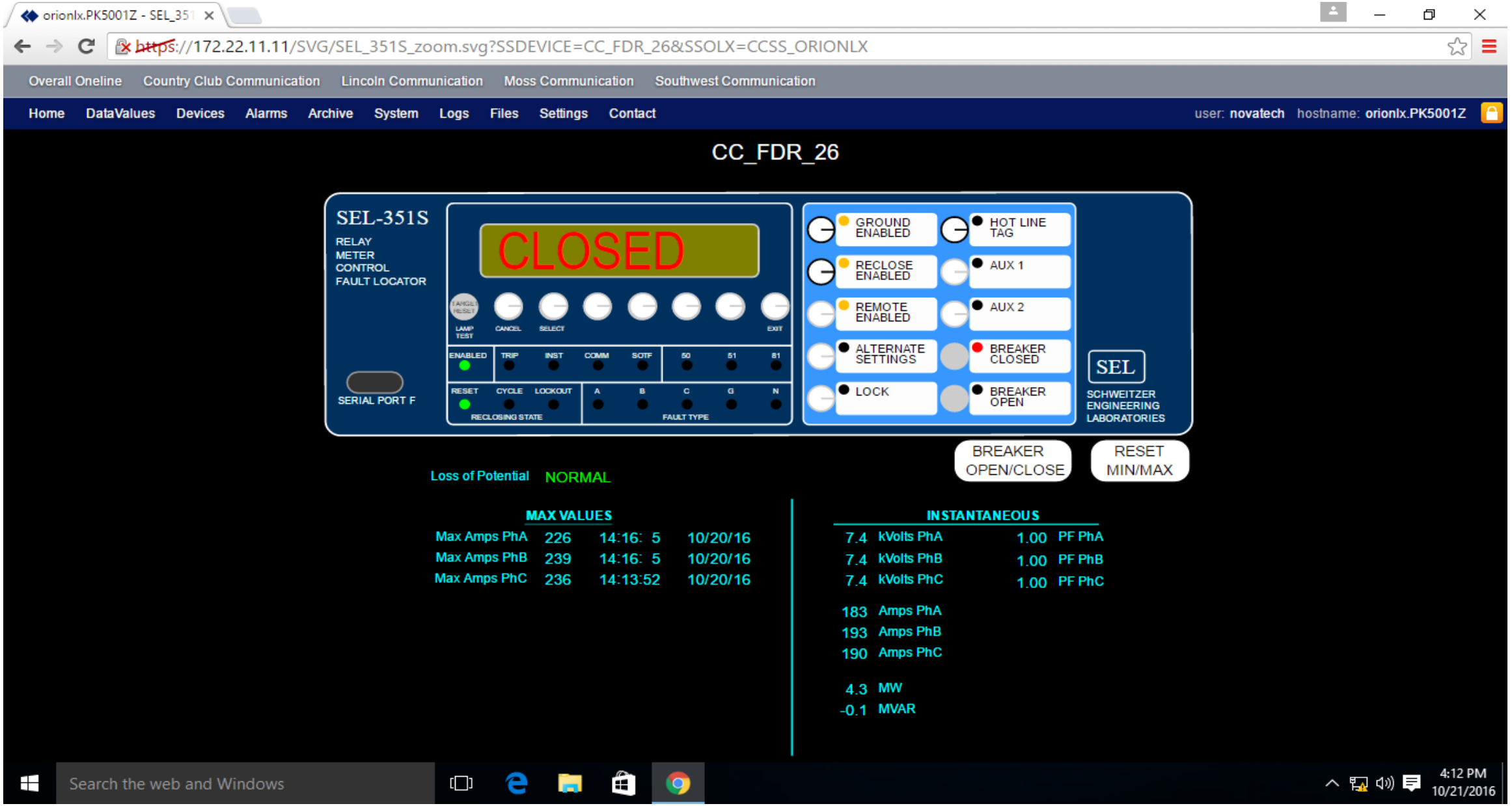
orionlx.PK5001Z - SEL_351
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Contact
user: novatech
hostname: orionlx.PK5001Z
CC_FDR_26
SEL-351S
RELAY
METER
CONTROL
FAULT LOCATOR
CLOSED
LAMP TEST
CANCEL
SELECT
EXIT
ENABLED
TRIP
INST
COMM
SOTF
50
51
81
RESET
CYCLE
LOCKOUT
RECLOSING STATE
A
B
C
G
N
FAULT TYPE
SERIAL PORT F
GROUND ENABLED
HOT LINE TAG
RECLOSE ENABLED
AUX 1
REMOTE ENABLED
AUX 2
ALTERNATE SETTINGS
BREAKER CLOSED
LOCK
BREAKER OPEN
SEL
SCHWEITZER ENGINEERING LABORATORIES
BREAKER OPEN/CLOSE
RESET MIN/MAX
Loss of Potential
NORMAL
MAX VALUES
Max Amps PhA 226 14:16: 5 10/20/16
Max Amps PhB 239 14:16: 5 10/20/16
Max Amps PhC 236 14:13:52 10/20/16
INSTANTANEOUS
7.4 kVolts PhA
7.4 kVolts PhB
7.4 kVolts PhC
1.00 PF PhA
1.00 PF PhB
1.00 PF PhC
183 Amps PhA
193 Amps PhB
190 Amps PhC
4.3 MW
-0.1 MVAR
Search the web and Windows
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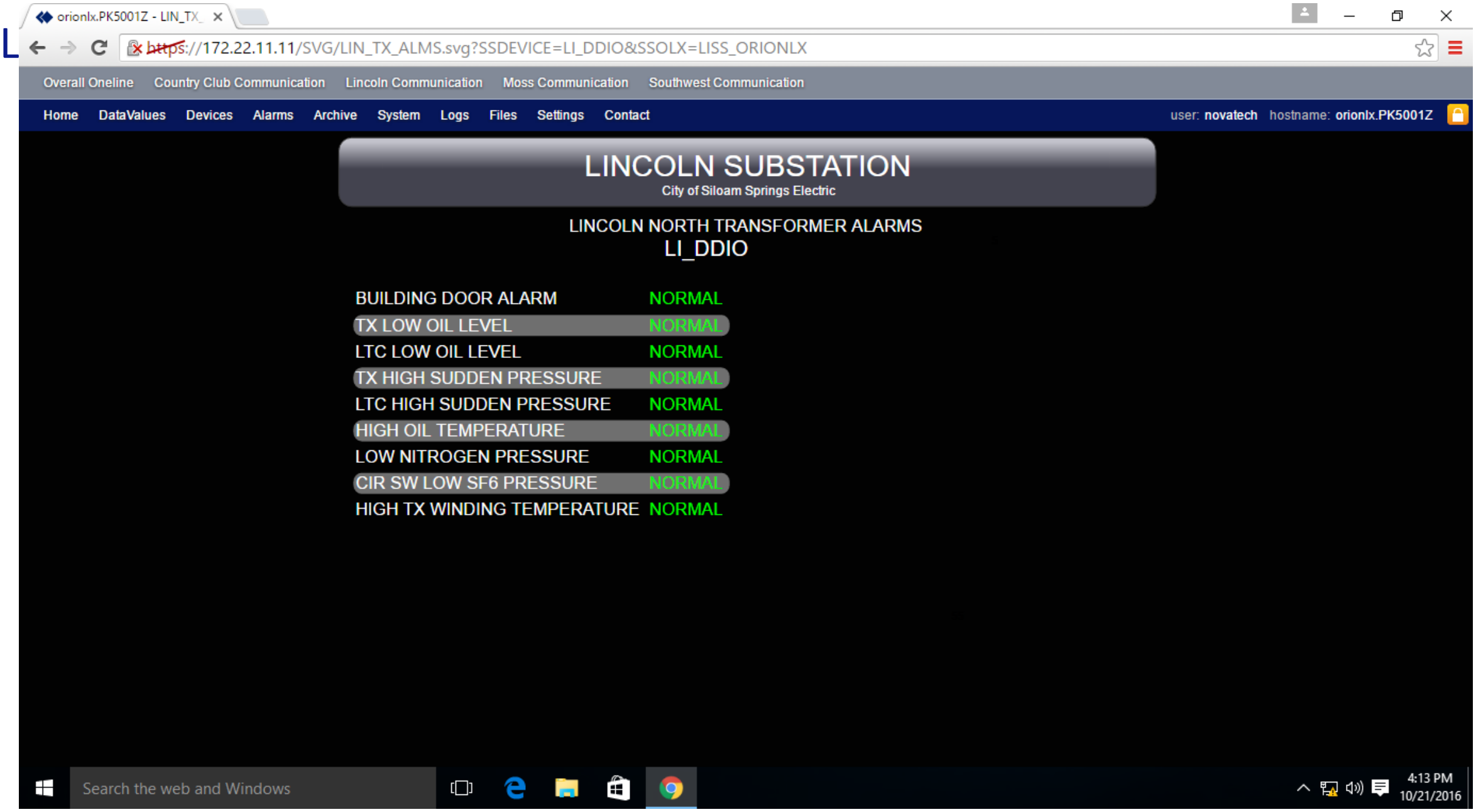
orionlx.PK5001Z - LIN_TX_
https://172.22.11.11/SVG/LIN_TX_ALMS.svg?SSDEVICE=LI_DDIO&SSOLX=LISS_ORIONLX
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Files
Settings
Contact
user: novatech
hostname: orionlx.PK5001Z
LINCOLN SUBSTATION
City of Siloam Springs Electric
LINCOLN NORTH TRANSFORMER ALARMS
LI_DDIO
BUILDING DOOR ALARM NORMAL
TX LOW OIL LEVEL NORMAL
LTC LOW OIL LEVEL NORMAL
TX HIGH SUDDEN PRESSURE NORMAL
LTC HIGH SUDDEN PRESSURE NORMAL
HIGH OIL TEMPERATURE NORMAL
LOW NITROGEN PRESSURE NORMAL
CIR SW LOW SF6 PRESSURE NORMAL
HIGH TX WINDING TEMPERATURE NORMAL
Search the web and Windows
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10/21/2016

Lessons Learned // Added Benefits

- More thorough when specifying equipment such as relays; SCADA protocols, communication means, -- Cheapest bid is not always best!

- During project we saw additional benefits
  - Update system drawings and one line drawing
  - Locate equipment drawings and instructions that were misplaced
  - Straighten up equipment racks and control cable
  - Clean out substation houses

Future SCADA projects

- Project under budget – adding some alarms from our battery chargers, changing communications for SW substation relays, bus voltage alarms, tile annunciator for office

- Future
  - 120V ac devices to DC
  - Add two of our large industrial customers: Metering and breaker relays
  - Recording package
  - Set up VPN for remote access
  - Add touch screen displays in stations
  - Change SW substation feeder relays

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