CONNECTIONS SUMMIT

SCADA Systems for Small Budgets without Sacrificing Features

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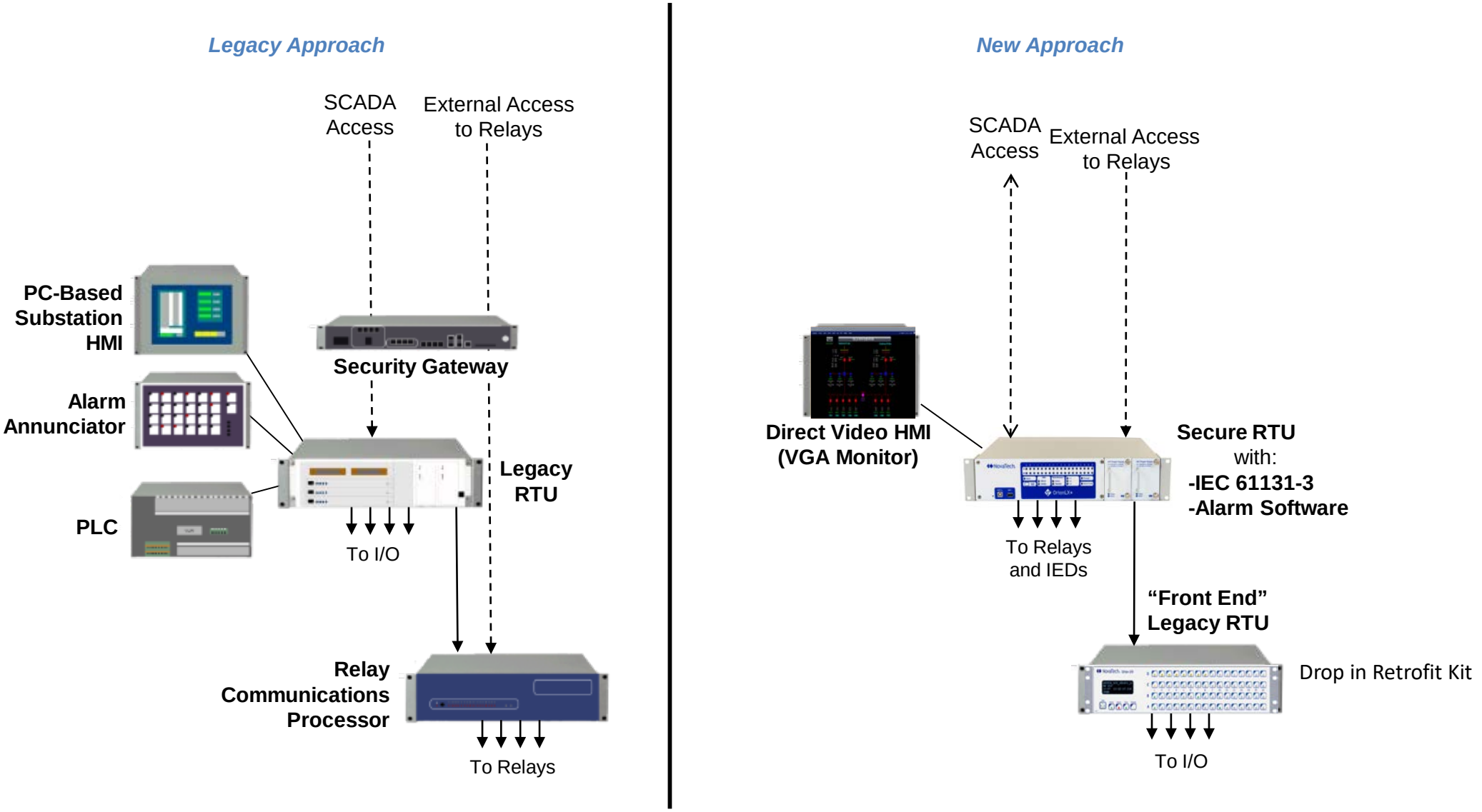
SCADA system Functional Requirements

- Visualization for Situational Awareness
- Alarm and Event Archival and Viewing
- Trending and Reporting for Conditional Analysis over Time
- Distribution Automation Functionality, Automation of Feeders and Conditional based Automation
- Redundancy
- Integration with OMS, AMI systems

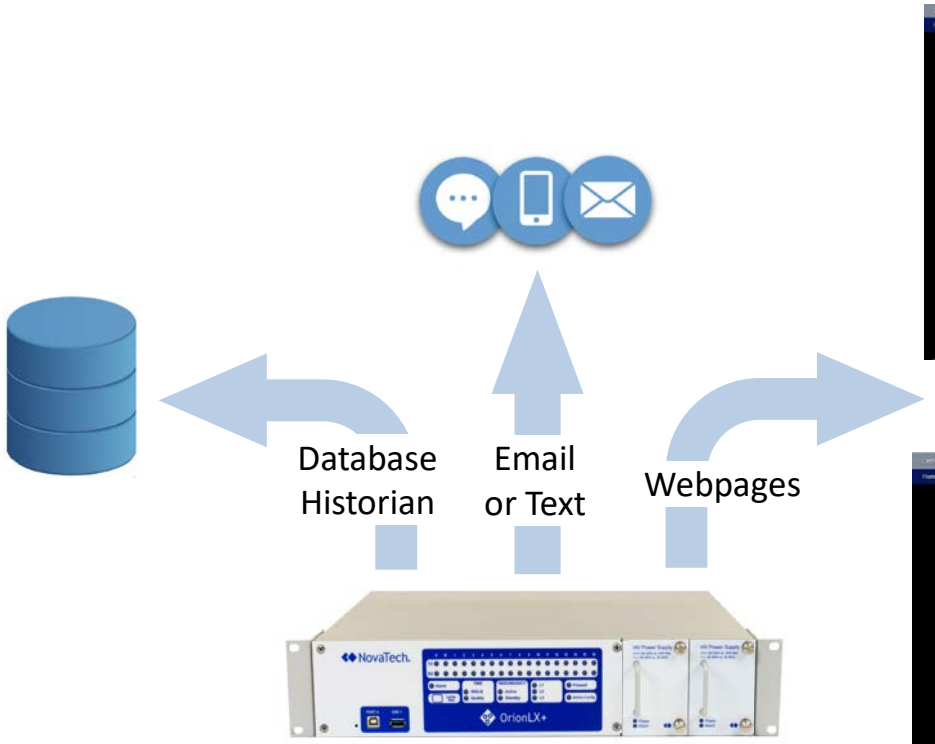
Many of these Features are only viewed as possible with large expensive SCADA, DMS solutions

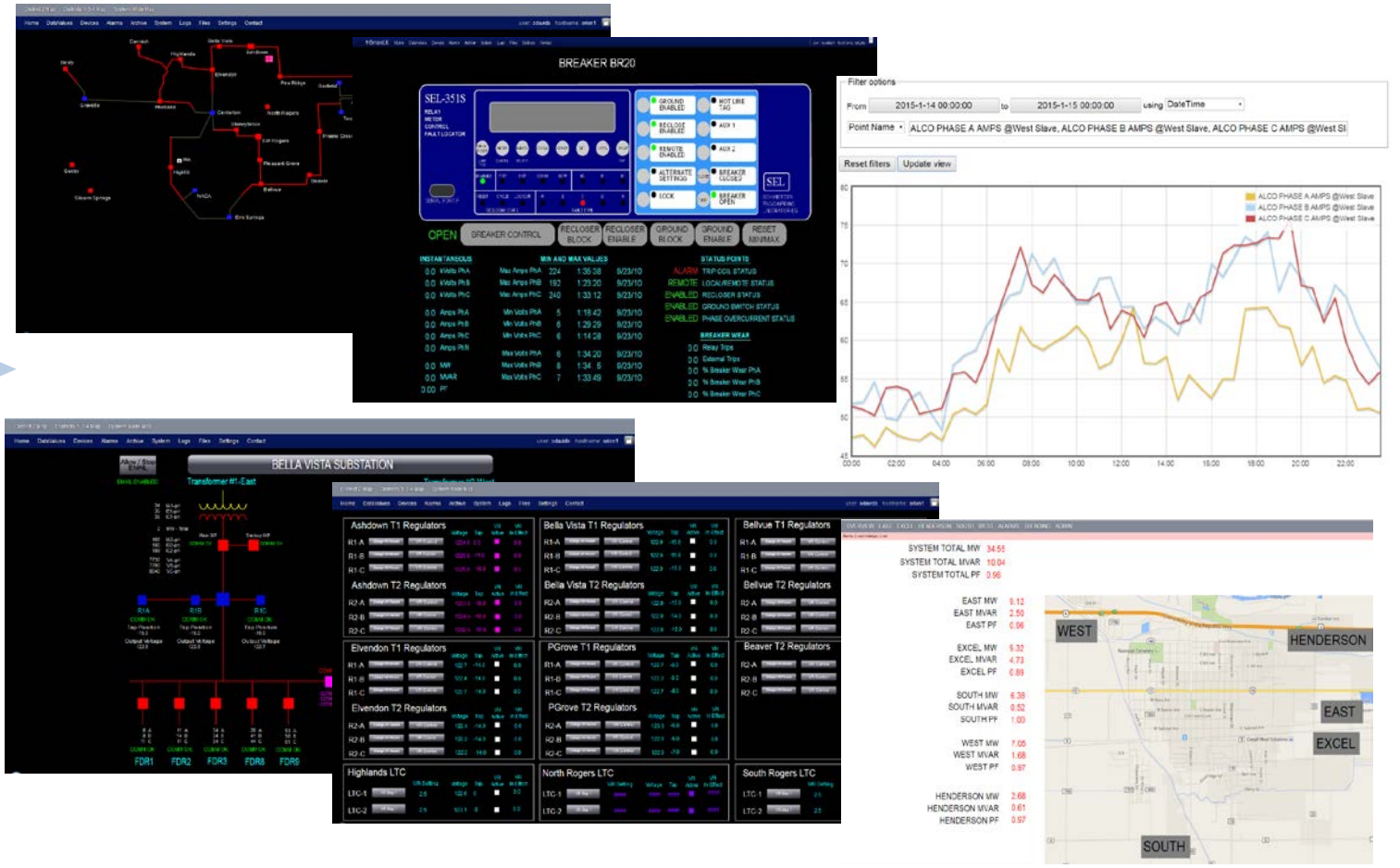
Box Consolidation Legacy → Today



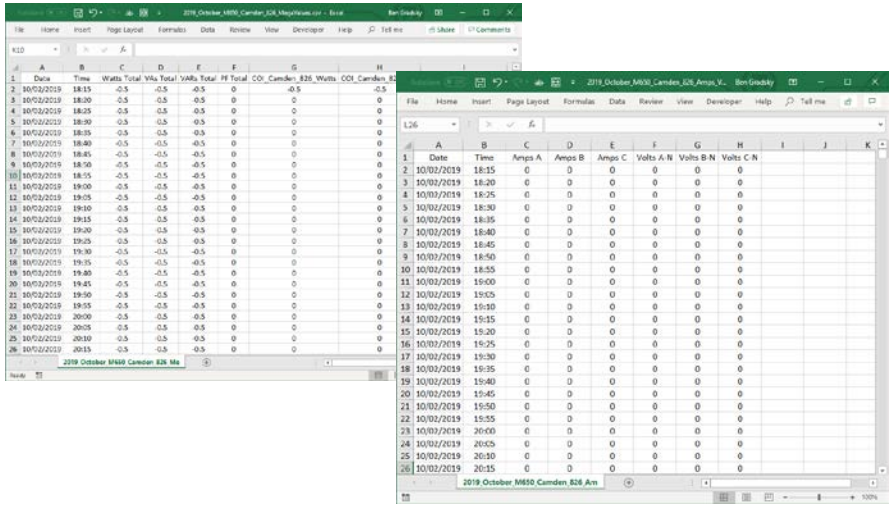
RTU's as SCADA Controller

- Same RTU's in the Substations are capable of generating SCADA Visualization either directly or through browser interface
- Connects to hundreds of devices, existing RTU's and meters
- Archive of Alarms and Events or push to external Historian. Trend View of Archived Data.
- Place an RTU at the Control Center as head end SCADA Controller





Reporting in a Centralized WEBserver SCADA



Enterprise

Queries and Custom Report options

Reports can be viewed, saved and printed.

Server replicates data archived in WEBserver RTU

Server

WEBserver RTU

Station RTU

Substation 1

Station RTU

Substation 2

Station RTU

Substation 3

“Sum” Report Example

Data view

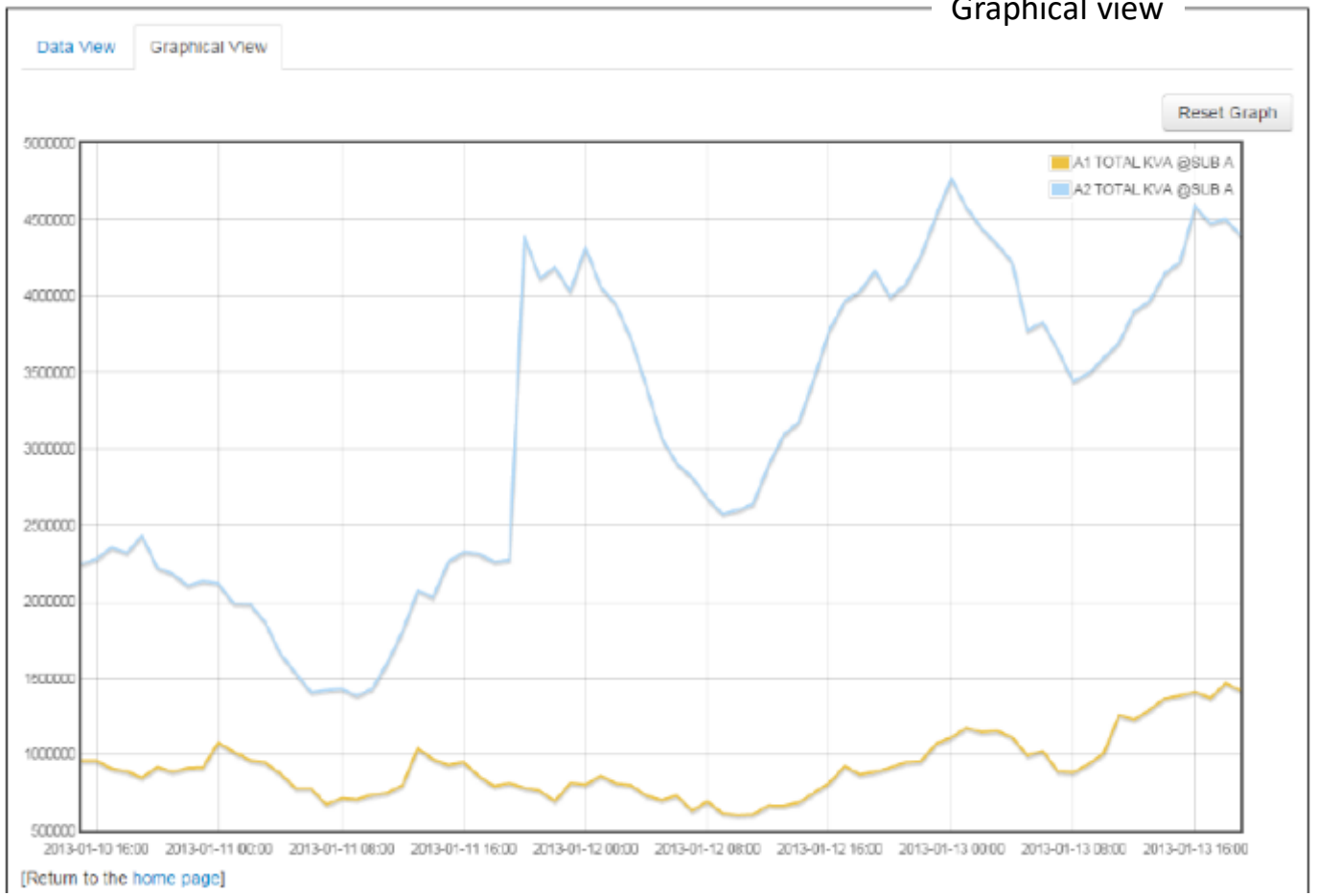
Sum Report

2013-01-09 13:34:27 - 2013-01-13 13:34:27

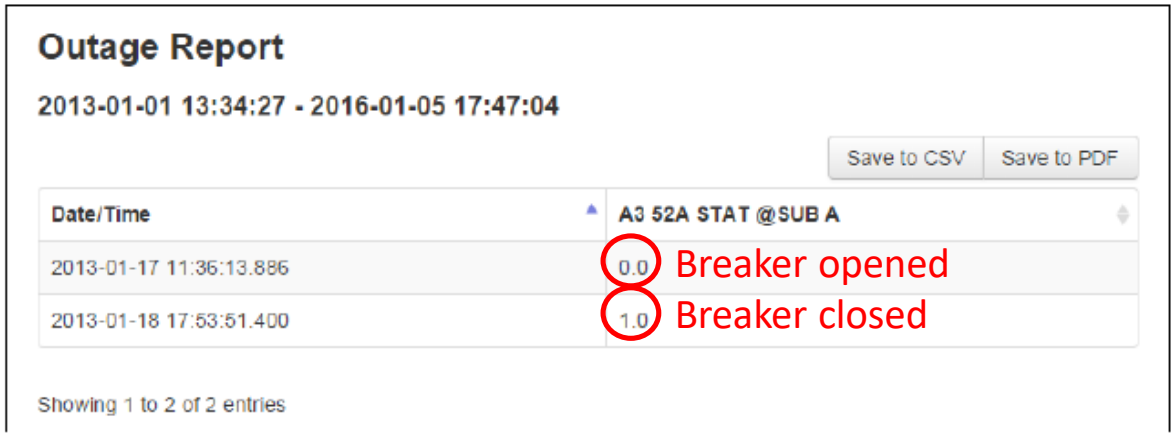
Save to CSV | Save to PDF

Date/Time	A1 TOTAL KVA @SUB A	A2 TOTAL KVA @SUB A
2013-01-10 09:00	961560.0	2250119.0
2013-01-10 10:00	961617.0	2281457.0
2013-01-10 11:00	911511.0	2356026.0
2013-01-10 12:00	893504.0	2320743.0
2013-01-10 13:00	853268.0	2434261.0
2013-01-10 14:00	921320.0	2224545.0
2013-01-10 15:00	891707.0	2185217.0
2013-01-10 16:00	914864.0	2108096.0
2013-01-10 17:00	918634.0	2137393.0
2013-01-10 18:00	1079129.0	2122710.0
2013-01-10 19:00	1020348.0	1995918.0
2013-01-10 20:00	963434.0	1990248.0
2013-01-10 21:00	949137.0	1871292.0
2013-01-10 22:00	878214.0	1663600.0
2013-01-10 23:00	784131.0	1539136.0
2013-01-11 00:00	782840.0	1411870.0
2013-01-11 01:00	575276.0	1424636.0
2013-01-11 02:00	718664.0	1433406.0
2013-01-11 03:00	711256.0	1389344.0
2013-01-11 04:00	740976.0	1434203.0
2013-01-11 05:00	753865.0	1609710.0

Graphical view



“Outage” Report Example



Outage Report

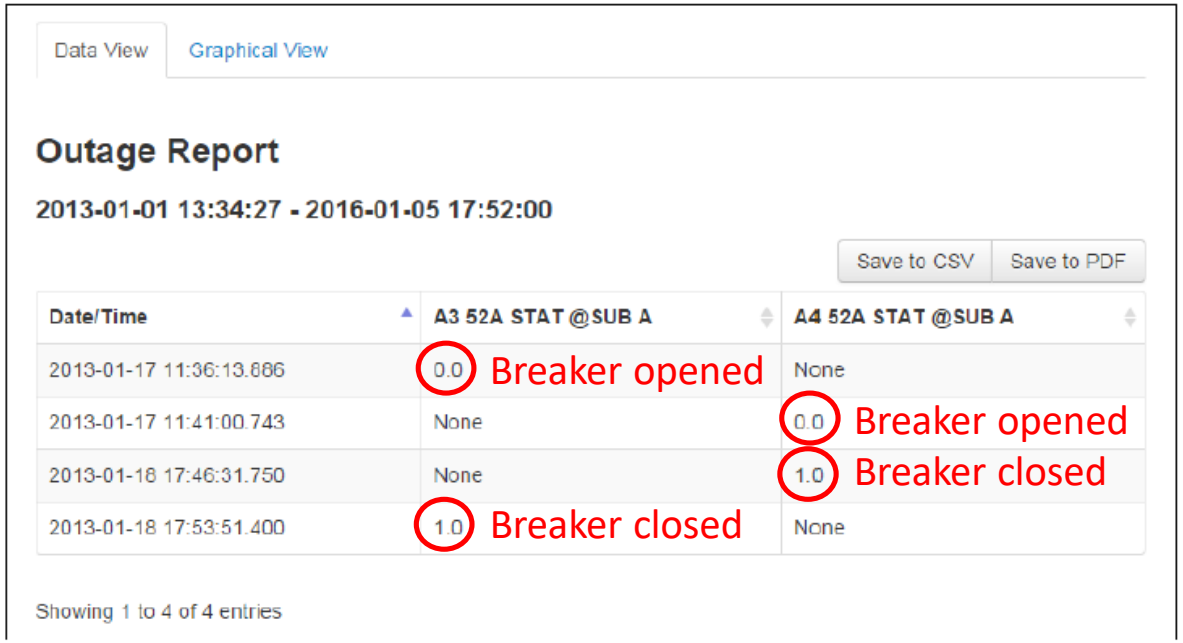
2013-01-01 13:34:27 - 2016-01-05 17:47:04

Save to CSV | Save to PDF

Date/Time	A3 52A STAT @SUB A
2013-01-17 11:36:13.886	0.0 Breaker opened
2013-01-18 17:53:51.400	1.0 Breaker closed

Showing 1 to 2 of 2 entries

Outage Report Sample – Two Breaker Events



Data View | Graphical View

Outage Report

2013-01-01 13:34:27 - 2016-01-05 17:52:00

Save to CSV | Save to PDF

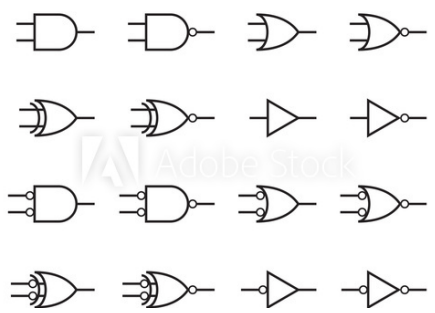
Date/Time	A3 52A STAT @SUB A	A4 52A STAT @SUB A
2013-01-17 11:36:13.886	0.0 Breaker opened	None
2013-01-17 11:41:00.743	None	0.0 Breaker opened
2013-01-18 17:46:31.750	None	1.0 Breaker closed
2013-01-18 17:53:51.400	1.0 Breaker closed	None

Showing 1 to 4 of 4 entries

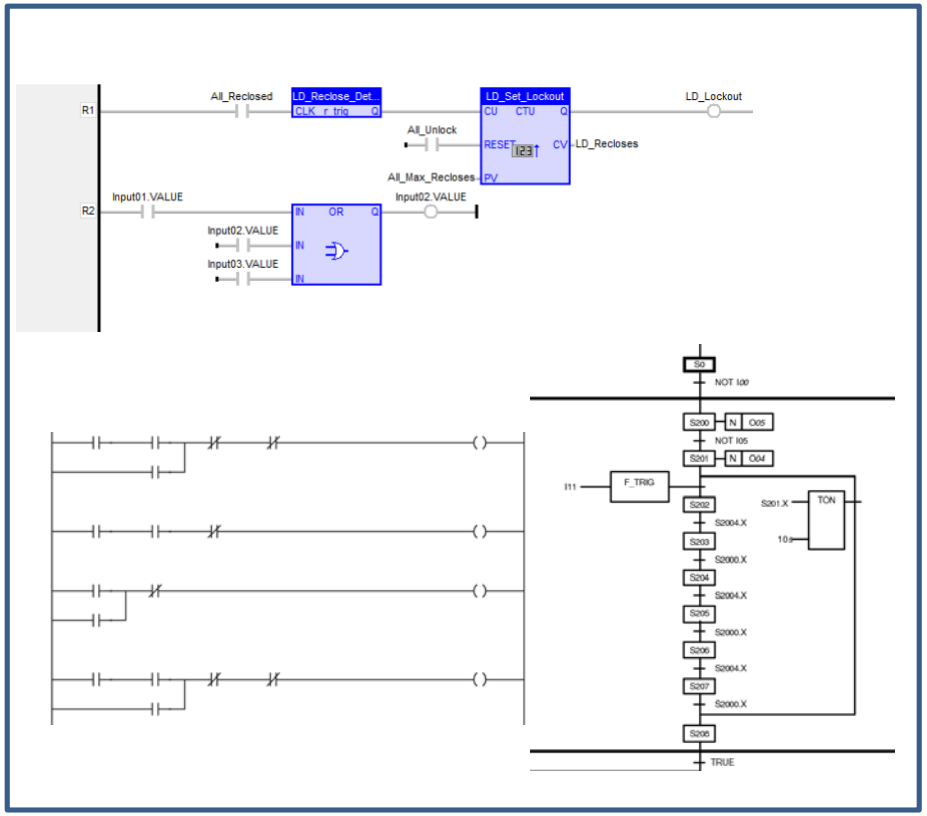
***52a**- AC Circuit Breaker Position (Contact Open when Breaker Open)*

RTU Controller Logic Capabilities

Logic Pak – For simple Logic Functions



61131 – Function Block, Ladder or Sequential Function Chart (SFC)

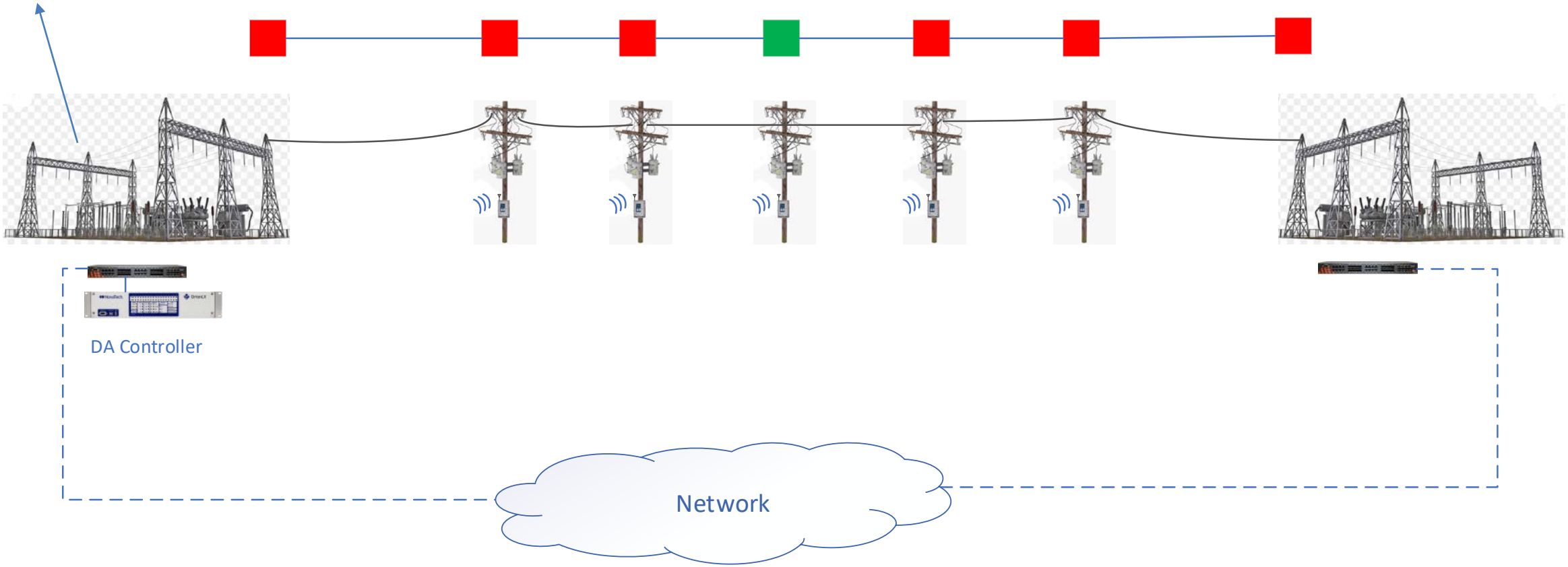


Advanced Math & Logic – LUA Scripting Engine

```lua
require "serialize"  -- needed to serialize table to string

trigger_counts = trigger_counts or {}  -- ensure table exists, if not loaded from variable

-- on plugin install, convert variable into Lua table
function OnPluginInstall ()
  assert (loadstring (GetVariable ("trigger_counts") or "")) ()
end -- function OnPluginInstall

-- on saving state, convert Lua table back into string variable
function OnPluginSaveState ()

  -- add the counts from last session to the ones for this session
  local new_counts = { }

  local plugins = GetPluginList() or {}
  table.insert (plugins, "") -- add main world to plugins list

  for _, pluginID in pairs (plugins) do

    local t1 = GetPluginTriggerList(pluginID) or {}
    for id, name in ipairs (t1) do
       local matchText = GetPluginTriggerInfo (pluginID, name, 1)
       local count = GetPluginTriggerInfo (pluginID, name, 21) + (trigger_counts [matchText] or 0)
       new_counts [matchText] = count
    end  -- for

  end -- of each plugin

  -- save the updated counts
  SetVariable ("trigger_counts",
               "trigger_counts = " .. serialize.save_simple (new_counts))
end -- function OnPluginSaveState
```

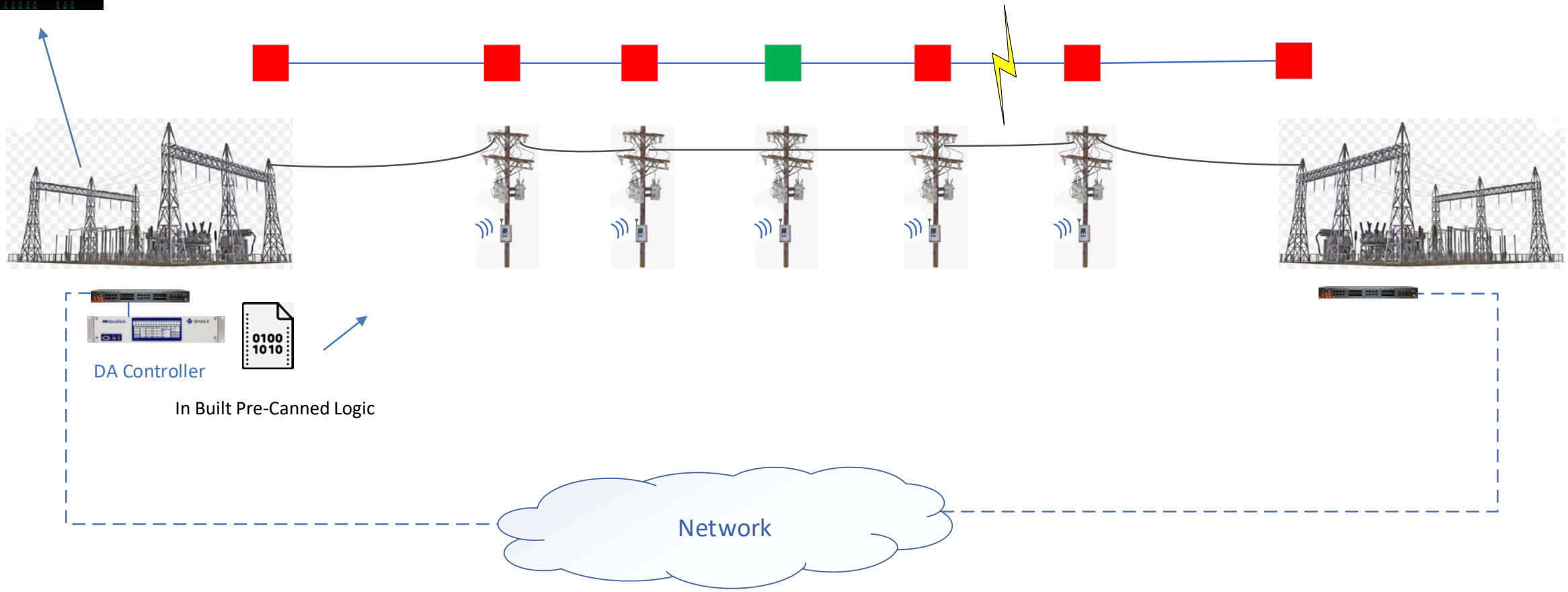
Same RTU in the Substation as a DA Controller

SCADA View



Same RTU in the Substation as a DA Controller

SCADA View



Same RTU in the Substation as a DA Controller

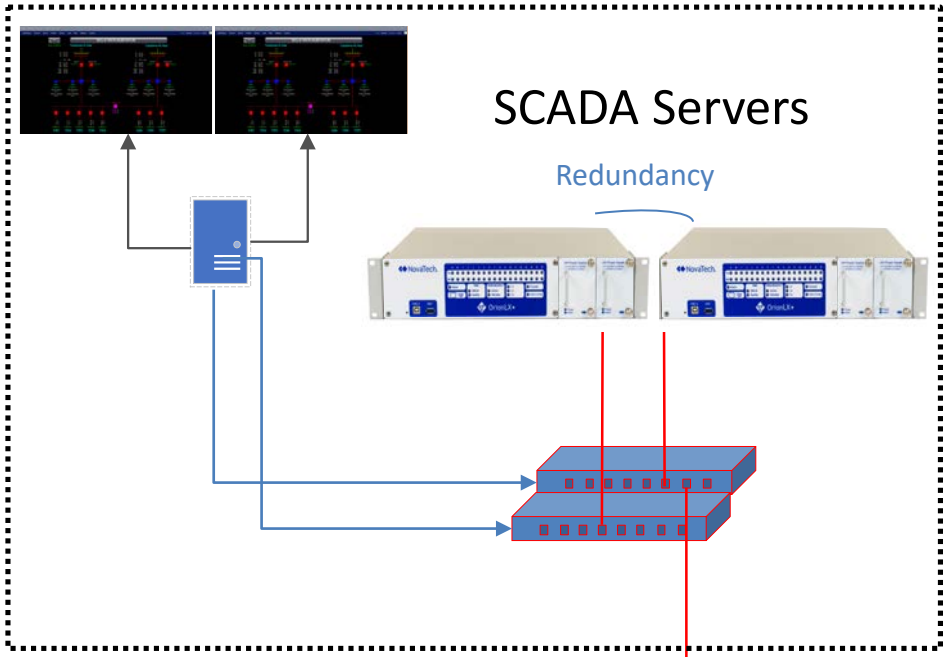
SCADA View

Fault Isolated

DA Controller

Network

Redundancy

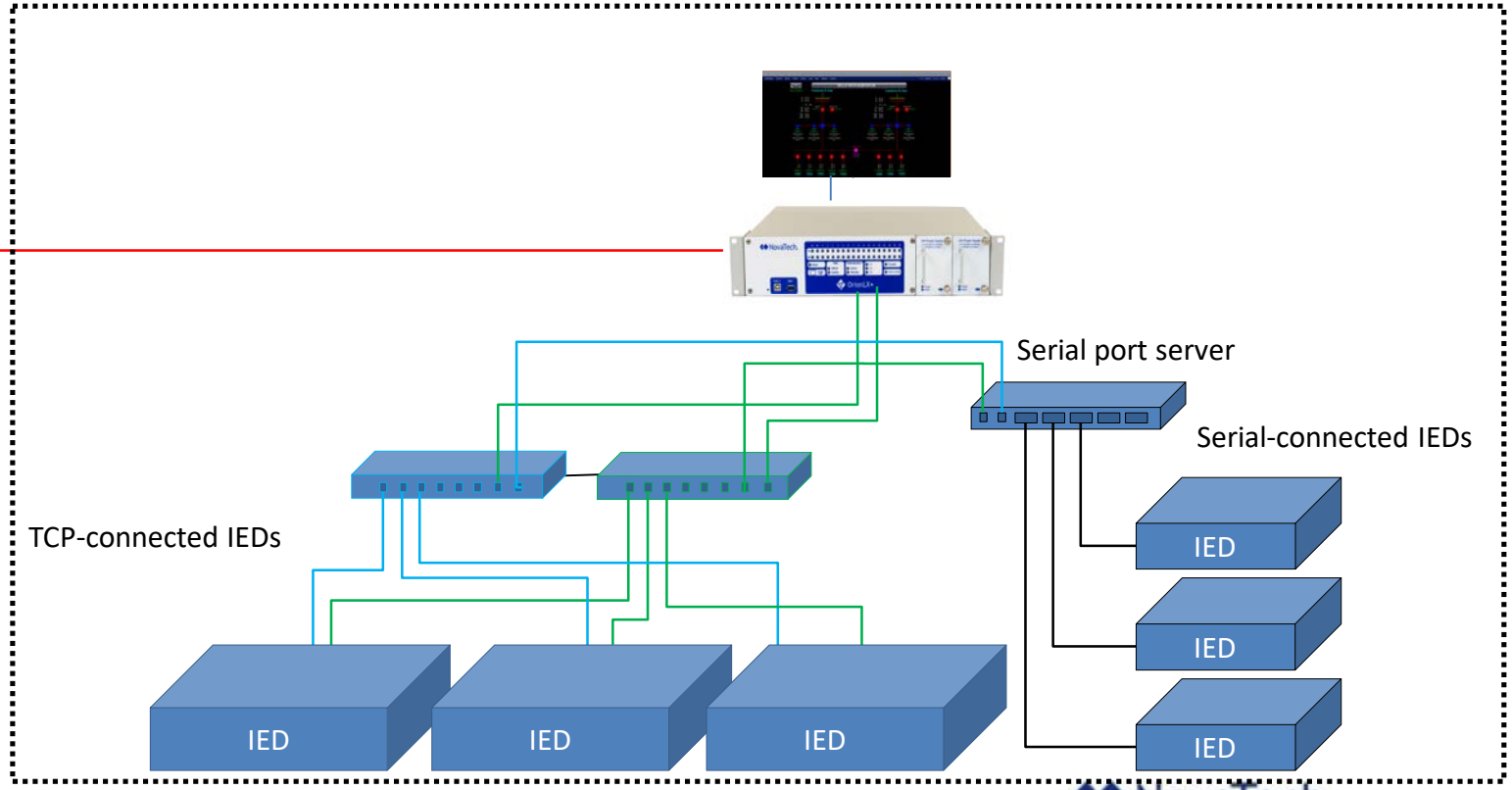


Replicates HMI/SCADA Actions

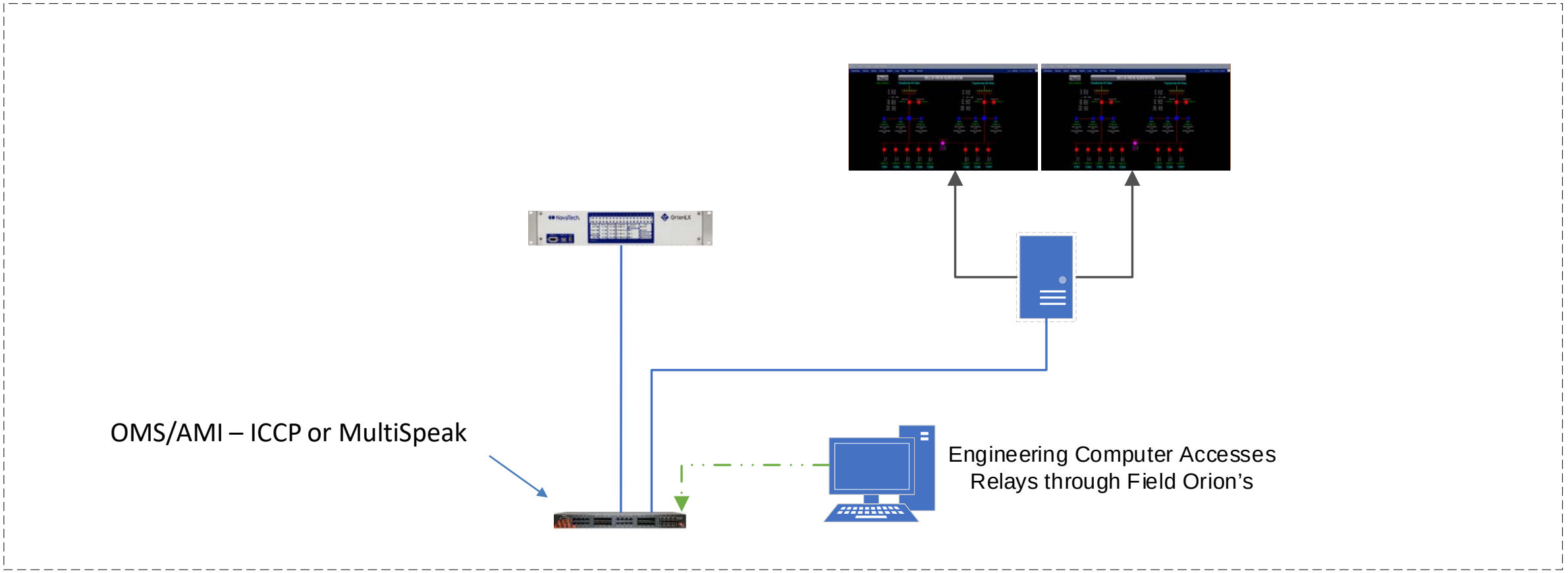
Intelligently manages SCADA communication

Keeps databases synchronized

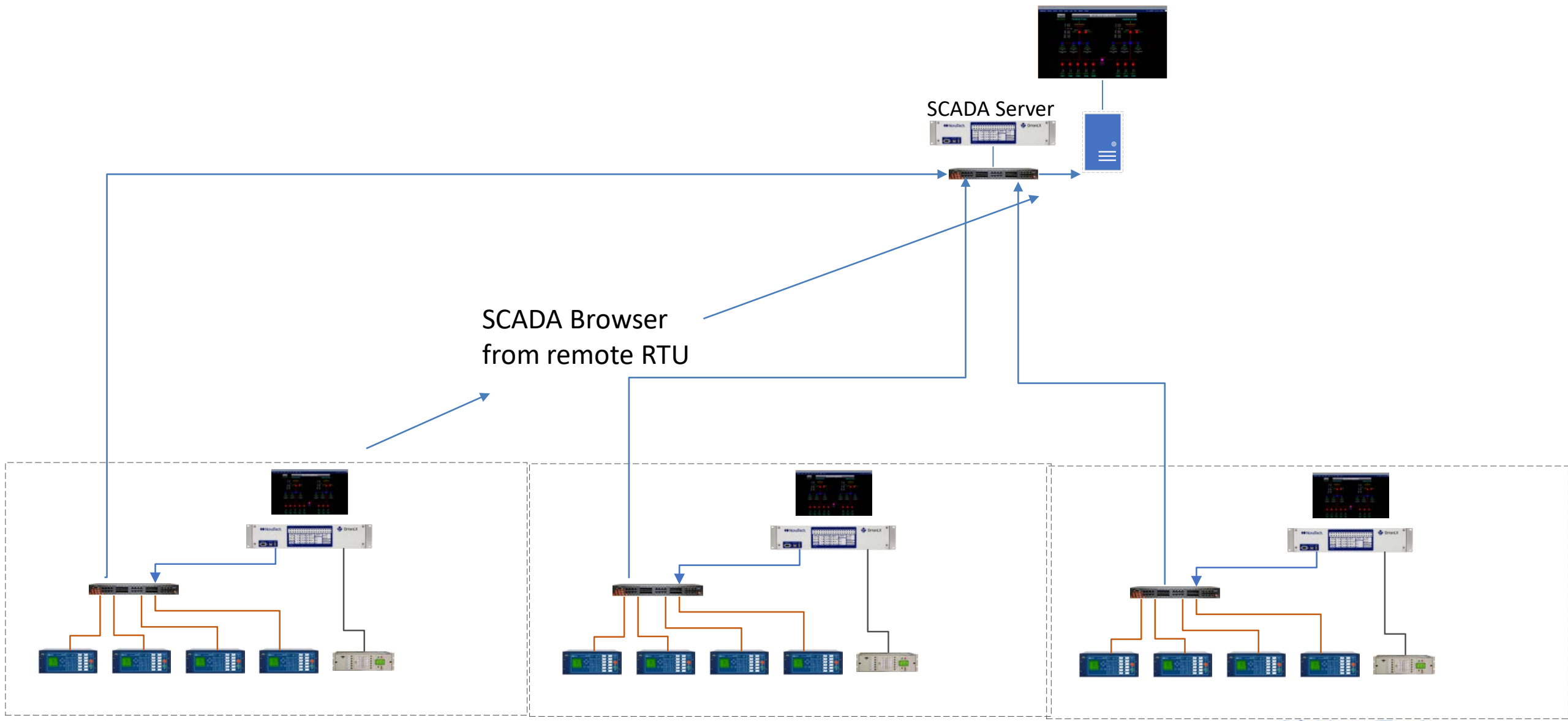
Provides housekeeping and diagnostics tools



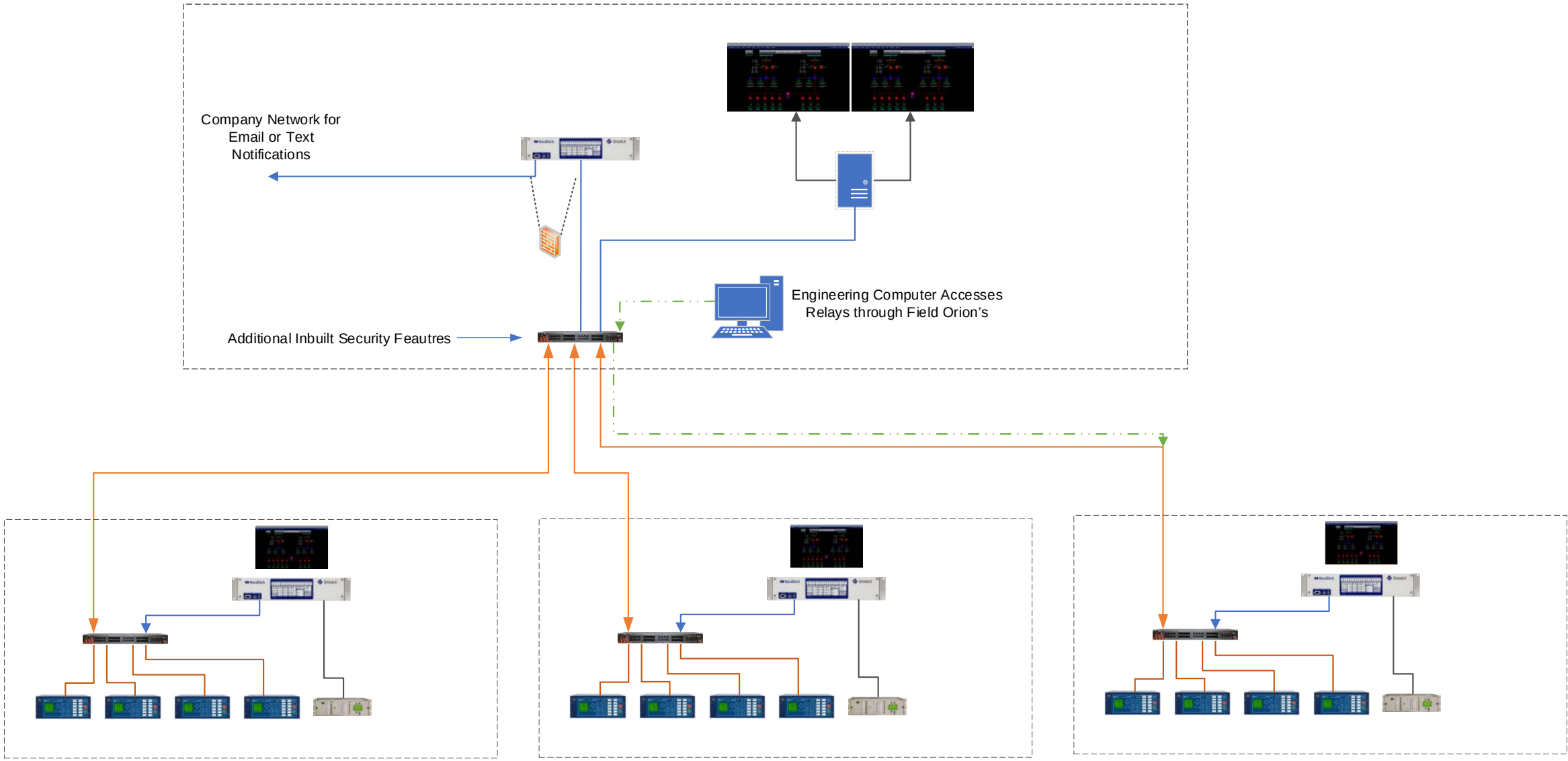
Integrate Existing OMS or AMI Systems



Start Small and Build as Budgets allow



SCADA System Example



Traditional SCADA vs. Orion WEBserver SCADA

Challenges to Traditional SCADA	WEBserver SCADA Advantage
• Software licensing fees	• No licensing fees
• Need for specialized personnel who understand servers and PC architecture	• "SCADA" maintained by same personnel that work on RTUs
• Short life expectancy – PC-based systems required operating system upgrades every few years.	• Longer life expectancy of WEBserver host (Substation Hardened RTU) Users can expect at least 10 years from the RTU when applied as a WEBserver host.
• Page viewing options limited	• Any SCADA page can be viewed from any WEBserver RTU in any substation.
• Use of PCs for page viewing required	• The "Direct Video" option enables users to connect a monitor to the RTU and view SCADA pages without a PC.
• SCADA System and RTUs not designed for accessing non-operational data from protective relays	• Accesses fault records from relays, and provides secure engineering passthrough using relay manufacturers' configuration software
• Large initial investment to get started	• Scalability and Smaller Initial Investment • WEBserver SCADA can fit into a utility with three substations, or into a utility with 30 substations. The utility with three substations may pay 1/10th as much.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