

Elipse

Power

## IEC61850 智慧型變電站SCADA 整合應用

郭宗周-宗賢科技



# 關於宗賢科技



- 2010年來本公司以電力監控系統服務起家，先後在高雄、麥寮地區設立公司和辦事處。多年來所承接的業務，遍及全台灣各個角落。
- 我們以服務為本，網羅最佳的技術與設備。提供給客戶最完善的全方位整合服務。
- 2015年開始，本公司將陸續在台中、台北設立分公司，以服務更多需求。



# IEC 61850 解決方案團隊



解決方案整合: 宗賢科技  
資源豐富的系統整合



軟體平台: Elipse Software  
智慧電網解決方案軟體平台



網通設備: EtherWAN  
智慧電網網通設備



電腦設備: JoAn Vision  
智慧電網硬體設備



# 摘要

- IEC 61850 整合平台
  - IEC 61850 不同廠牌 IED 整合
  - 匯入到 SCADA 中的 IEC 61850 邏輯節點 (Logical node)
  - 匯入 ICD 檔案與 IEC 61850 通訊整合流程
  - Power CAD 編輯器與資料視覺化
- 故障事件波形管理平台 (COMTRADE)
- 網通設備與 IEC 61850 整合平台
  - 網通設備
  - IEC61850 整合平台與工具集
    - 硬體介紹
    - 工具集
- 案例分享
  - 幾個在亞洲的專案

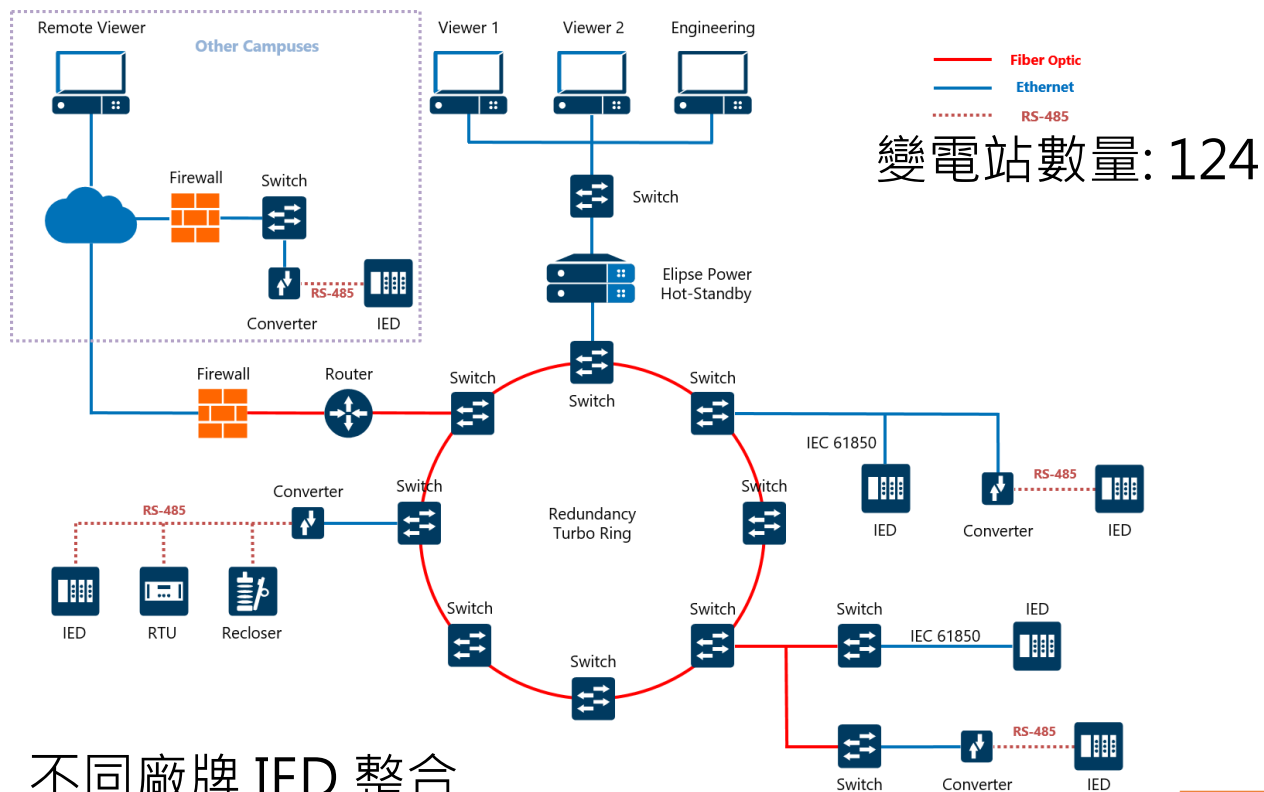


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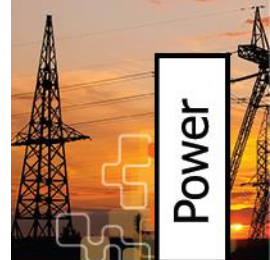
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# IEC 61850 變電站



不同廠牌 IED 整合



Power

Elipse

POWER MANAGEMENT SUITE



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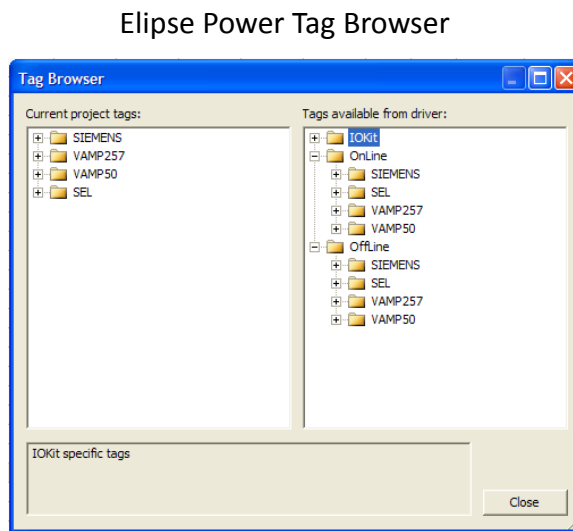
# 匯入到 SCADA 中的 IEC 61850 邏輯節點

- 減少工程設計花費
- XML 語言基礎
- 彈性通訊配置
- 所有變電站整合



.ICD  
.SCD

**XML**





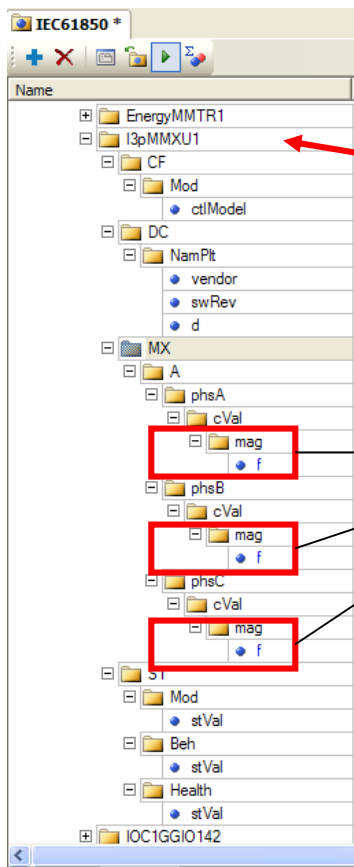
# 匯入到 SCADA 中的 IEC 61850 邏輯節點

The screenshot displays the E3 Studio interface for IEC61850 configuration. The main window shows a table of logical nodes. A red box highlights the table area, and a red arrow points to the 'I3pMMXU1' node.

Name	Device	Item	P1/N1...	P2/N2...	P3/N3...	P4/N4...	Siz...	Scan
IEC61850			0	0	0	0		
VAMP257								
VAMP257_71Relay	VAMP257-VAMP257_71Relay							
CBWA1GGIO20	VAMP257-VAMP257_71Relay							
CBWA2GGIO21	VAMP257-VAMP257_71Relay							
DEF1PTOC9	VAMP257-VAMP257_71Relay							
DEF2PTOC10	VAMP257-VAMP257_71Relay							
DI27GGIO71	VAMP257-VAMP257_71Relay							
DI28GGIO72	VAMP257-VAMP257_71Relay							
DI28GGIO72	VAMP257-VAMP257_71Relay							
DOC1PTOC12	VAMP257-VAMP257_71Relay							
DOC2PTOC13	VAMP257-VAMP257_71Relay							
EF1PTOC4	VAMP257-VAMP257_71Relay							
EF2PTOC5	VAMP257-VAMP257_71Relay							
EF3PTOC6	VAMP257-VAMP257_71Relay							
EnergyMMTR1	VAMP257-VAMP257_71Relay							
I3pMMXU1	VAMP257-VAMP257_71Relay							
CF	VAMP257-VAMP257_71Relay							
DC	VAMP257-VAMP257_71Relay							
MX	VAMP257-VAMP257_71Relay							
ST	VAMP257-VAMP257_71Relay							
IOC1GGIO142	VAMP257-VAMP257_71Relay							
IOC2GGIO143	VAMP257-VAMP257_71Relay							
IOC3GGIO144	VAMP257-VAMP257_71Relay							
Io2MMXU12	VAMP257-VAMP257_71Relay							
IoCMMXU13	VAMP257-VAMP257_71Relay							
LLN0	VAMP257-VAMP257_71Relay							
OC1PTOC1	VAMP257-VAMP257_71Relay							
OC2PTOC2	VAMP257-VAMP257_71Relay							
OV1PTOV3	VAMP257-VAMP257_71Relay							
OV2PTOV4	VAMP257-VAMP257_71Relay							
Ob1CSWI1	VAMP257-VAMP257_71Relay							
Ob1RSYN1	VAMP257-VAMP257_71Relay							



# 匯入到 SCADA 中的 IEC 61850 邏輯節點



字首

邏輯節點

字尾

I3p + MMXU + I

三相電流

Ia

Ib

Ic



# 匯入到 SCADA 中的 IEC 61850 邏輯節點

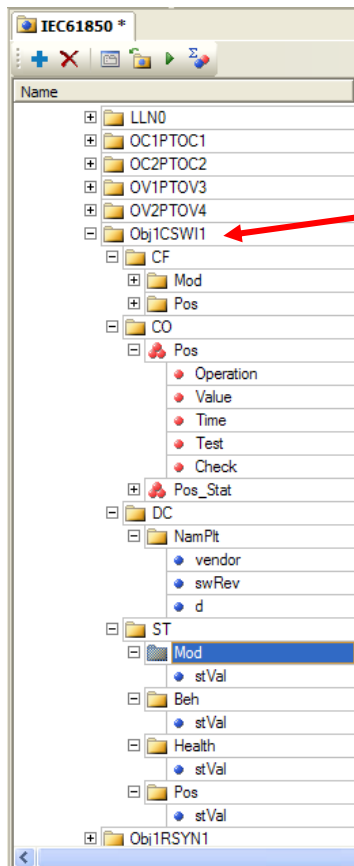
The screenshot shows the E3 Studio interface with the following components:

- Organizer:** A tree view on the left showing the project structure, including 'Domain: V50', 'Servers', 'Files', 'Remote Domains', 'Objects Library', 'View', 'Viewer and Frames', 'Screens', 'Reports', 'Resources', 'Server objects', 'Drivers and OPC', 'IEC61850', 'SNMP', 'V50\_DNP\_TCP', and 'Data objects'.
- Table:** A table listing IEC61850 tags. The table has columns: Name, Device, Item, P1/N1..., P2/N2..., P3/N3..., P4/N4..., Siz..., Scan, and Read?. The table is highlighted with a red border.
- Properties Panel:** A panel at the bottom left showing properties for 'Obj1CSWI1' (IODrv.IOFolder), including Doc-String, Name, ParamDevice, PathContainer, PathName, and PathVolume.
- Annotation:** A yellow box with the text 'IEC61850 Tags' and a red arrow pointing to the table.

Name	Device	Item	P1/N1...	P2/N2...	P3/N3...	P4/N4...	Siz...	Scan	Read?
IEC61850			0	0	0	0			
VAMP257									
VAMP257_71Relay	VAMP257-VAMP257_71Relay								
CBWA1GGIO20	VAMP257-VAMP257_71Relay								
CBWA2GGIO21	VAMP257-VAMP257_71Relay								
DEF1PTOC9	VAMP257-VAMP257_71Relay								
DEF2PTOC10	VAMP257-VAMP257_71Relay								
DI27GGIO71	VAMP257-VAMP257_71Relay								
DI28GGIO72	VAMP257-VAMP257_71Relay								
DOC1PTOC12	VAMP257-VAMP257_71Relay								
DOC2PTOC13	VAMP257-VAMP257_71Relay								
EF1PTOC4	VAMP257-VAMP257_71Relay								
EF2PTOC5	VAMP257-VAMP257_71Relay								
EF3PTOC6	VAMP257-VAMP257_71Relay								
EnergyMMTR1	VAMP257-VAMP257_71Relay								
I3pMMXU1	VAMP257-VAMP257_71Relay								
IOCTGGIO142	VAMP257-VAMP257_71Relay								
IOC2GGIO143	VAMP257-VAMP257_71Relay								
IOC3GGIO144	VAMP257-VAMP257_71Relay								
IO2MMXU12	VAMP257-VAMP257_71Relay								
IOCMXU13	VAMP257-VAMP257_71Relay								
LLN0	VAMP257-VAMP257_71Relay								
OC1PTOC1	VAMP257-VAMP257_71Relay								
OC2PTOC2	VAMP257-VAMP257_71Relay								
OV1PTOV3	VAMP257-VAMP257_71Relay								
OV2PTOV4	VAMP257-VAMP257_71Relay								
Obj1CSWI1	VAMP257-VAMP257_71Relay								
Obj1RSYN1	VAMP257-VAMP257_71Relay								
Obj2CSWI2	VAMP257-VAMP257_71Relay								
Obj2RSYN2	VAMP257-VAMP257_71Relay								
Obj3CSWI3	VAMP257-VAMP257_71Relay								
Obj4CSWI4	VAMP257-VAMP257_71Relay								



# 匯入到 SCADA 中的 IEC 61850 邏輯節點



字首

邏輯節點

字尾

Obj1 + CSWI + I

- Mod: Mode
- Beh: Behavior
- Health: Health
- Pos: Switch Position General
- StVal:
  - Intermediate State(0)
  - Off(1)
  - On(2)
  - Bad State(3)



# 匯入到 SCADA 中的 IEC 61850 邏輯節點

BUK01/Q0CSWI1.Pos.ctIV

屬性名稱 (固定)

資料物件名稱 (固定)

邏輯節點名稱 (字尾)

邏輯節點類別 (固定)

邏輯節點名稱 (字首)

邏輯設備 (LD) 名稱



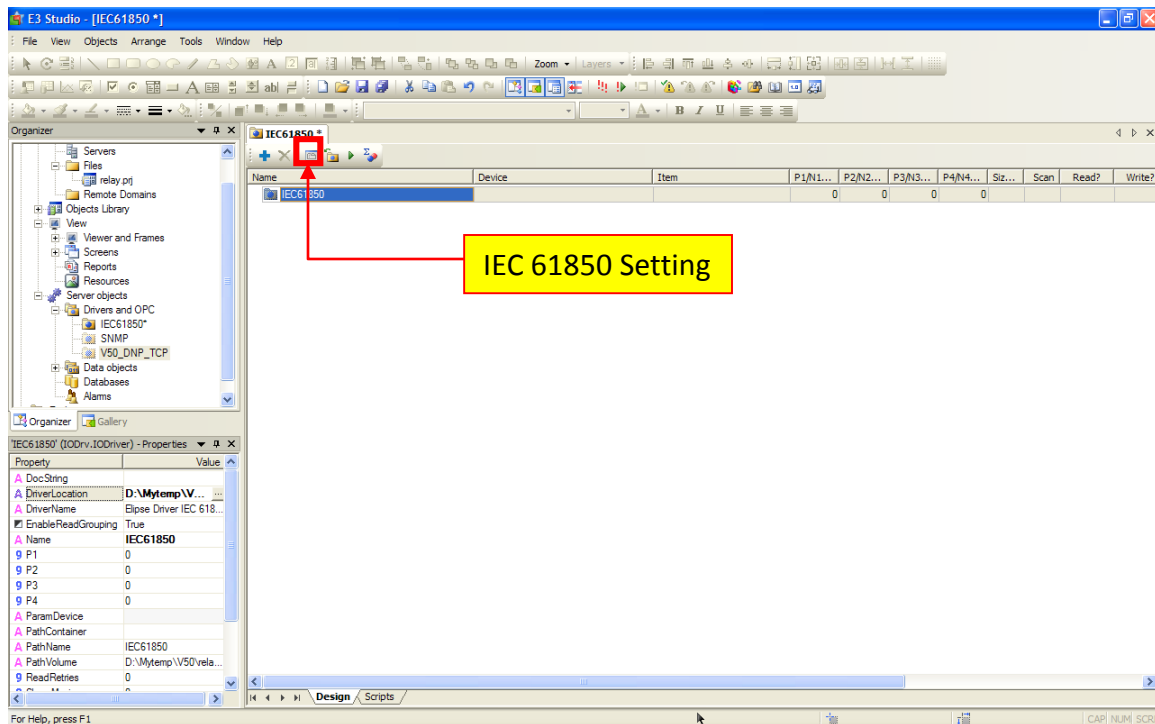
# IEC 61850 智慧型變電站 SCADA 整合應用

- **IEC 61850 整合平台**
  - IEC 61850 多供應商整合
  - 匯入到 SCADA 中的 IEC 61850 邏輯節點 (Logical node)
  - **匯入 ICD 檔案與 IEC 61850 通訊整合流程**
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# IEC 61850 通訊整合流程

步驟 1. 打開 Elipse Power Studio 然後點選 IEC 61850 Setting



# IEC 61850 通訊整合流程

步驟 2. 設定保護電驛 IP 與名稱，接著將它加入清單中

Name	IP Address	Add	Update	Delete
VAMP257	192.168.1.171			

加入保護電驛

IED 名稱: VAMP 257

IP: 192.168.1.171

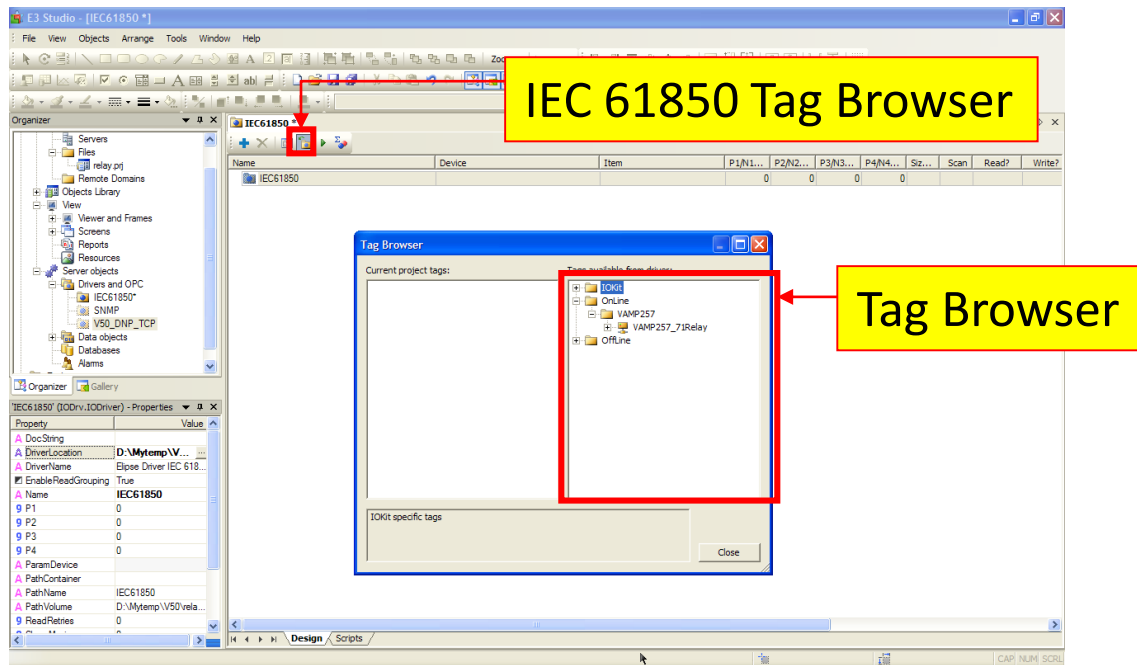
保護電驛清單





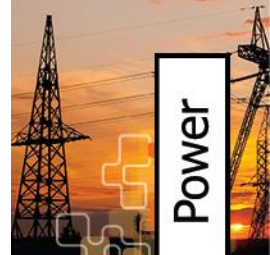
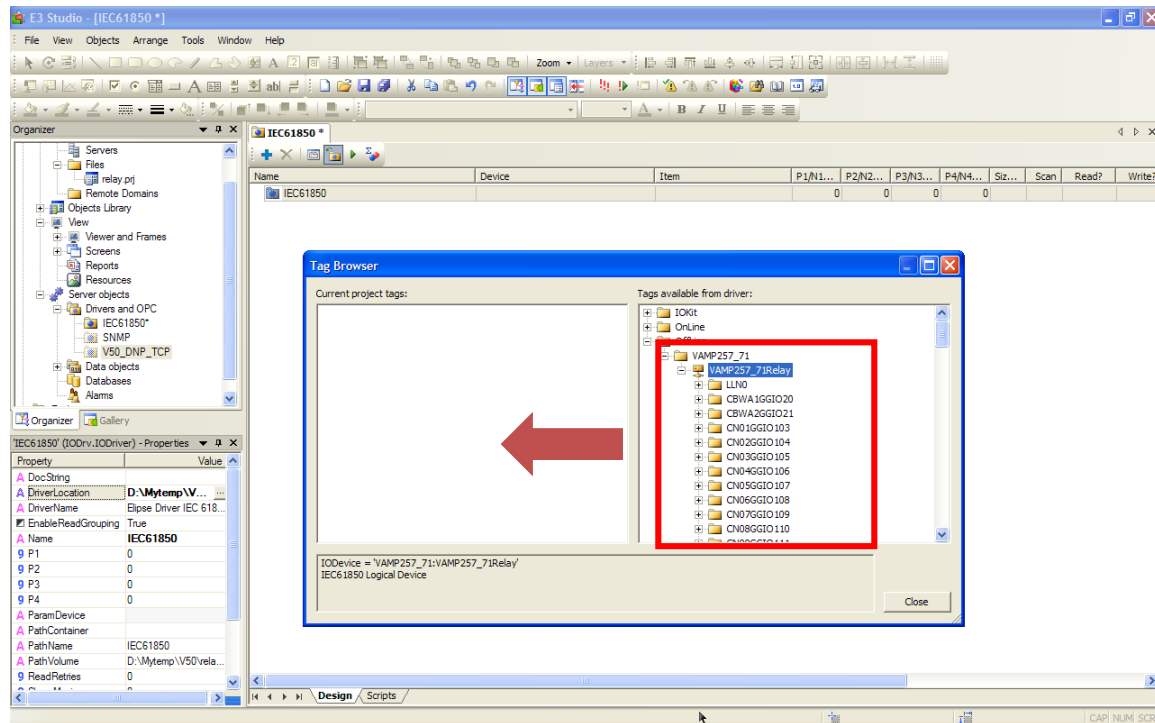
# IEC 61850 通訊整合流程

步驟 3. 使用 IEC 61850 Tag Browser 來線上/離線匯入保護電驛點位資料



# IEC 61850 通訊整合流程

步驟 4. 將點位資料拖曳至左邊匯入



# IEC 61850 通訊整合流程

## 步驟 5. 點位資料都已匯入至應用程式

The screenshot shows the E3 Studio interface for an IEC61850 project. The 'Organizer' pane on the left shows the project structure. The main window displays a table of tags for the 'VAMP257\_71Relay' device. A 'Tag Browser' dialog box is open, showing a list of tags available from the driver. A red box highlights the 'VAMP257\_71Relay' folder in the 'Current project tags' list, and a red arrow points to it. Another red box highlights the 'Close' button in the dialog box. A yellow callout box with the text '關閉視窗' (Close window) points to the 'Close' button.

Name	Device	Item	P1/N1...	P2/N2...	P3/N3...	P4/N4...	Siz...	Scan	Read?	Write?
IEC61850										
VAMP257_71Relay	VAMP257_71Relay		0	0	0	0				



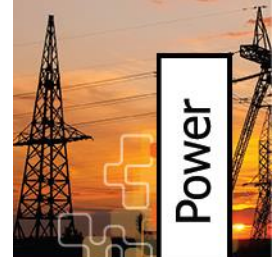
關閉視窗

# IEC 61850 通訊整合流程

## 步驟 6. 完成

The screenshot shows the E3 Studio interface with the 'IEC61850' project selected. The main window displays a table of imported tags. A red box highlights the first 22 rows of the table, which are all 'VAMP257\_71:VAMP257\_71Relay' tags. A yellow box with the text 'Tags Imported' and a red arrow points to the first row of this highlighted section.

Name	Device	Item	P1/N1...	P2/N2...	P3/N3...	P4/N4...	Siz...	Scan	Read?	Write?	So
IEC61850			0	0	0	0					
VAMP257_71Relay	VAMP257_71:VAMP257_71Relay										
LLN0	VAMP257_71:VAMP257_71Relay										
CBWA1GGIO20	VAMP257_71:VAMP257_71Relay										
CBWA2GGIO21	VAMP257_71:VAMP257_71Relay										
CN01GGIO103	VAMP257_71:VAMP257_71Relay										
CN02GGIO104	VAMP257_71:VAMP257_71Relay										
CN03GGIO105	VAMP257_71:VAMP257_71Relay										
CN04GGIO106	VAMP257_71:VAMP257_71Relay										
CN05GGIO107	VAMP257_71:VAMP257_71Relay										
CN06GGIO108	VAMP257_71:VAMP257_71Relay										
CN07GGIO109	VAMP257_71:VAMP257_71Relay										
CN08GGIO110	VAMP257_71:VAMP257_71Relay										
CN09GGIO111	VAMP257_71:VAMP257_71Relay										
CN10GGIO112	VAMP257_71:VAMP257_71Relay										
CN11GGIO113	VAMP257_71:VAMP257_71Relay										
CN12GGIO114	VAMP257_71:VAMP257_71Relay										
CN13GGIO115	VAMP257_71:VAMP257_71Relay										
CN14GGIO116	VAMP257_71:VAMP257_71Relay										
CN15GGIO117	VAMP257_71:VAMP257_71Relay										
CN16GGIO118	VAMP257_71:VAMP257_71Relay										
CN17GGIO119	VAMP257_71:VAMP257_71Relay										
CN18GGIO120	VAMP257_71:VAMP257_71Relay										
CN21GGIO123	VAMP257_71:VAMP257_71Relay										
CN22GGIO124	VAMP257_71:VAMP257_71Relay										
CN23GGIO125	VAMP257_71:VAMP257_71Relay										
CN24GGIO126	VAMP257_71:VAMP257_71Relay										
CN25GGIO127	VAMP257_71:VAMP257_71Relay										
CN26GGIO128	VAMP257_71:VAMP257_71Relay										
CN27GGIO129	VAMP257_71:VAMP257_71Relay										
CN28GGIO130	VAMP257_71:VAMP257_71Relay										
CTAmGGIO22	VAMP257_71:VAMP257_71Relay										



Power

Elipse

POWER MANAGEMENT SUITE



JoAn  
Vision

EtherWAN

elipse  
software

# IEC 61850 通訊整合流程



SCADA 平台

KEMA IEC 61850 Certificate Level A



JoAn  
Vision

EtherWAN

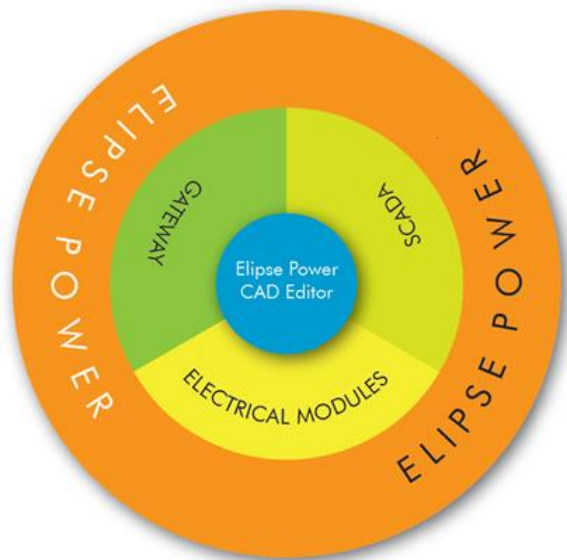
elipse  
software

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# Eclipse Power



- Elipse Power CAD 編輯器是 Elipse Power 的核心
- Gateway 提供超過 400 種通訊驅動器
- 專注於電力的進階SCADA功能
- 電力模組 Electrical Modules :
  - 拓樸處理器 Topology Processor
  - 電力潮流模組 Power Flow Module
  - 狀態估測 State Estimator
  - 智慧卸載 Load Shedding
  - 模擬與操作訓練
  - 負載分配管理 Load Allocator



# Power Configuration

Name	Electrical Phase	Description	Sort Out
*BreakerPosition	8 - epDevice	Breaker state	0
*BreakerRackPosition	8 - epDevice	Breaker Extracted Indication	1
*GeneratorModelType	8 - epDevice	Generator Model Type	1
*GeneratorPriority	8 - epDevice	Generator Priority	0
*LoadSheddingBreakerAvail	8 - epDevice	Breaker's availability to Load Sheddin	0
*LoadSheddingOperate	8 - epDevice	Indication of Open Caused by Load S	1
*LoadSheddingPriority	8 - epDevice	Load Shedding Priority	1
*LoadStateOnScenario	8 - epDevice	Load Status on Load Shedding Scen	1
*ProtectionMode	8 - epDevice	Protection Mode	0
*ProtectionOperate	8 - epDevice	Protection Operate	0
*ProtectionStart	8 - epDevice	Protection Start	0
*ShedLoadOnScenario	8 - epDevice	Breaker Load Shedding in Scenario	1
*SwitchPosition	8 - epDevice	Switch status	0
*TapPosition	8 - epDevice	Tap Position	1
*TapPositionA	1 - epA	Posição do Tap Fase A	1
*TapPositionB	2 - epB	Posição do Tap Fase B	1
*TapPositionC	3 - epC	Posição do Tap Fase C	1

Meaning	Description	Application Value	Source Value
Open	Opened	9 0	9 2
Closed	Closed	9 1	9 1
Intermediate	Intermediate	9 2	9 0
Invalid	Invalid	9 3	9 3

Nominal Voltage (...)	Energized color	Follow energized c...	De-energized c...
(Default)	255, 255, 255	<input checked="" type="checkbox"/>	127, 127, 127
13.8	255, 255, 87	<input checked="" type="checkbox"/>	127, 127, 43
23	238, 68, 0	<input checked="" type="checkbox"/>	119, 34, 0
44	0, 192, 0	<input checked="" type="checkbox"/>	0, 96, 0
69	0, 255, 0	<input checked="" type="checkbox"/>	0, 127, 0
138	255, 0, 0	<input checked="" type="checkbox"/>	127, 0, 0
230	255, 68, 0	<input checked="" type="checkbox"/>	127, 34, 0
500	192, 192, 192	<input checked="" type="checkbox"/>	96, 96, 96

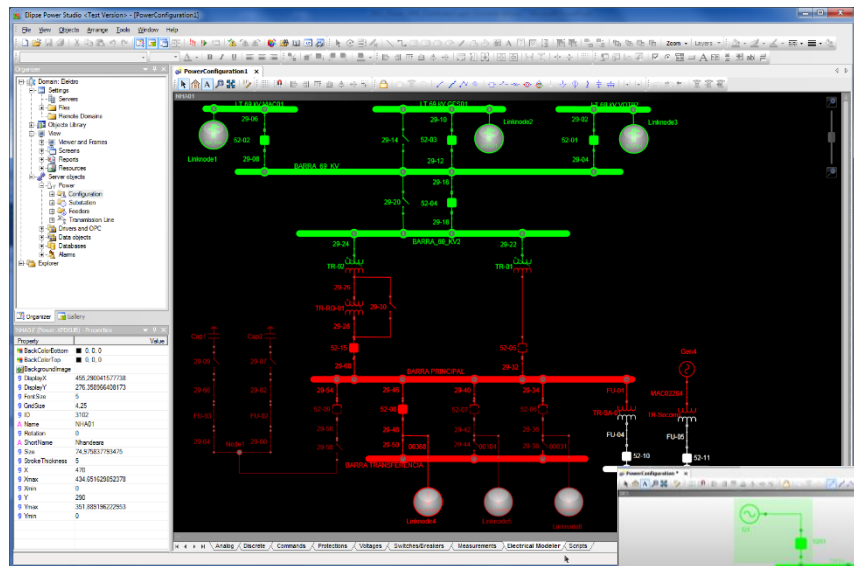
電壓等級顏色調整

所有的設備都能透過一個獨特的介面來配置控制、量測等樣板



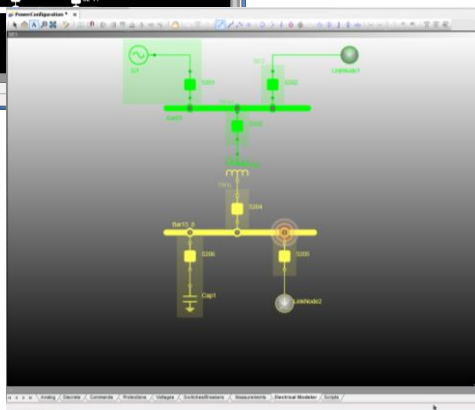


# Power CAD 編輯器



使用 Power CAD 編輯器設計  
以CIM為基礎的電力系統模型

電力系統模型



# Power CAD 編輯器

The screenshot displays the Elipse software interface for power system management. The main window shows a power system diagram for 'Yangming' with components like Bar 69, Bar 13\_B, and various breakers (5201-5206). Three floating windows are overlaid on the diagram:

- Top Window:** 'Yangming - Fd\_1 - 5205 (PowerBreaker)' with tabs for Analog, Discrete, Commands, Protections, and Tags. The 'Commands' tab is active, showing 'Breaker Position Command' with 'Unit "Open"' and buttons for 'Open', 'Close', 'Select', 'Operate', and 'Cancel'.
- Middle Window:** 'Yangming - Fd\_1 - 5205 (PowerBreaker)' with tabs for Analog, Discrete, Commands, Protections, and Tags. The 'Measurements' tab is active, displaying a table of current values:

Measure	Value
Phase B Current	23.11 A
Phase C Current	16.22 A
Phase A Current	74.69 A

- Bottom Window:** 'Yangming - Fd\_1 - 5205 (PowerBreaker)' with tabs for Analog, Discrete, Commands, Protections, and Tags. The 'Protections' tab is active, showing a log of events:

使用者	時間	筆記
admin	12/8/2013 5:15:56 PM	MCB in Maintenance

At the bottom of the main interface, there is a table of system events:

Acked	Operator	Area	Message	Severity	DateTime (in)	DateTime (out)
No		SE1_AL_5205	Overcurrent	Medium	12/09/2013 05:21:44 PM	
No		SE1_AL_5205	Overcurrent	Medium	12/09/2013 05:20:00 PM	
No		SE1_AL_5205	Normal	Medium	12/09/2013 05:18:34 PM	12/09/2013 05:19:58 PM
No		LT_SE1_SE2LT_SE1_SE2	On	High	12/09/2013 05:05:21 PM	

Power Explorer 視窗讓操作者能迅速的掌握狀態及控制

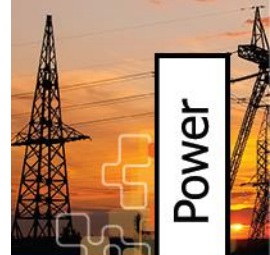


# IEC 61850 智慧型變電站 SCADA 整合應用

- IEC 61850 整合平台
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  - Power CAD 編輯器與資料視覺化
- **故障事件波形管理平台 (COMTRADE)**
- 網通設備與 IEC 61850 整合平台
  - 網通設備
  - IEC61850 整合平台與工具集
    - 硬體介紹
    - 工具集
- 案例分享
  - 幾個在亞洲的專案



# 故障事件波形管理平台



Power

Elipse

POWER MANAGEMENT SUITE



Event Timestamp	Relay	Group	Message	Status
27/10/2015 00:39:10	F215	AQ	Capture complete.	Info
27/10/2015 00:38:42	F215	AQ	Connecting physical layer...	Info
27/10/2015 00:38:36	F215	AQ	Manual command for forced capture.	Info
27/10/2015 00:37:29	F215	AQ	Capture complete.	Info
27/10/2015 00:37:02	F215	AQ	Connecting physical layer...	Info
27/10/2015 00:36:46	*	*	Automatic capture command (system initialization)	Info
27/10/2015 00:34:05	F215	AQ	Manual command for forced capture.	Info
27/10/2015 00:30:68	F215	AQ	Manual command for forced capture.	Info

Day	Start	End	Start	End
<input type="checkbox"/> Sun	00	00	hs	min
<input checked="" type="checkbox"/> Mon	10	00	hs	min
<input checked="" type="checkbox"/> Tue	10	00	hs	min
<input checked="" type="checkbox"/> Wed	00	00	hs	min
<input checked="" type="checkbox"/> Thu	00	00	hs	min
<input checked="" type="checkbox"/> Fri	00	00	hs	min
<input type="checkbox"/> Sat	00	00	hs	min

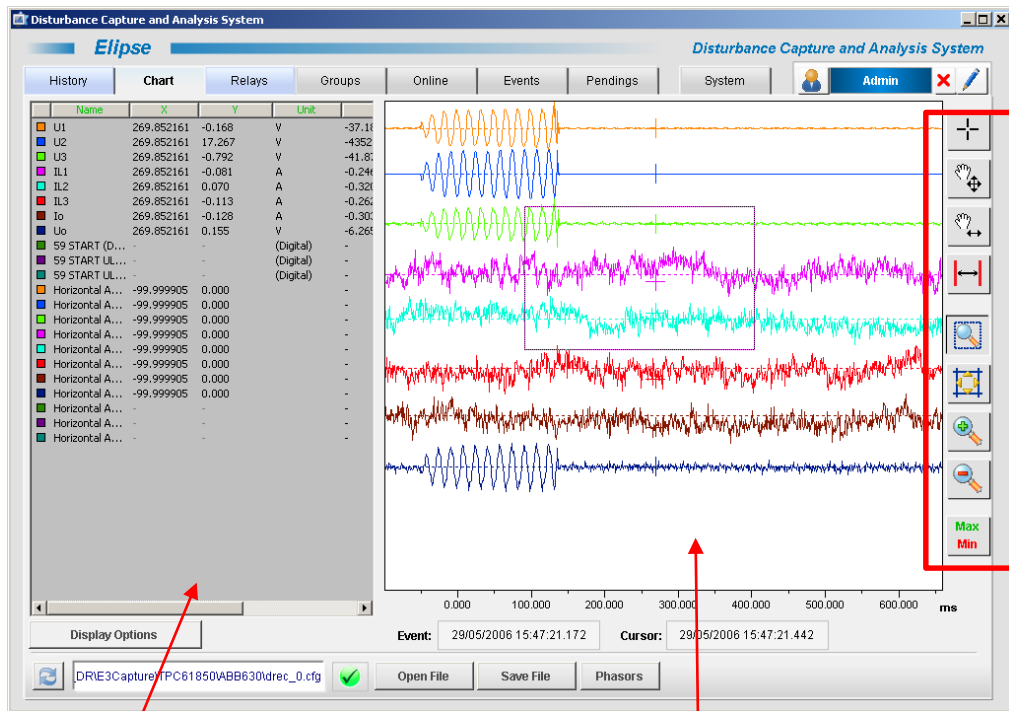
- ABB (IEC 61850)
- ARCTEQ (IEC 61850)
- Areva (IEC 103)
- Areva (IEC 61850)
- Areva (Modbus)
- Areva (Courier)
- Schneider (IEC 61850)
- SEL (ASCII)
- Siemens (IEC 61850)
- VAMP (FTP)

可以利用這個系統  
管理多種 IED 之故  
障波形檔案

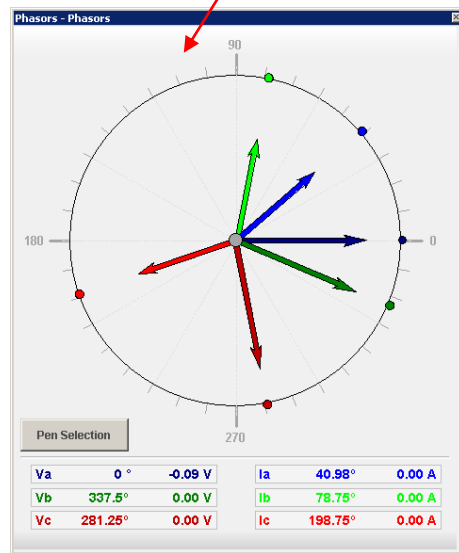
故障波形檔  
案排程上傳



# 故障事件波形管理平台



## 相角分析



每筆信號的詳細資訊

分析波形時可使用的工具，例如縮放、選取範圍等



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# 網通設備

## EX89000

IEC61850-3/IEEE1613 **Modulized** Hardened Managed 24-port 10/100BASE and 4-port Gigabit Ethernet Switch with SFP options



### Versatile Connectivity

Modulized 24-port 10/100BASE-TX/FX/BX and 4-port Gigabit TX/SX/LX/BX/SFP

### Full Network Management & Control

VLAN, QoS, IGMP, GMRP, LLDP, Bandwidth Rate Control, Port Trunking, Port Mirroring, Packet Filtering, DHCP Server/Client, IEEE802.1x Security, SNMP (v1, v2c, v3), RMON, Web Management, Telnet Management, RS-232 Console Management

### Network Redundancy

Secured with EtherWAN's Alpha-Ring network fault recovery time  $< 15\text{ms}$

### High EMS Sustainability

Meets the standards for operating in high electromagnetic susceptibility environments



# 網通設備

## EX27000 & EX87000

IEC61850-3/IEEE1613 Hardened Managed 24-port 10/100BASE and 4-port Gigabit Ethernet Switch with SFP options



### Versatile Connectivity

Flexibility of 24-port 10/100BASE-TX/FX/BX/SFP&4-port Gigabit TX/SX/LX/BX/SFP

### Full Network Management & Control

VLAN, QoS, IGMP, GMRP, LLDP, Bandwidth Rate Control, Port Trunking, Port Mirroring, Packet Filtering, DHCP Server/Client, IEEE802.1x Security, SNMP (v1, v2c, v3), RMON, Web Management, Telnet Management, RS-232 Console Management

### Network Redundancy

Secured with EtherWAN's Alpha-Ring network fault recovery time < 15ms

### KEMA-Certified

IEC61850-3 and IEEE1613 performance tests conducted by KEMA





# 網通設備

## EX83000

IEC61850/IEEE1613 Managed Hardened 16-port 10/100BASE with 2-port Gigabit combo Ethernet Switch



### Versatile Connectivity

Up to 16-port 10/100BASE-TX/FX/BX/SFP & 2-port Gigabit-SX/LX/BX/SFP combo

### Full Network Management & Control

VLAN, QoS, IGMP, GMRP, LLDP, Bandwidth Rate Control, Port Trunking, Port Mirroring, Packet Filtering, DHCP Server/Client, IEEE802.1x Security, SNMP (v1, v2c, v3), RMON, Web Management, Telnet Management, RS-232 Console Management

### Network Redundancy

Secured with EtherWAN's Alpha-Ring network fault recovery time < 15ms



# 網通設備

## Security

High level of security

MAC address filtering

Enabled/Disabled port

Storm control (broadcast and multicast types)

IEEE802.1x LAN access control

Remote authentication through

RADIUS

SSH for CLI and Telnet security

SSL for web security

## KEMA Certified



REPORT OF PERFORMANCE

TDT 1576-10

OBJECT	Managed Hardened 24-port 10/100BASE Fast Ethernet and 4 Gigabit port Ethernet Switch with SFP options
TYPE	EX87244-ZA1VR SERIAL No. see paragraph 1.2 80-384 VAC – 85-370 VDC – 48 VDC
MANUFACTURER	EtherWAN Systems, Inc. 4F-7 No.79, Sec.1 Xintai Wu Rd., Xizhi City, Taipei County 121, Taiwan
CLIENT	EtherWAN Systems, Inc. 4F-7 No.79, Sec.1 Xintai Wu Rd., Xizhi City, Taipei County 121, Taiwan
TESTED BY	KEMA HIGH-VOLTAGE LABORATORY Arnhem, the Netherlands
DATE OF TESTS	12 October 2010 to 15 November 2010
TEST PROGRAMME	Selected tests in accordance with IEC 61850-3 (2002-01), IEC 61000-6-2 (2005-01), IEC 61000-6-4 (2006-07), IEC / TS 61200-6-6 (2007) and IEEE 1619 (2003) (see page 2).
SUMMARY AND CONCLUSION	The tests were passed, with the remarks as mentioned in chapter 4.

This Report of Performance applies only to the object tested. The responsibility for conformity of any object having the same designations with that tested rests with the Manufacturer.

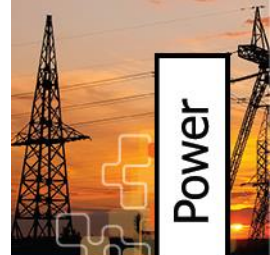
This report consists of 79 pages in total.

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KEMA/Nederland B.V.

P. K. A. Bus  
KEMA TEST Testing Services  
Managing Director

Arnhem, 23 December 2010



Power

Elipse

POWER MANAGEMENT SUITE



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# IEC 61850 整合平台與工具集

## PSD 2000



## 主要規格

3rd Gen Intel® Quad Core™ i5 Ivy Bridge Mobile Processor (6M Cache, up to 3.30 GHz)

I/O: 4 COM, 4 USB 3.0, 2 USB2.0

6 GbE LANs, Independent LAN Controllers

DVI-D, VGA, LVDS, Independent Displays

Fanless, -25°C to 70°C Operation Temperature

Mini-PCIe (1 with SIM Card Socket)

Dual power supply input



# IEC 61850 整合平台與工具集



## 特色

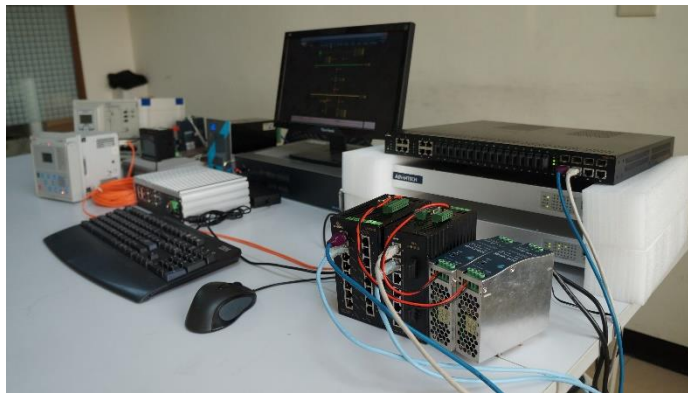
- Eclipse Power
- IEC 61850 IED 模擬器
- IEC 61850 SCL 編輯器
- Goose and SMV 工具集



# IEC 61850 Multi-Vendor Benchmark



IEC 61850 整合平台範例，所使用的IED: ABB, Alstom, Arc-teq, VAMP, SEL 等



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# PSD 2000: IED Simulator

根據所匯入的SCL檔案來進行 IEC 61850 Server (IED) 模擬的軟體  
加入多個SCL檔案，例如ICD、CID、SCD

	IED Name	IP address	IP mask	Boot time [ms]	Manufacturer	Type	Status
<input type="checkbox"/>	OSSK1Q47	10.132.129.147	255.255.255.0	0	SIEMENS	Siprotec-7SJ6xx	Not created
<input type="checkbox"/>	OSSK1Q46	10.132.129.146	255.255.255.0	0	SIEMENS	Siprotec-7SJ6xx	Not created
<input type="checkbox"/>	OSSK1Q41	10.132.129.141	255.255.255.0	0	SIEMENS	Siprotec-7SJ6xx	Not created
<input type="checkbox"/>	OSSK1Q40	10.132.129.140	255.255.255.0	0	SIEMENS	Siprotec-7SJ6xx	Not created
<input type="checkbox"/>	OSSK1Q43	10.132.129.143	255.255.255.0	0	SIEMENS	Siprotec-7SJ6xx	Not created
<input type="checkbox"/>	OSSK1Q42	10.132.129.142	255.255.255.0	0	SIEMENS	Siprotec-7SJ6xx	Not created
<input type="checkbox"/>	OSSK1Q39	10.132.129.139	255.255.255.0	0	SIEMENS	Siprotec-7SJ6xx	Not created
<input type="checkbox"/>	OSSK1Q38	10.132.129.138	255.255.255.0	0	SIEMENS	Siprotec-7SJ6xx	Not created

軟體驗證SCL檔案是否有錯誤之後會列出所匯入的IEC 61850 Server (IED)





# PSD 2000: IED Simulator

勾選要進行模擬的IED

The screenshot displays the '61850 SCL Runner - Control Panel' interface. It features a list of IEDs on the left and a detailed view of the selected IED on the right. The IED 'VAMP50' is selected and checked. The right pane shows a tree view of the IED's components and a table of variables.

Variable	Value	Auto	Cycle [s]	Formula
I3pMMXU1\$MXS\$A\$phsA\$cvVal\$smag\$sf	0			
I3pMMXU1\$MXS\$A\$phsA\$q	0000000000000000 {good,process}			
I3pMMXU1\$MXS\$A\$phsA\$t	1970-01-01 00:00:00.000			
I3pMMXU1\$MXS\$A\$phsB\$cvVal\$smag\$sf	0			
I3pMMXU1\$MXS\$A\$phsB\$q	0000000000000000 {good,process}			
I3pMMXU1\$MXS\$A\$phsB\$t	1970-01-01 00:00:00.000			
I3pMMXU1\$MXS\$A\$phsC\$cvVal\$smag\$sf	0			
I3pMMXU1\$MXS\$A\$phsC\$q	0000000000000000 {good,process}			
I3pMMXU1\$MXS\$A\$phsC\$t	1970-01-01 00:00:00.000			
I3pMMXU1\$ST\$Mod\$stVal	0			
I3pMMXU1\$ST\$Mod\$q	0000000000000000 {good,process}			
I3pMMXU1\$ST\$Mod\$t	1970-01-01 00:00:00.000			
I3pMMXU1\$ST\$Beh\$stVal	0			
I3pMMXU1\$ST\$Beh\$q	0000000000000000 {good,process}			
I3pMMXU1\$ST\$Beh\$t	1970-01-01 00:00:00.000			
I3pMMXU1\$ST\$Health\$stVal	0			
I3pMMXU1\$ST\$Health\$q	0000000000000000 {good,process}			
I3pMMXU1\$ST\$Health\$t	1970-01-01 00:00:00.000			

模擬出來的IED會顯示在個別的視窗



# PSD 2000: IED Simulator

IED中所有資料、屬性的數值都能由使用者更改

61850 SCL Runner - Generic IEC 61850 Server OSSK1Q36

Variable	Value	Auto	Cycle [s]	Formula
Q3CSW11\$ST\$Mod\$stVal	0			
Q3CSW11\$ST\$Mod\$stq	00000000000000 {good,process}			
Q3CSW11\$ST\$Mod\$st	1970-01-01 00:00:00.000			
Q3CSW11\$ST\$Beh\$stVal	0			
Q3CSW11\$ST\$Beh\$stq	00000000000000 {good,process}			
Q3CSW11\$ST\$Beh\$st	1970-01-01 00:00:00.000			
Q3CSW11\$ST\$Health\$stVal	0			
Q3CSW11\$ST\$Health\$stq	00000000000000 {good,process}			
Q3CSW11\$ST\$Health\$st	1970-01-01 00:00:00.000			
Q3CSW11\$ST\$Loc\$stVal	false			
Q3CSW11\$ST\$Loc\$stq	00000000000000 {good,process}			
Q3CSW11\$ST\$Loc\$st	1970-01-01 00:00:00.000			
Q3CSW11\$ST\$Pos\$origin\$orCat	0			
Q3CSW11\$ST\$Pos\$origin\$orIdent				
Q3CSW11\$ST\$Pos\$ctlNum	0			
Q3CSW11\$ST\$Pos\$stVal	closed			
Q3CSW11\$ST\$Pos\$stq	middle			
Q3CSW11\$ST\$Pos\$st	open			
Q3CSW11\$ST\$Pos\$stSeld	closed			
Q3CSW11\$ST\$Pos\$stSeld	faulty			
Q3CSW11\$CO\$Pos\$SBOw\$ctlVal	raise			

IED: OSSK1Q36 IP: 10.132.129.136 Running

例如CB位置狀態能被手動更改或從下拉式清單選擇



# PSD 2000: IED Simulator

數值也能透過函數方式自動更改

61850 SCL Runner - Generic IEC 61850 Server VAMP50

File Server Automation Help

Variable	Value	Auto	Cycle [s]	Formula
OCPTRC1\$ST\$Tr\$general	true	Yes	0	EF_Trip or OC1_Trip or OC2_Trip
OCPTRC1\$ST\$Tr\$phsA	false			
OCPTRC1\$ST\$Tr\$phsB	false			
OCPTRC1\$ST\$Tr\$phsC	false			
OCPTRC1\$ST\$Tr\$q	00000000000000 {good,process}			
OCPTRC1\$ST\$Tr\$t	2014-08-23 11:30:35.337			
OCPTRC1\$ST\$Str\$general	false			
OCPTRC1\$ST\$Str\$dirGeneral	0			
OCPTRC1\$ST\$Str\$phsA	false			
OCPTRC1\$ST\$Str\$dirPhsA	0			
OCPTRC1\$ST\$Str\$phsB	false			
OCPTRC1\$ST\$Str\$dirPhsB	0			
OCPTRC1\$ST\$Str\$phsC	false			
OCPTRC1\$ST\$Str\$dirPhsC	0			
OCPTRC1\$ST\$Str\$q	00000000000000 {good,process}			
OCPTRC1\$ST\$Str\$t	2014-08-23 10:58:30.796			
OCPTRC1\$CF\$Mod\$ctlModel	0			

Press F2 or double click to edit the values

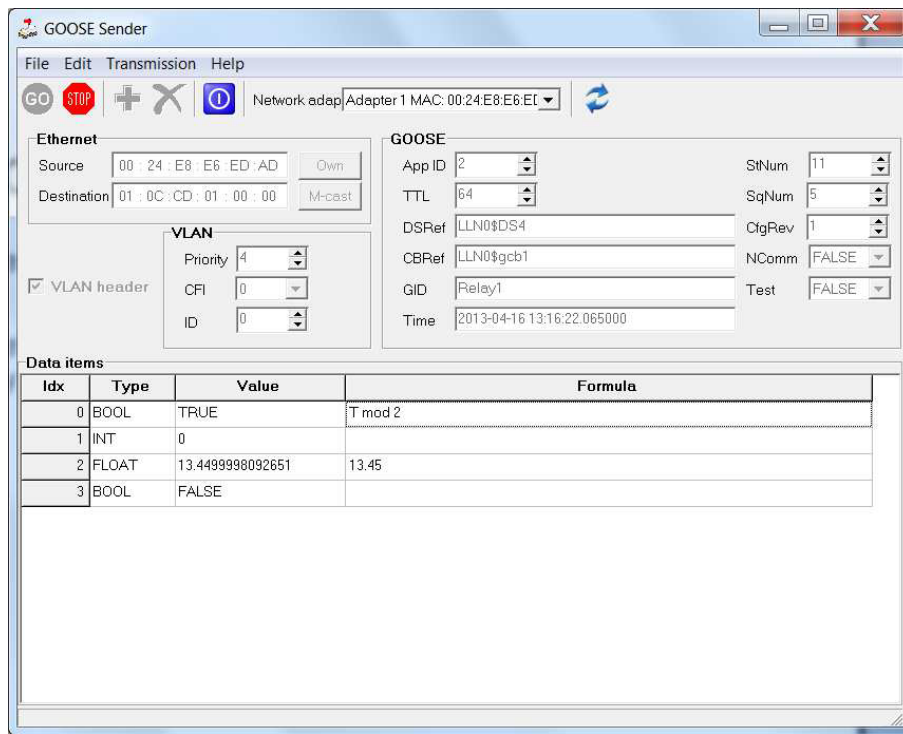
IED: VAMP50 IP: 192.168.0.181 Running



# PSD 2000: GOOSE Toolset, Sender

可調整參數的  
GOOSE  
Publisher。

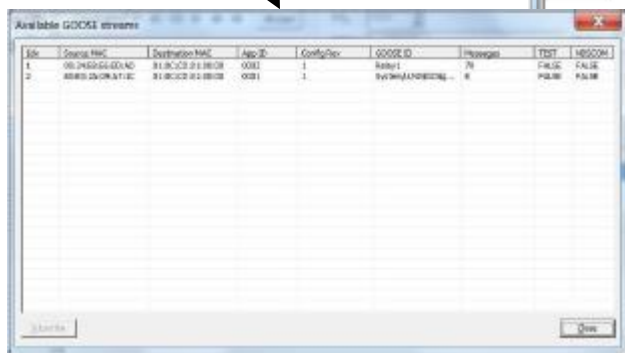
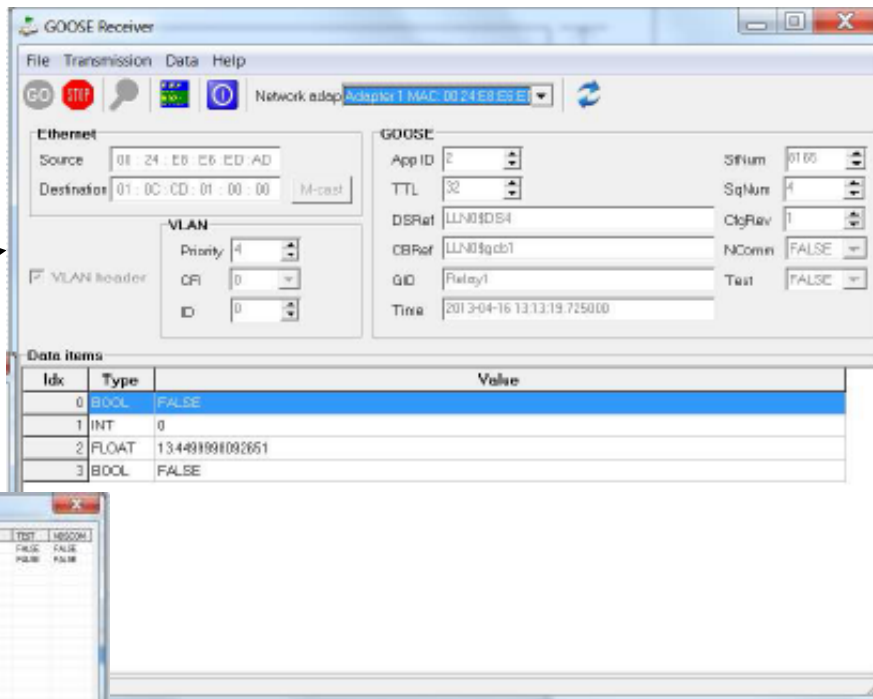
可以透過手動或  
函數方式更改要  
被發送出去的資  
料集合。



# PSD 2000: GOOSE Toolset, Receiver

可調整參數的  
GOOSE Subscriber。

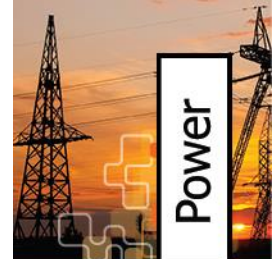
接收參數可以手動調  
整或來自偵測到的訊  
息串流。



# PSD 2000: SV Toolset, SMV Sender

SMV Sender 是 Merging Unit 模擬器。

取樣信號如振幅、相角、頻率等可調整的特性皆可以被手動或由函數方式更改。



Power

Ellipse

POWER MANAGEMENT SUITE



JoAn  
Vision

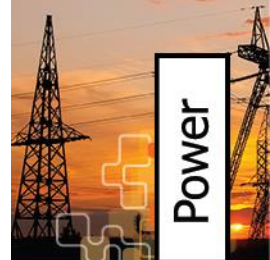
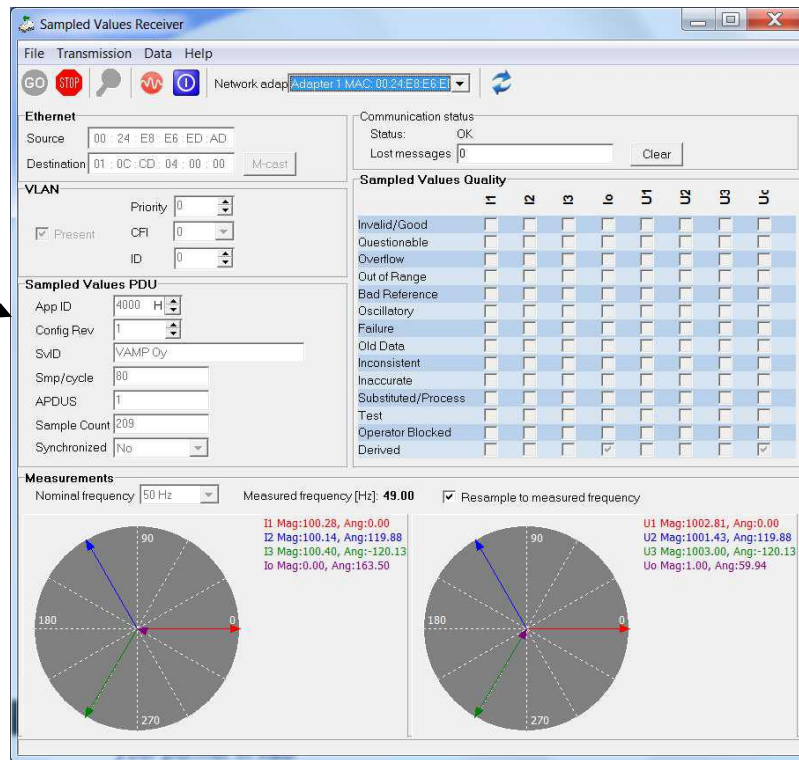
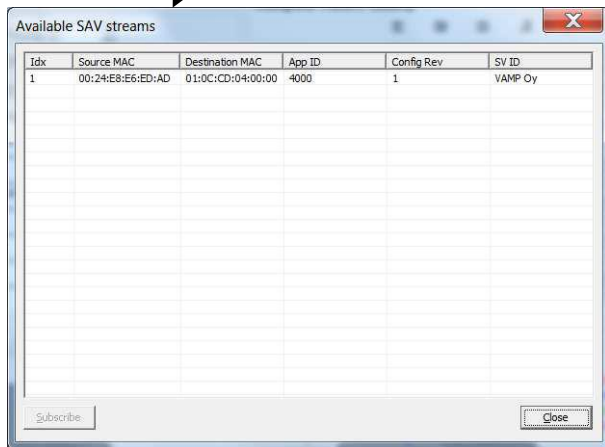
EtherWAN

ellipse  
software

# PSD 2000: SV Toolset, SMV Receiver

SMV Receiver: 可調整的SMV Subscriber。

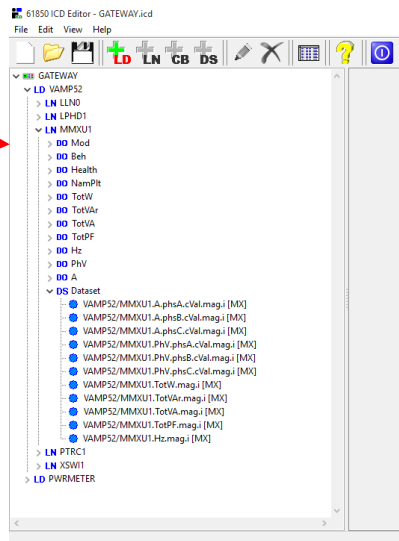
接收參數可以手動調整或來自偵測到的訊息串流。



# PSD 2000: IEC 61850 ICD Editor

特色:

- 直覺化的 IEC 61850 編輯器



IEC 61850 Standards :

IEC 61850 Edition 1

IEC 61850 Edition 2

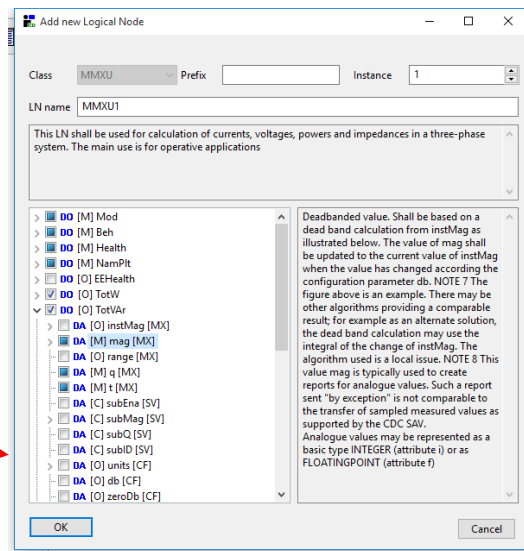
IEC 61850-7-410

(水力發電廠)

IEC 61850-25 (風力渦輪機)

IEC 61850-7-420

(Distributed Energy Resources)





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    - 工具集
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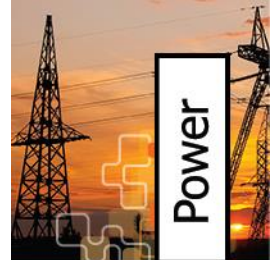
# Yeong Wol 複循環發電廠



Yeong Wol 發電廠的擁有者 KOSPO (Korea Southern Power Company) 是 KEPCO (Korea Electric Power Company) 的子公司，管理韓國的國家電網與五個主要的發電廠。



- 國家: 韓國
- 完成年份: 2010
- 容量: 930 MW  
(Steam and Gas turbines)



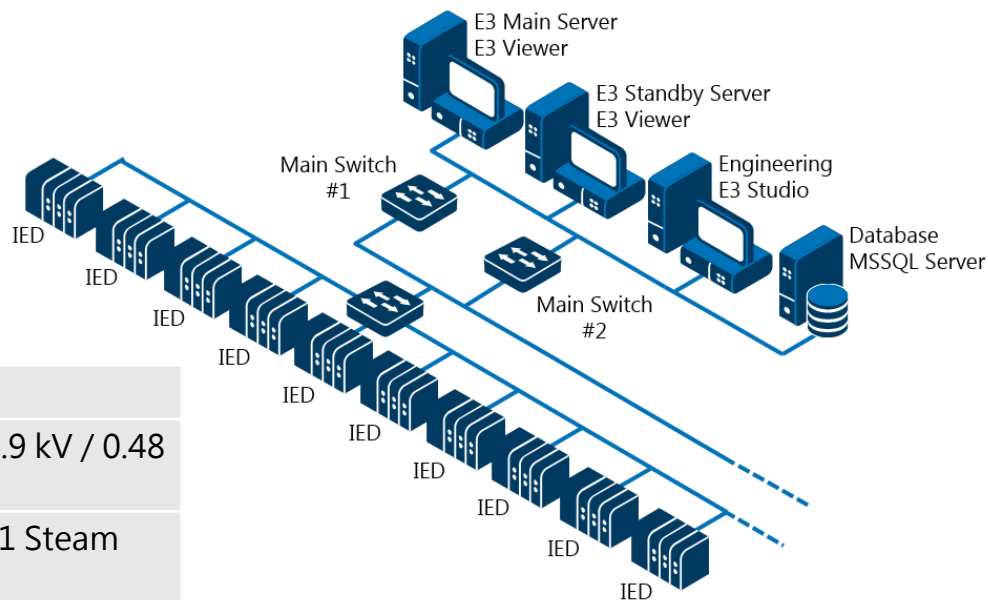
Power

Elipse

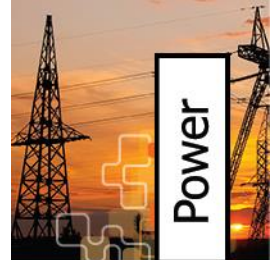
POWER MANAGEMENT SUITE



# Yeong Wol 複循環發電廠



發電容量:	818 MW
電壓等級:	154 kV / 18 kV / 6.9 kV / 0.48 kV
渦輪機:	3 Gas Turbines + 1 Steam Turbine
保護電驛 (IED):	SIEMENS : 12 pcs, VAMP : 90 pcs
信號點數量:	60,000
通訊協定:	IEC 61850, SNMP



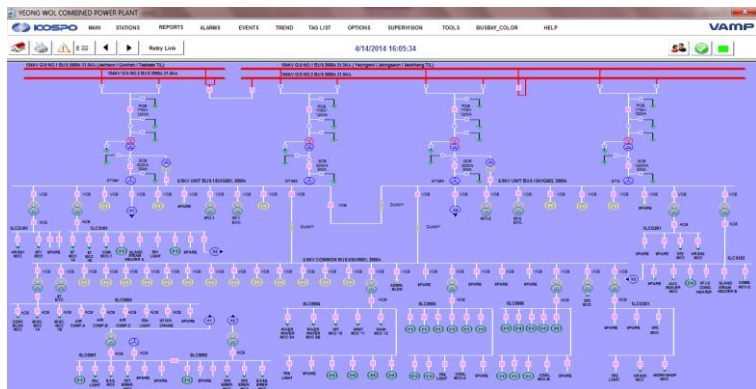
Power

Elipse

POWER MANAGEMENT SUITE

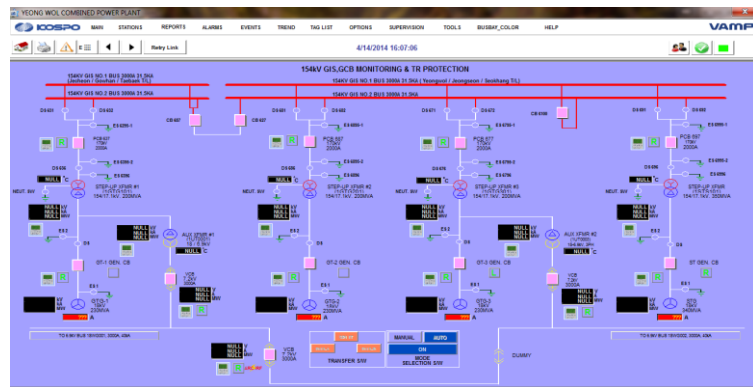


# Yeong Wol 複循環發電廠



整體系統單線圖

單線圖用來監視與控制饋線  
以及 *Tie transfer*



Power

Ellipse

POWER MANAGEMENT SUITE



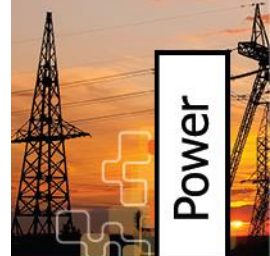
JoAn  
Vision



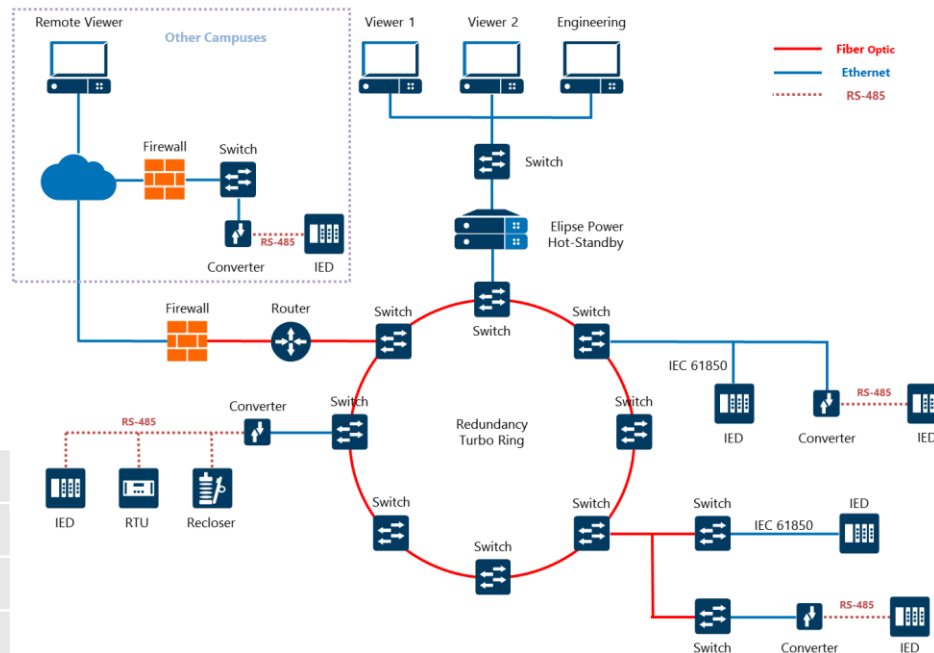
# National Taiwan University



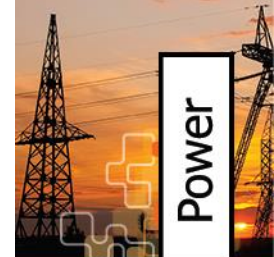
- 整合 124 個變電站
- 將既有保護電驛升級為IEC 61850 IED
- 應用GOOSE來增進電力網路協調
- 軟體提供介面與使用 Modbus與BACNet等協定的既有設備通訊
- 故障波形分析
- 電力品質分析



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變電站數量:	124
電壓等級:	22.8 kV
保護電驛 (IED):	VAMP, Schneider, SEL
信號點數量:	60,000 Tags
通訊協定:	IEC 61850, Modbus, BacNet



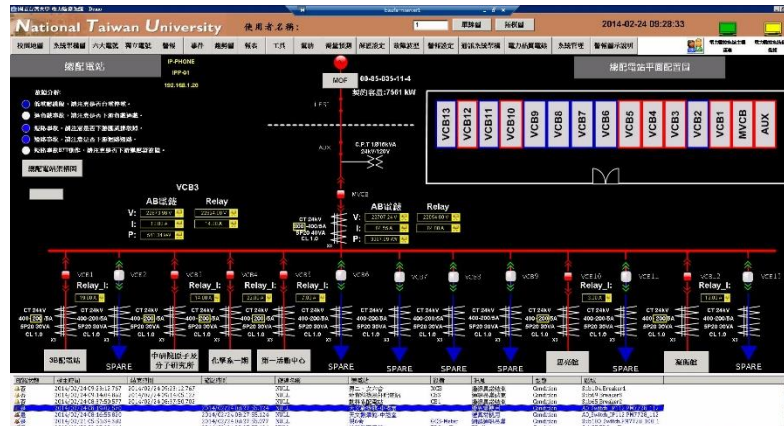
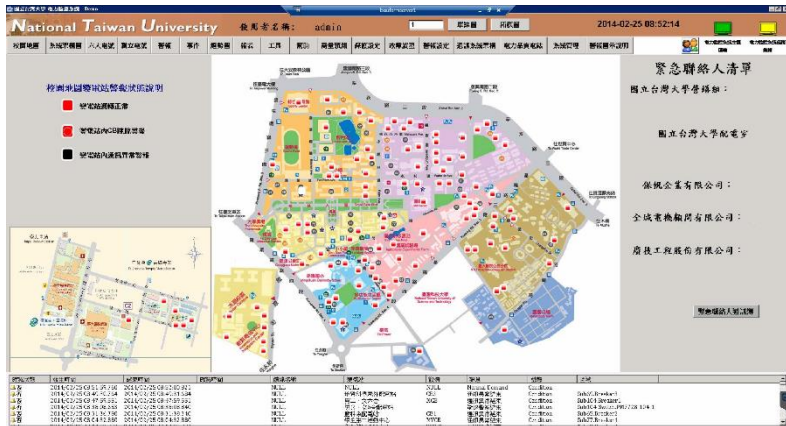
Power

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POWER MANAGEMENT SUITE

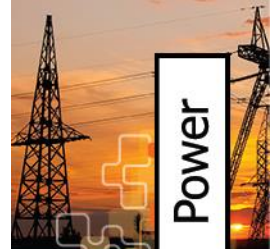


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圖中的地圖顯示每個變電站所在地點，若有任何異常發生，紅點會開始閃爍。

系統整體單線圖架構



Power

Elipse

POWER MANAGEMENT SUITE



JoAn  
Vision



# 110kV Gian Khau 變電站



110kV Gian Khau 變電站位於寧平省(距離河內 80 KM) 供電給 Gian Khau 工業區以及其週邊區域。 這變電站由 EVNNPC (EVN Northern Power Corporation) 管理。

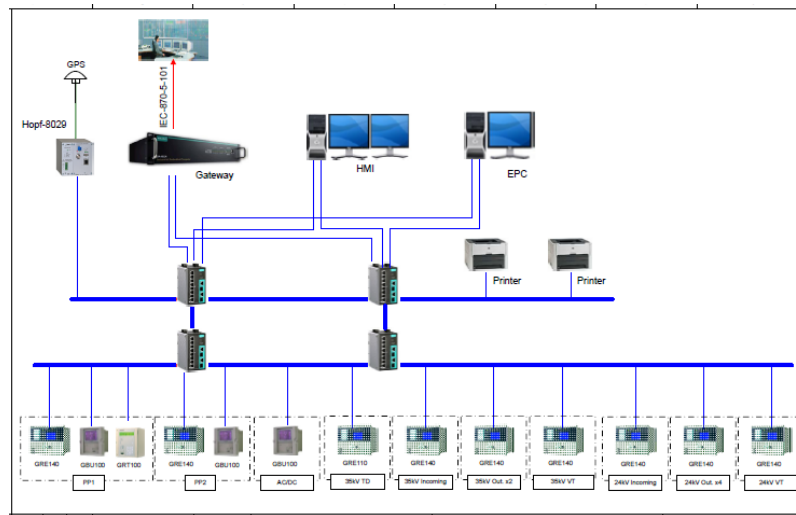


- 國家: 越南
- 容量: 63MVA
- 變電站之間的通訊透過 IEC 101





# 110kV Gian Khau 變電站



Physical Tags :	3,000
Communication :	IEC 61850, IEC 60870-5-101
Relay Integration :	ABB



# 報告完畢



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