UCA 2010 in Paris

IEC 61850 Client Conformance Testing System

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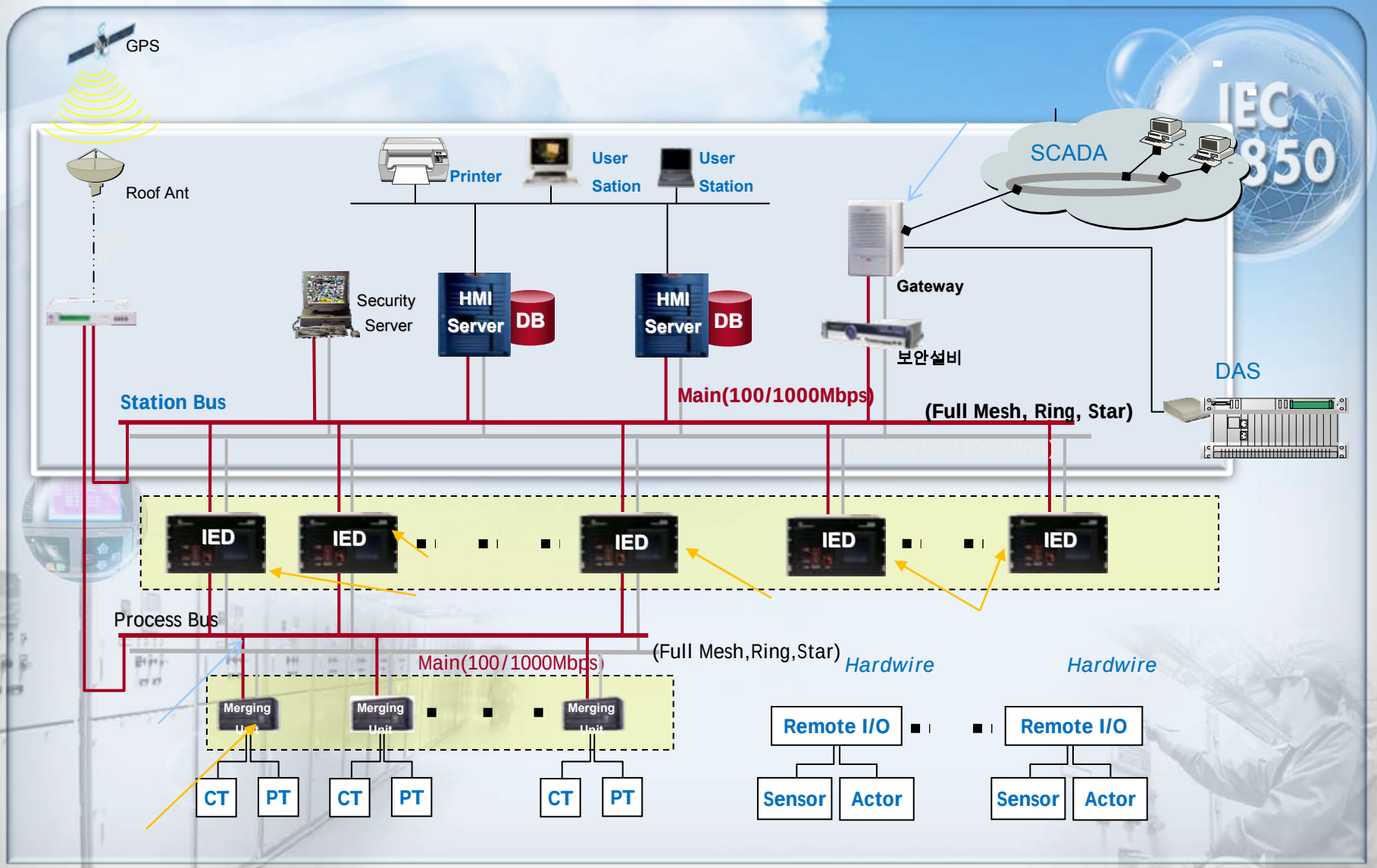
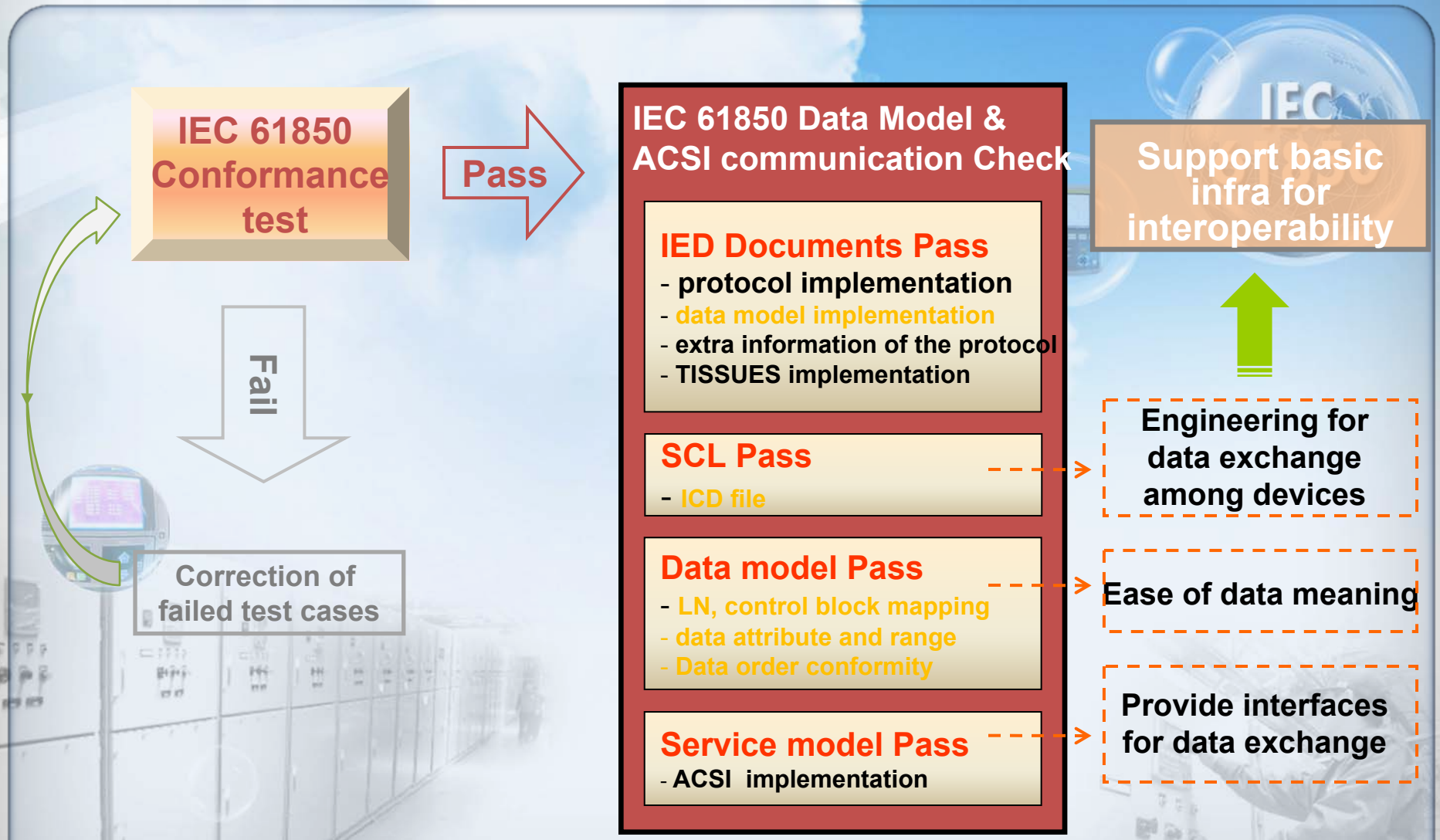
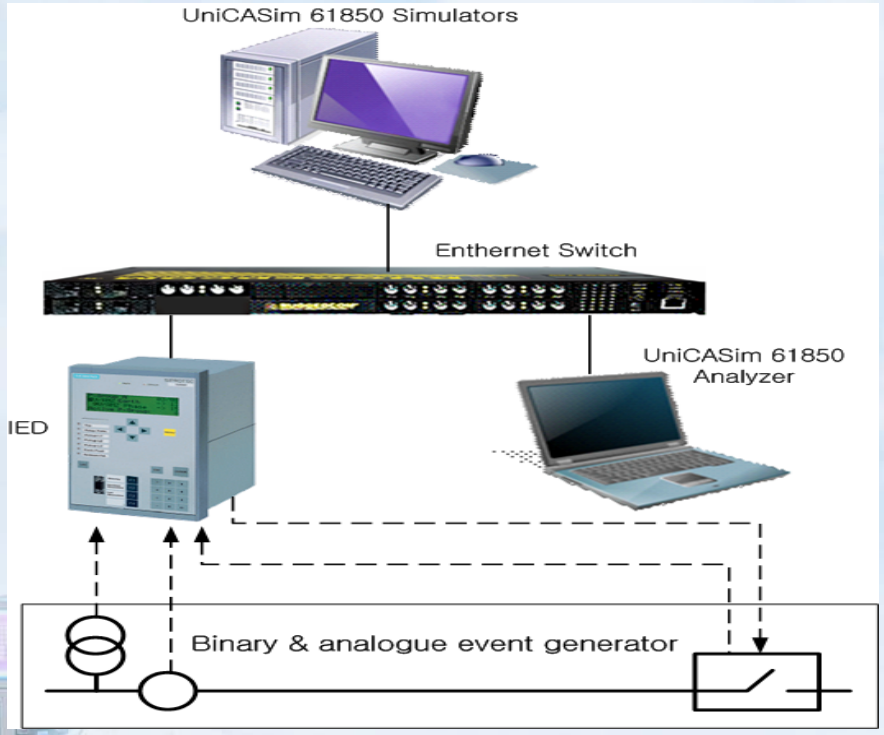
IEC 61850 Substation Automation System

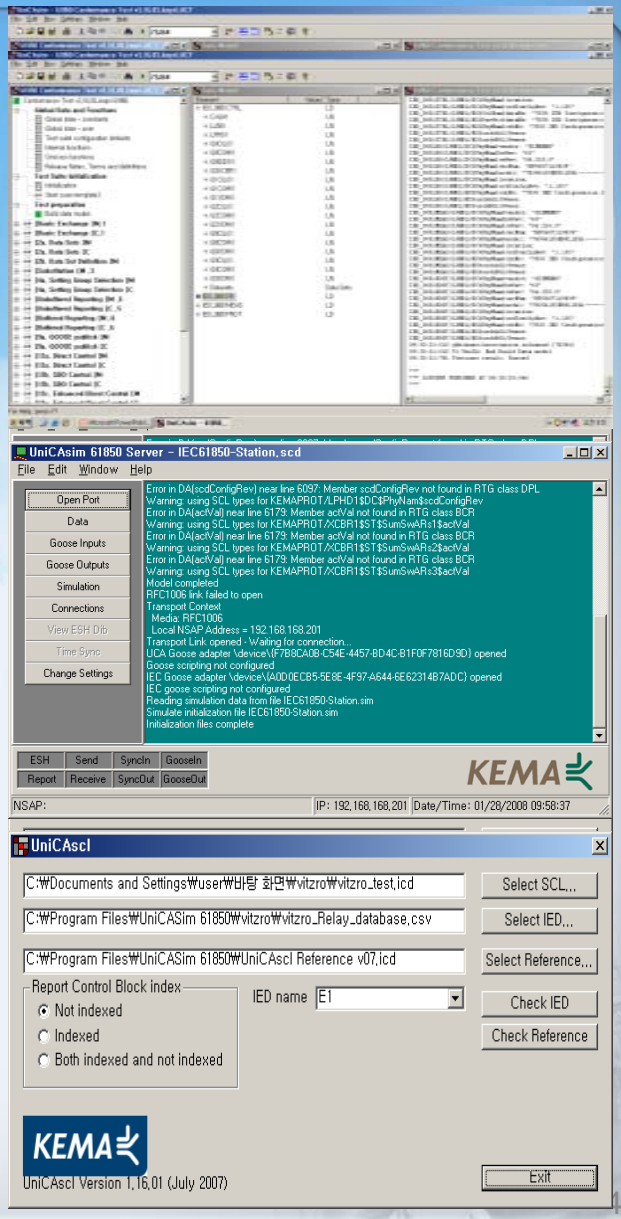


IEC 61850 Conformance test



Server Conformance Testing System





- ♦ System Configuration
  - UniCAsim 61850 client
  - UniCAsim 61850 GOOSE
  - UniCA 61850 analyzer
  - UniCA SCL Checker
- ♦ System Utilization
  - IEC 61850-10 conformance test
  - Analysis of EC 61850 communication messages
  - Verification of SCL(Substation Configuration Language) file

UCA client test procedures

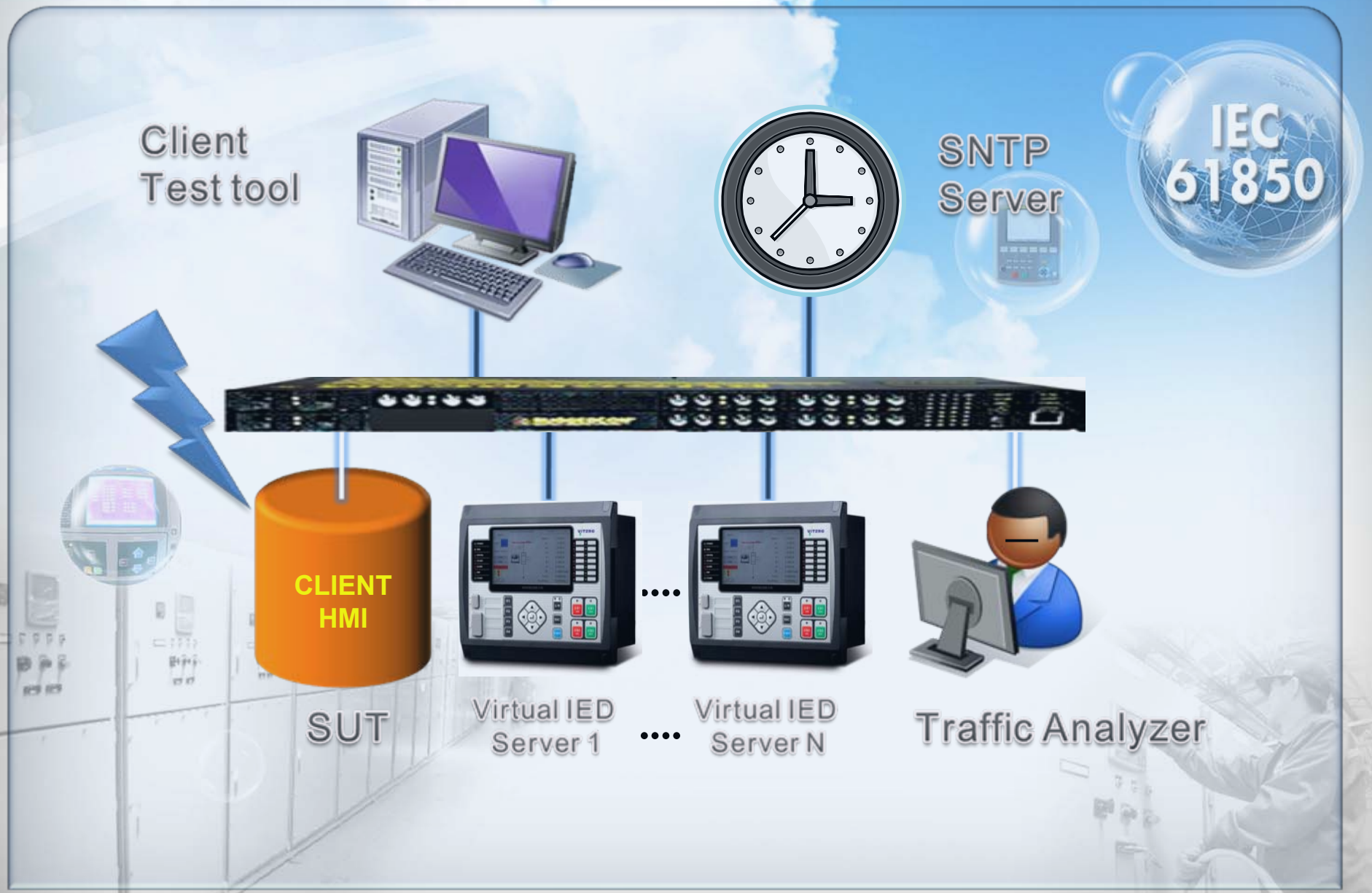
적합성 블록	Mandatory	Conditional
1: Basic Exchange (10/11)	cAss1,cAss2,cAss3,cAss4 cAssN1,cAssN4,cAssN5, cAssN6,Srv5, SrvN3	cAssN7,cSrv1,cSrv2, cSrv3,cSrv4,cSrv6,cSrv7 cSrN1, cSrvN2 SrvN4, SrvN5 cSrvN4
2: DataSets (3/4)	cDs1, cDs2, cDs1	cDs3, Ds4, DsN2, DsN3
2+:DataSet Definition (2/2)	cDs6D, cDsN4	cDs7, cDsN5
3: substitution (1/2)	cSub1	cSub2, cSub3
4: Setting Group Selection (2/2)	cSg2, cSgN1	cSg1, cSg3
4+: Setting Group Definition (2/0)	cSg3, cSg4	
5: Unbuffered Reporting (11/7)	cRp2, cRp3, cRp4, cRp5, cRp8, cRp9, cRp10 cRpN2, cRpN3, cRpN7 cRpN8	cRp1, cRpN1, cRp6, cRp7, cRpN4, cRpN5, cRpN6

적합성 블록	Mandatory	Conditional
6: Buffered Reporting (14/8)	cBr2, cBr3, cBr4, cBr5, cBr8, cBr9, cBr10, cBr11, cBr12, cBrN2, cBrN3, cBrN7, cBrN8, cBrN9	cBr1, cBr6, cBr7, cBr13, cBrN1, cBrN4, cBrN5, cBrN6
12a: Direct control (4/3)	cCtl4, cCtlN1, cDOns1 cDOns2	cCtl1, cCtl2, cCtl3
12b: SBO Control (5/4)	cCtl4, cCtlN1, cSBOns1, cSBOns2, cSBOns3	cCtl1, cCtl2, cCtl3 cSBOns4
12c: Enhanced Direct control (4/3)	cCtl4, cCtlN1, cDOes1, cDOes2	cCtl1, cCtl2, cCtl3
12d: Enhanced SBO control (5/4)	cCtl4, cCtlN1, cSBOes1, cSBOes2, cSBOes3	cCtl1, cCtl2, cCtl3 cSBOes4
13c: Time Sync (1/3)	cTm1	cTm2, cTmN1, cTmN2
12d: File transfer (5/3)	cFt2, cFt2, cFt3, cFtN1, cFtN2	cFt4, cFtN3, cFt5

IEC 61850

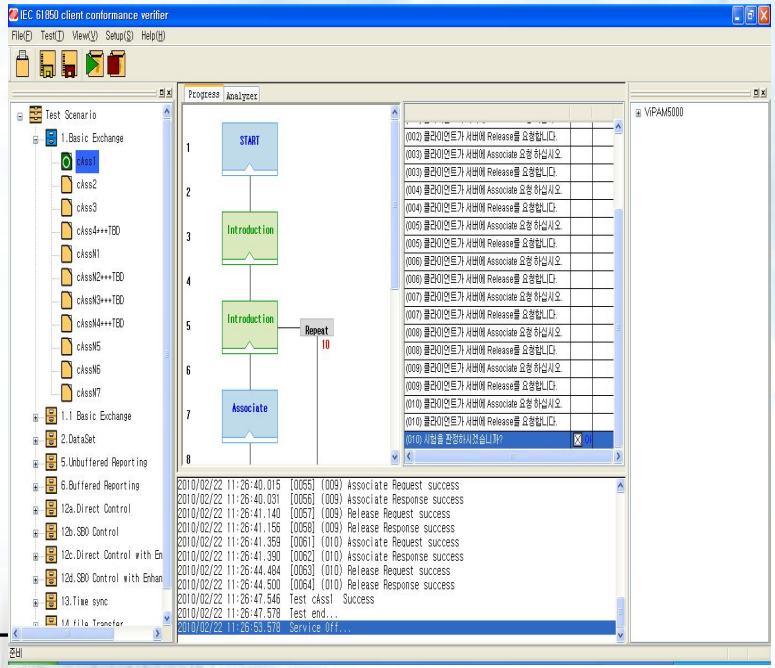
UCA Test Procedures Rev 1.1

Configuration of IEC 61850 Client Confomance Testing System



Introduction to IEC 61850 Client Testing System

Virtual Server System



IEC 61850 Client Conformance Testing System(CCTS)

System Features

♦ **IEC 61850 CCTS**

- Virtual Server System
  - Max running sever : 100
  - Include a virtual Circuit Breaker for Control Simulation
  - IEC 61850 Data Dynamic Simulator
  - Time Synchronization based on SNTP
  - Data(DA, Dataset, RCB, GoCB etc) Viewer
  - Verified by IEC 61850 conformance test
- CCTS
  - Implement Model driven UCA testing procedures
  - Analyze MMS & ACSI packet
  - Evaluate SUT
  - provide testing log & user guide UI

Overview of IEC 61850 Client Testing System

Test Case DB

CCTS

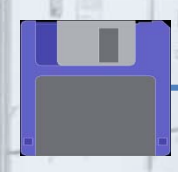
Testing procedures execution part

Packet analyzer part

Testing Verifier part

Client(SUT)

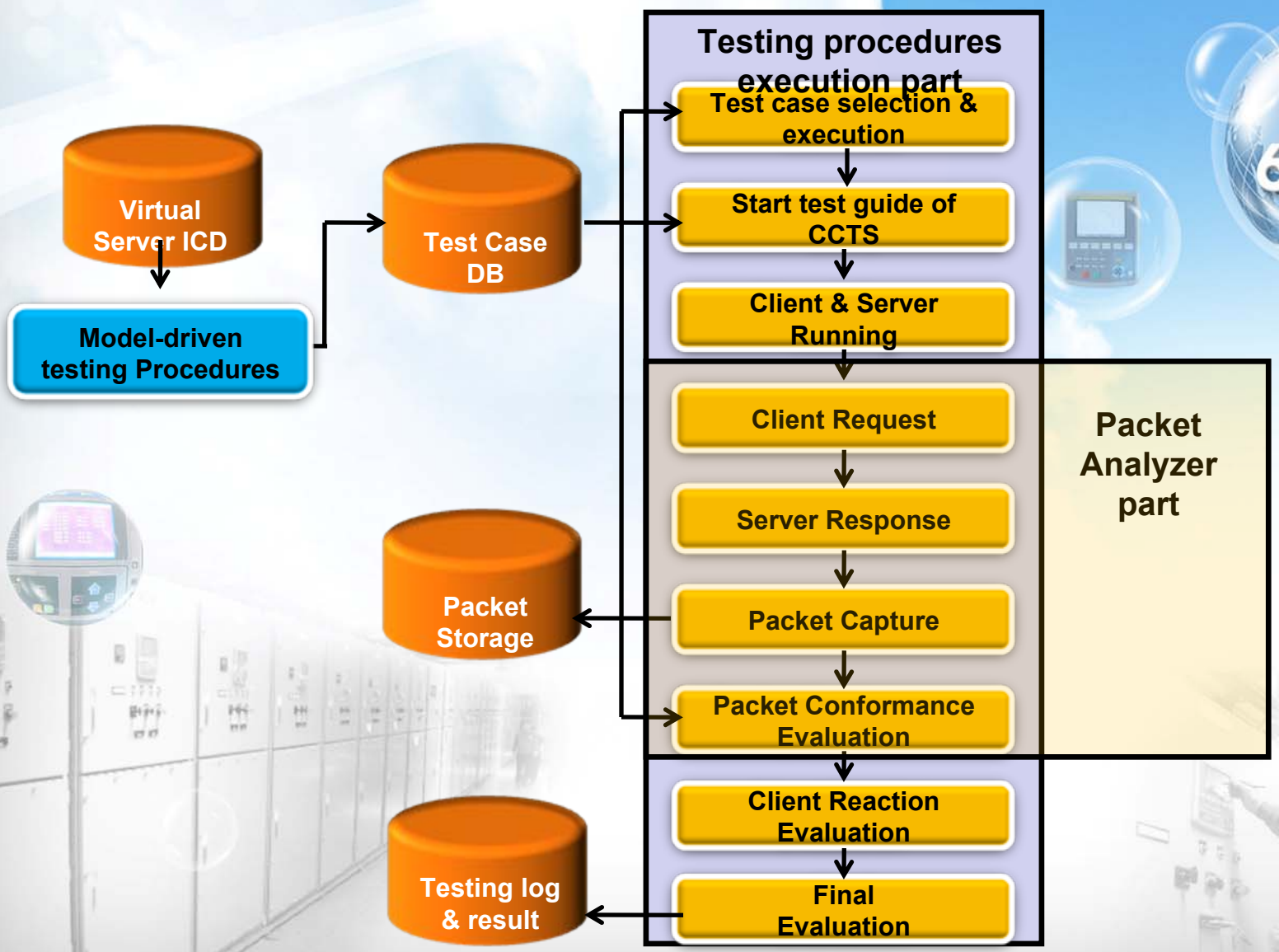
Network switch



Testing result Storage(*.cov)

Virtual Server

Action flow of IEC 61850 Client Testing System



ACSI supporting by IEC 61850 CCTS

- **IEC 61850 communication association :**

  Associate, Abort, Release

- **Data read and write :**

  GetServerDirectory, GetLogicalDeviceDirectory, GetDataValues, GetDataDirectory, GetDataDefinition, SetDataValues

- **Dataset:**

  GetDatasetValues, SetDatasetValues

- **Report service :**

  GetRCBValues, SetRCBValues

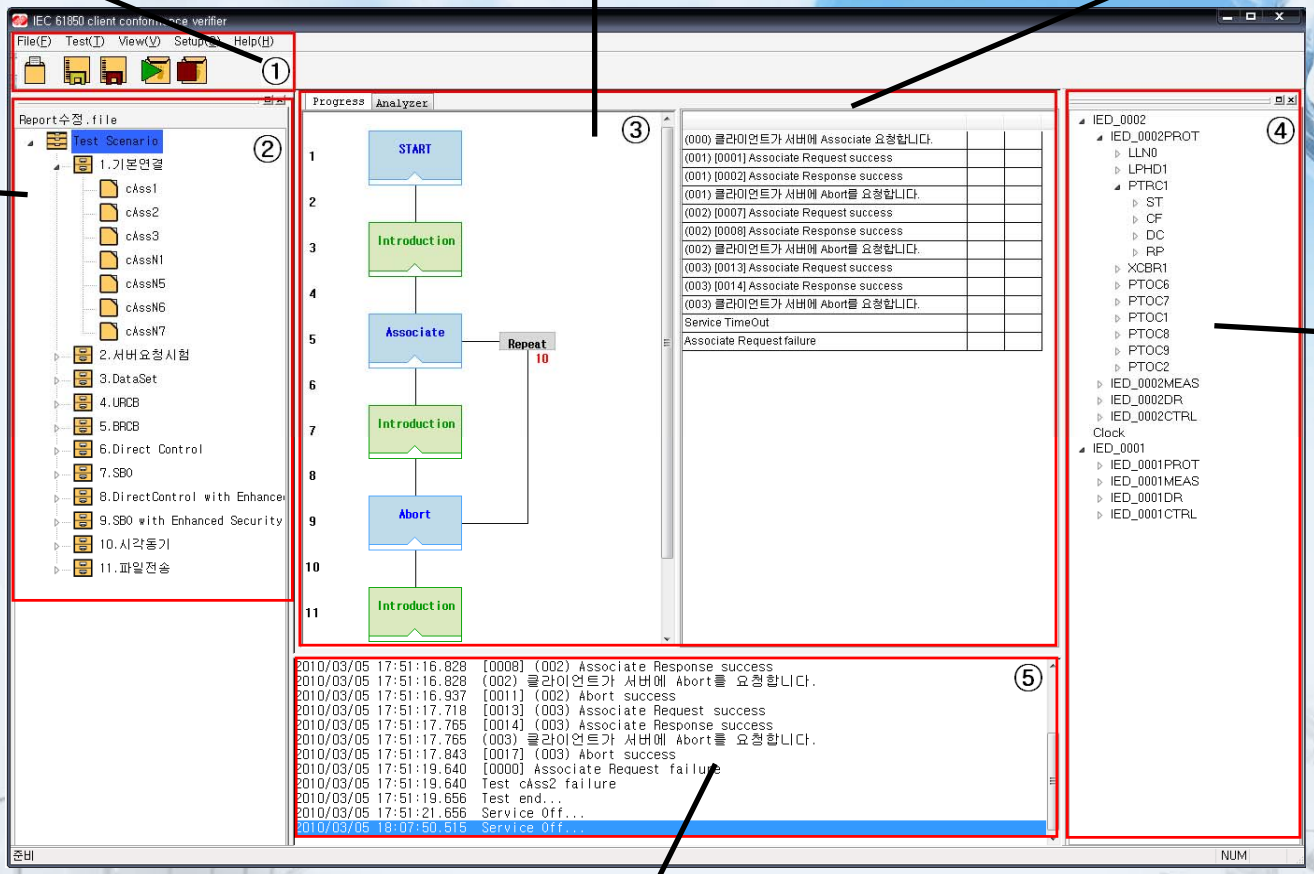
- **Control:**

  Operate, Select, Cancel, SelectwithValue

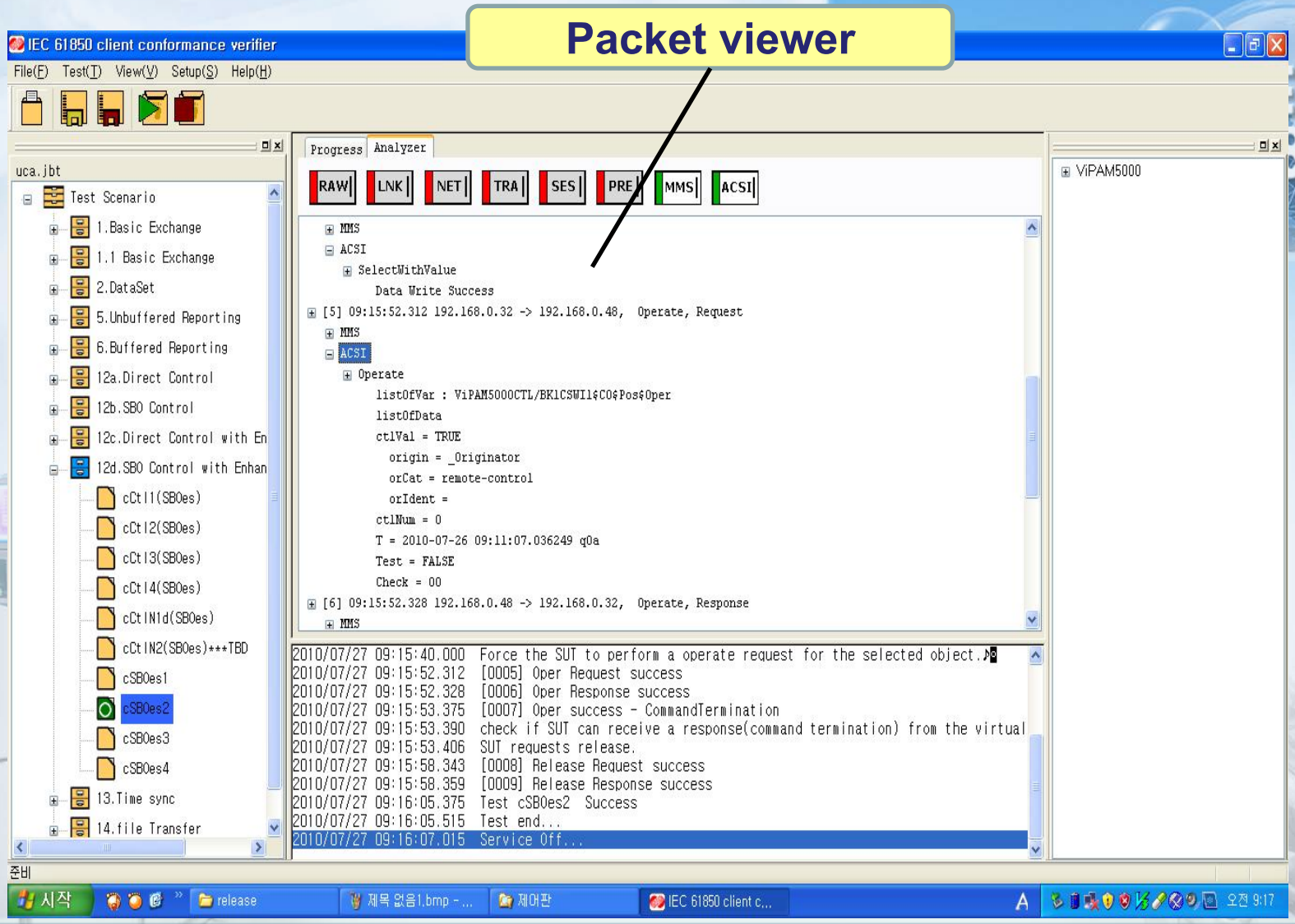
- **File transfer :**

  GetFile, GetFileAttributeValues, DeleteFile

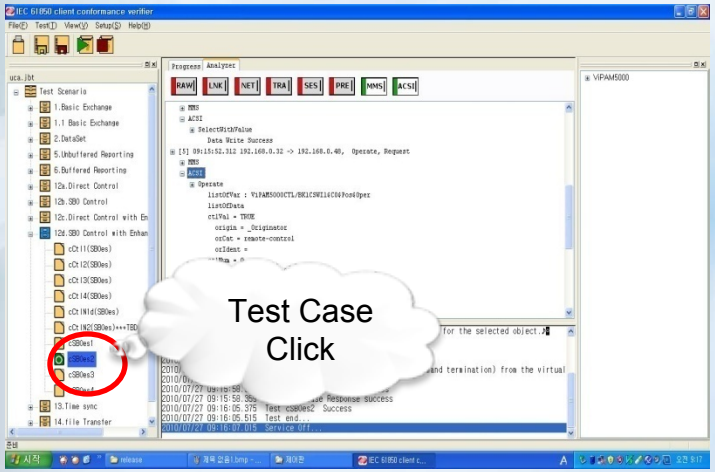
GUI of IEC 61850 client test system

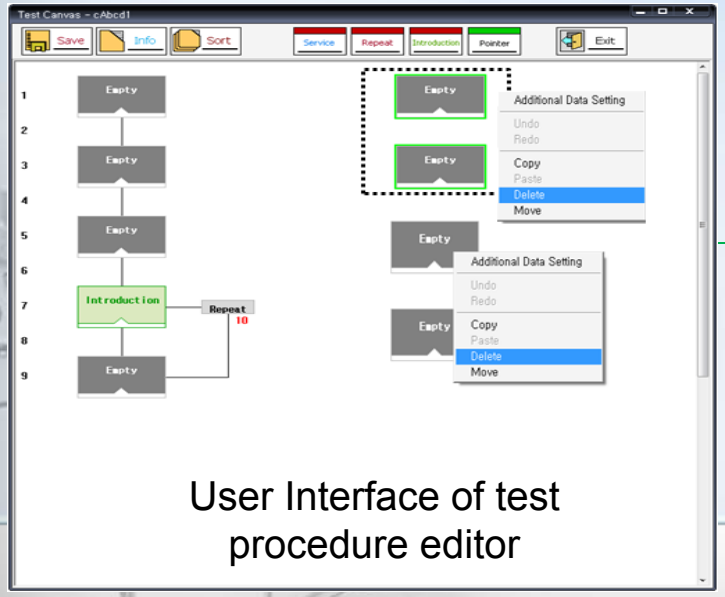


Network packet analyzer of IEC 61850 client test system



Model-driven test procedure editor(1)

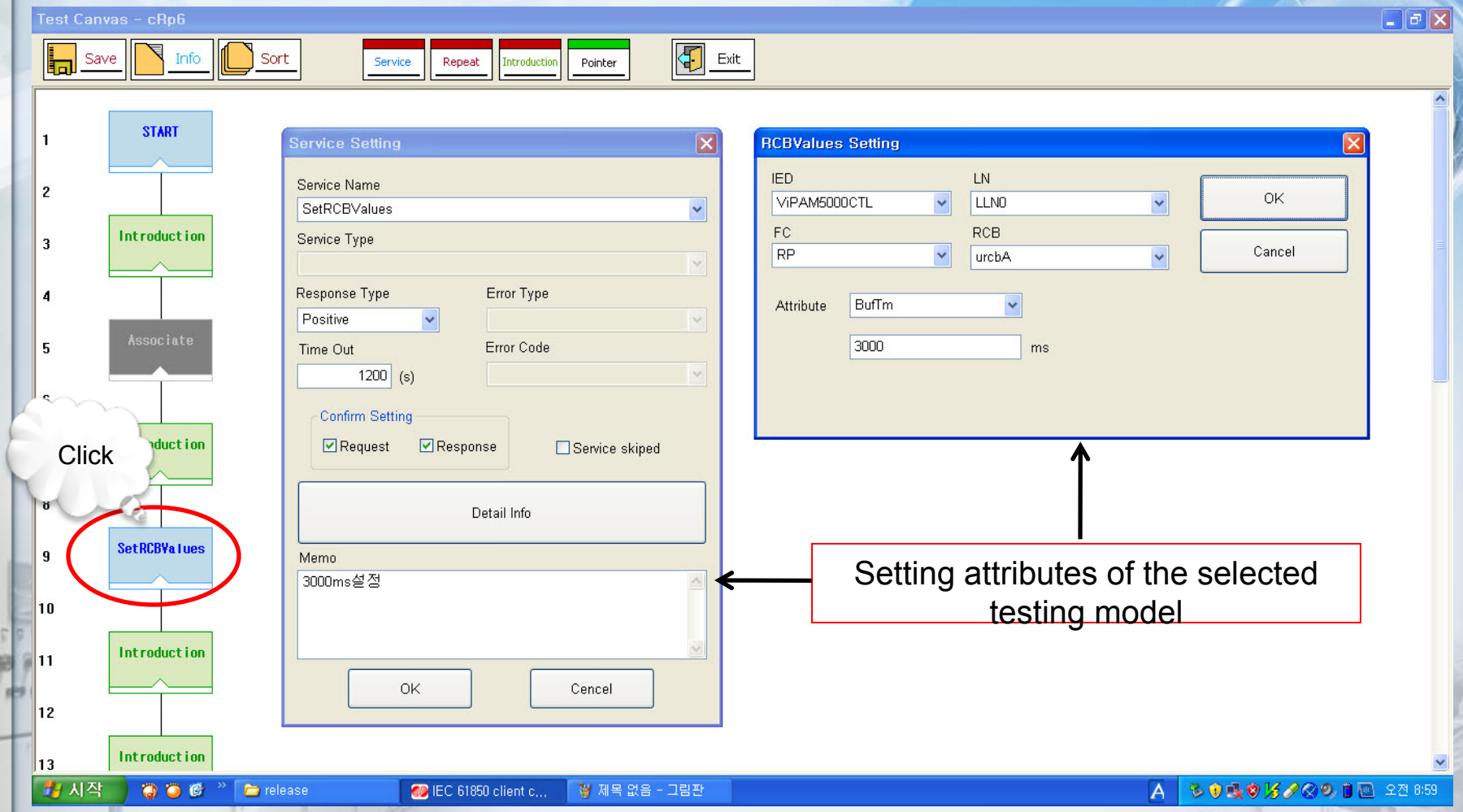




User Interface of test procedure editor

- Save : save of a test procedure
- Info : information of the test model
- Sort : sort of test models
- Service : IEC 61850 service object
- Repeat : repeat test process
- Introduction : introduction of the test case
- Pointer : selection of the test model
- Exit : exit of the editor

Model-driven test procedure editor(2)

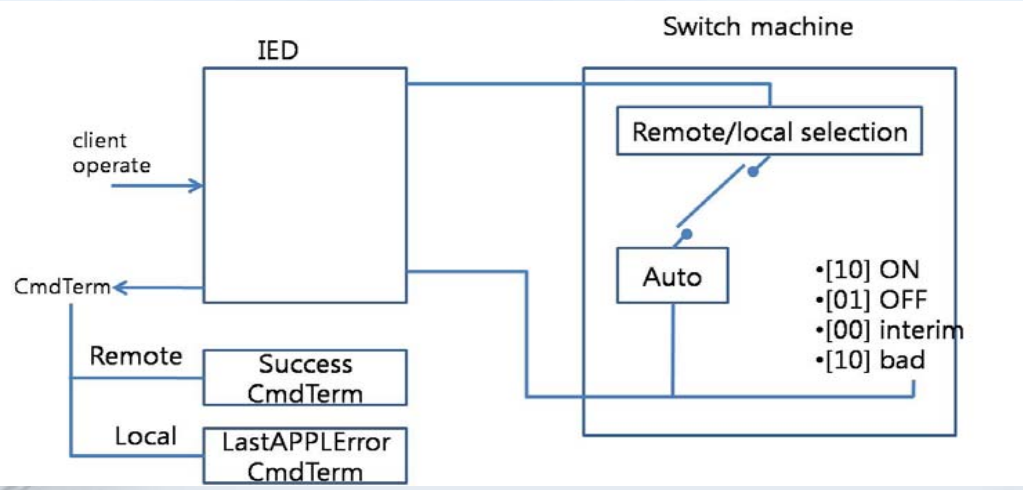


IEC 61850 ACSI supporting by the virtual server

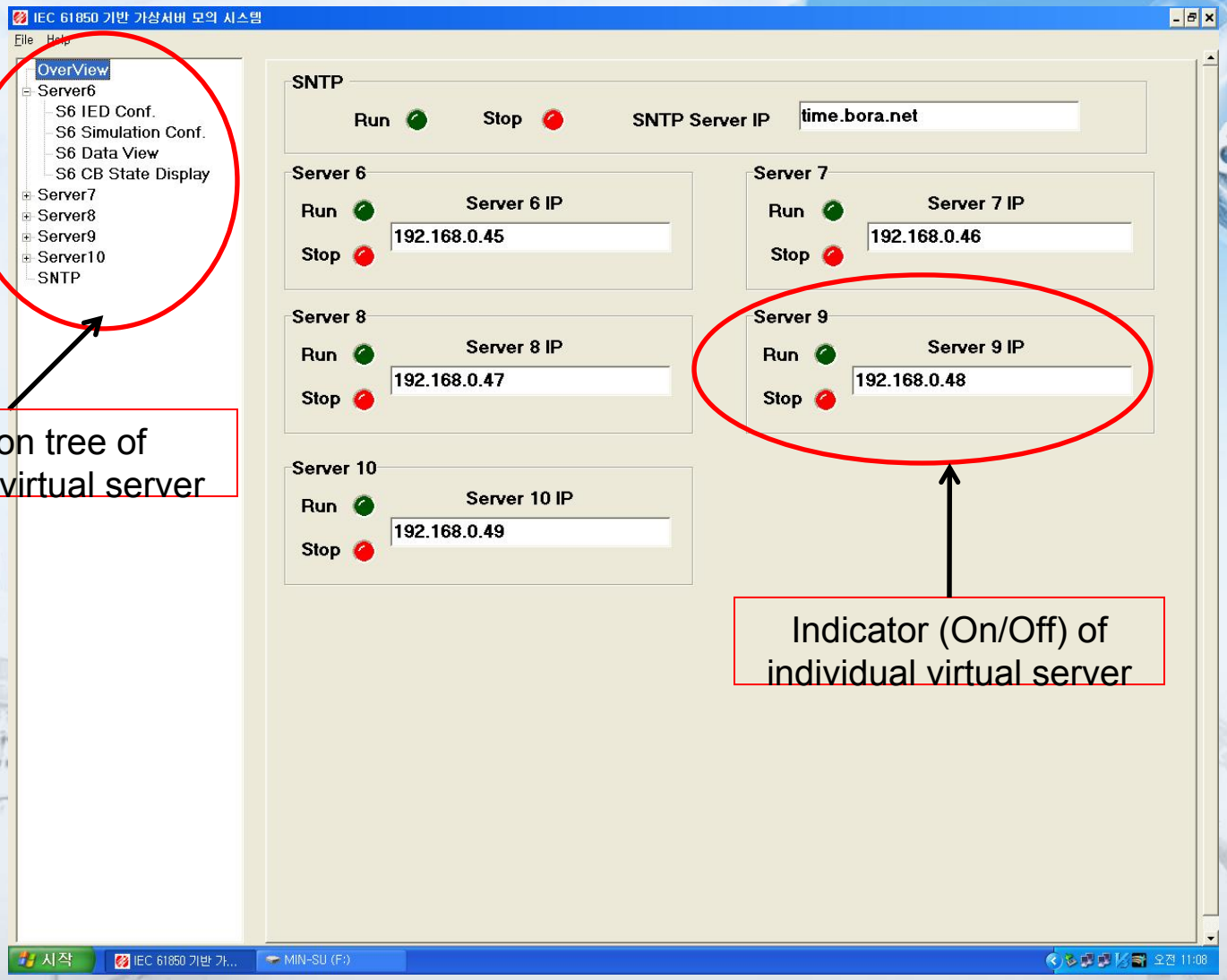
IEC 61850 communication association : Associate, Abort, Release
Data read and write : GetServerDirectory, GetLogicalDeviceDirectory, GetDataValues, GetDataDirectory, GetDataDefinition, SetDataValues
Dataset for transmitting report and GOOSE: GetDatasetValues, SetDatasetValues
Report service : GetRCBValues, SetRCBValues
Control : Operate, Select, Cancel, SelectwithValue
File transfer : GetFile, GetFileAttributeValues, DeleteFile

Features of the virtual server

- Network setting : IP. GOOSE, SNTP
- Support SNTP based time synchronization
- Install a number of virtual servers(over 100ea) in the H/W system
- View IEC 61850 data model of the virtual server by a user friendly interface :
  Logical device, Logical Node, Data object, Data attribute, Control block, Dataset
- Support Read/Write command on IEC 61850 data model of the virtual server
- Simulate IEC 61850 data of the virtual server
- Include the virtual switch machine for IEC 61850 control test



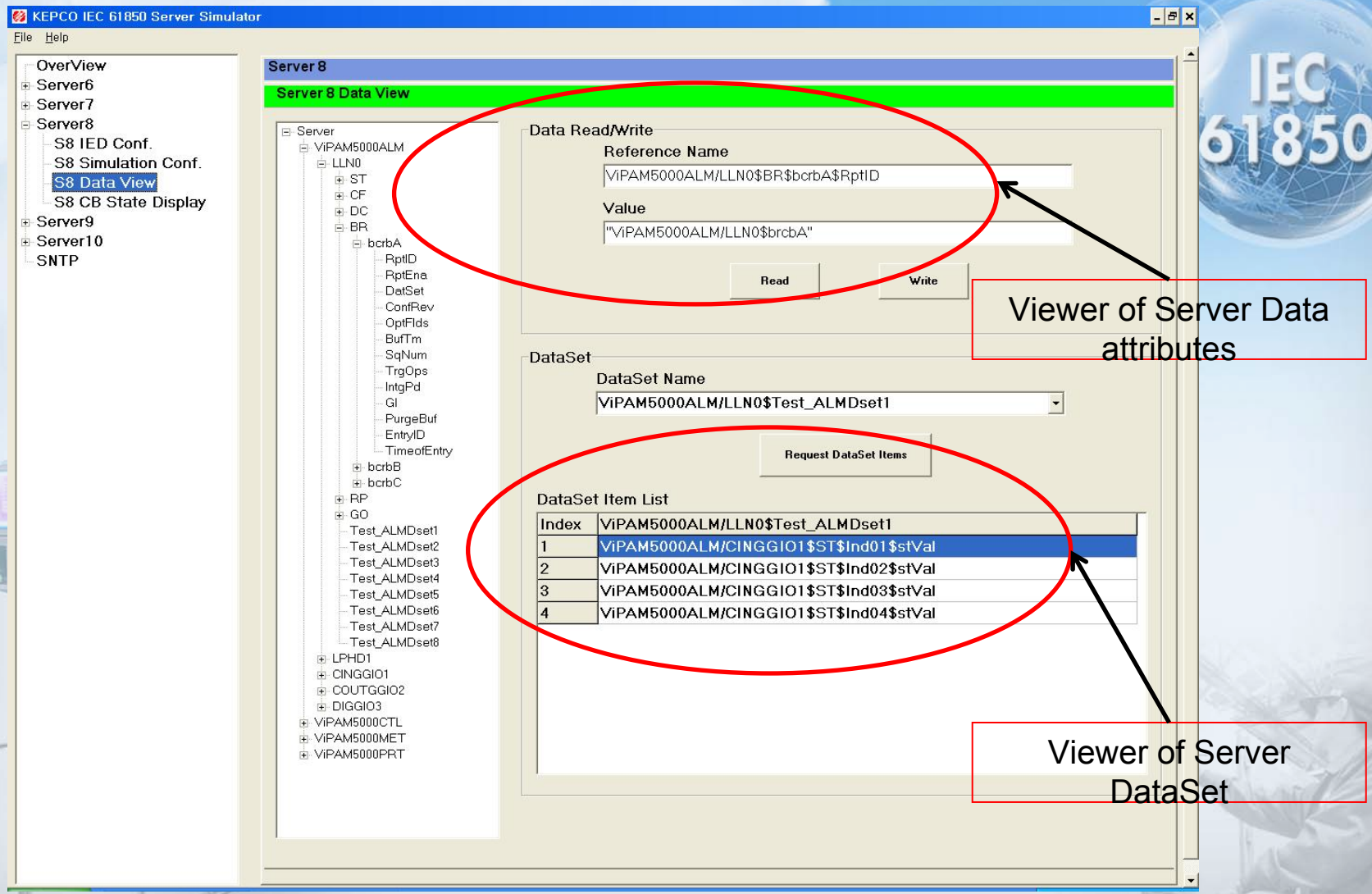
Main GUI of the Virtual Server system



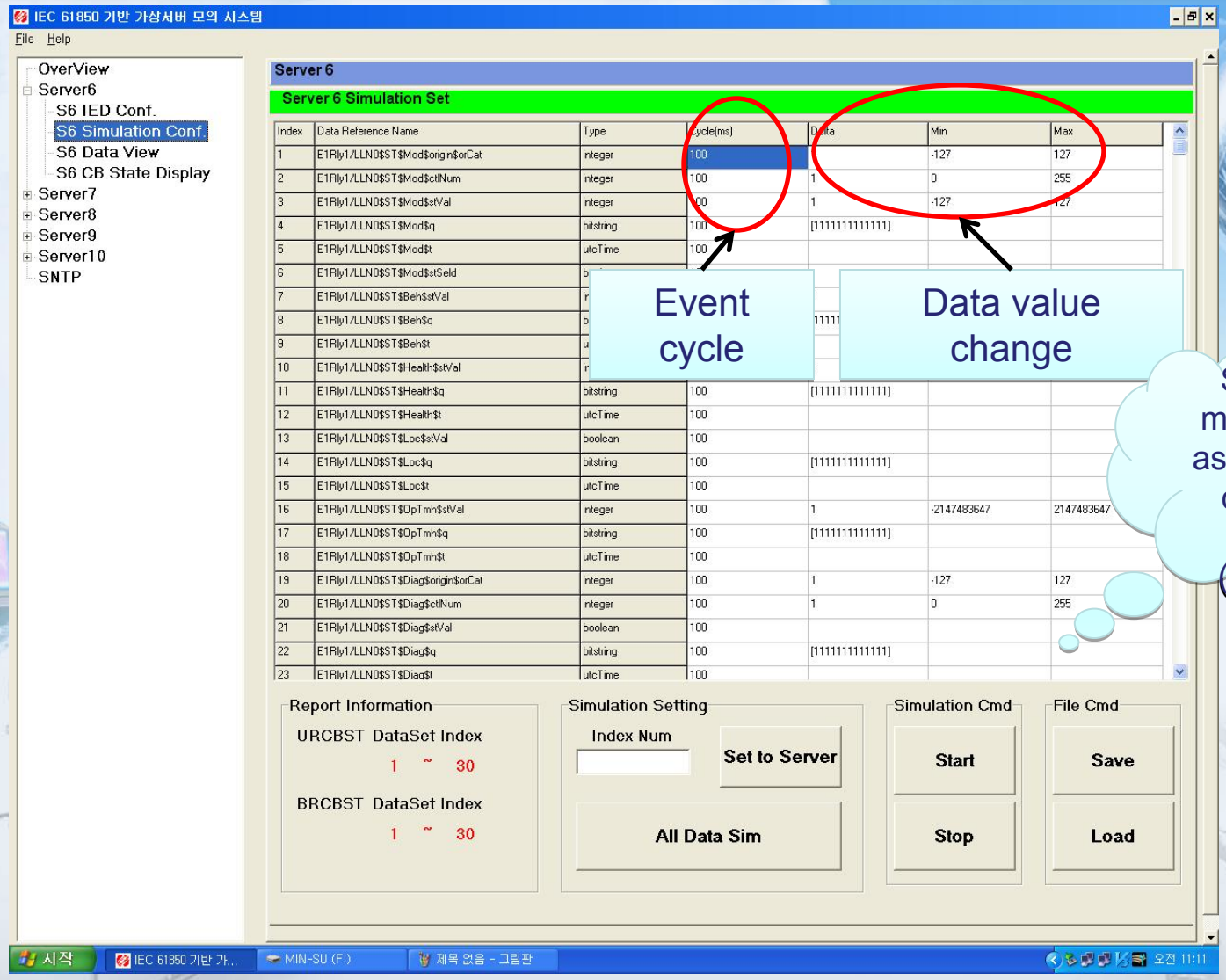
Function tree of individual virtual server

Indicator (On/Off) of individual virtual server

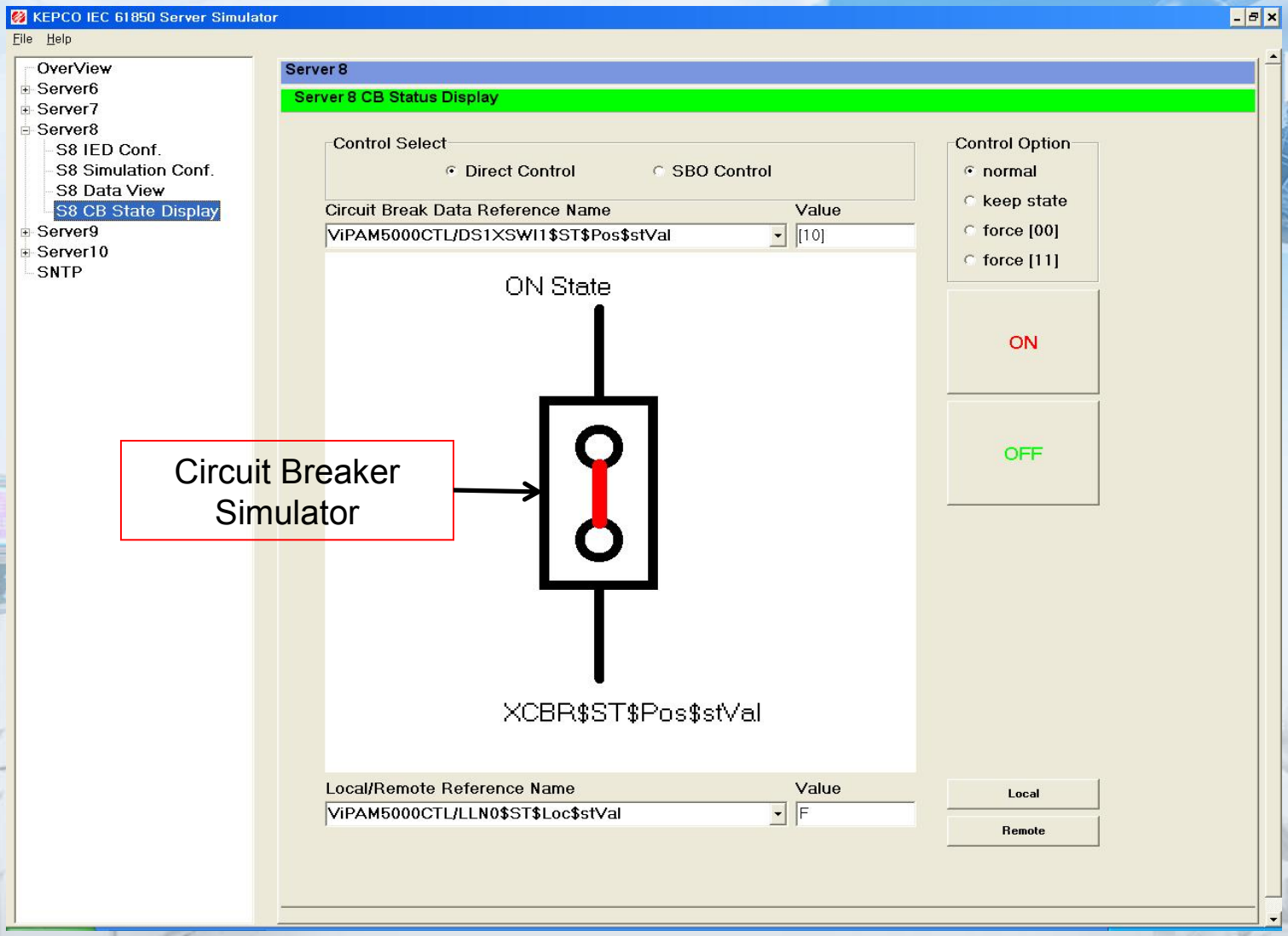
IEC 61850 data Viewer



IEC 61850 data simulator



Virtual switch machine



Demonstration of KEPCO IEC 61850 CCTS

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