Kuliah Umum Teknik Listrik

Politeknik Jakarta

di Kampus Politeknik Jakarta

Mombang Sihite

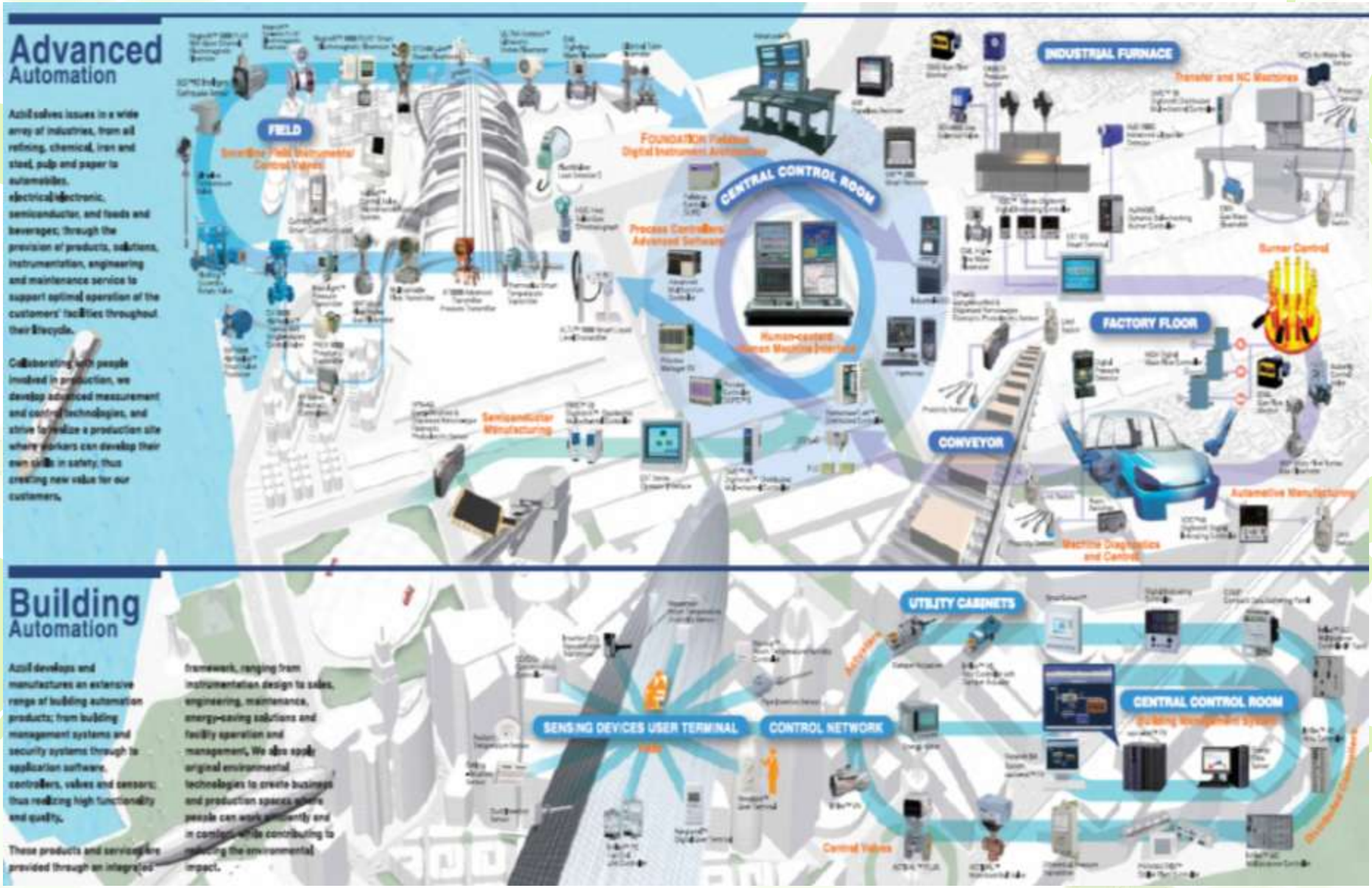
Jakarta, 10 Nopember 2012

PT. Azbil Berca Indonesia.

Contents

- BUILDING AUTOMATION SYSTEM
- ADVANCE AUTOMATION SYSTEM

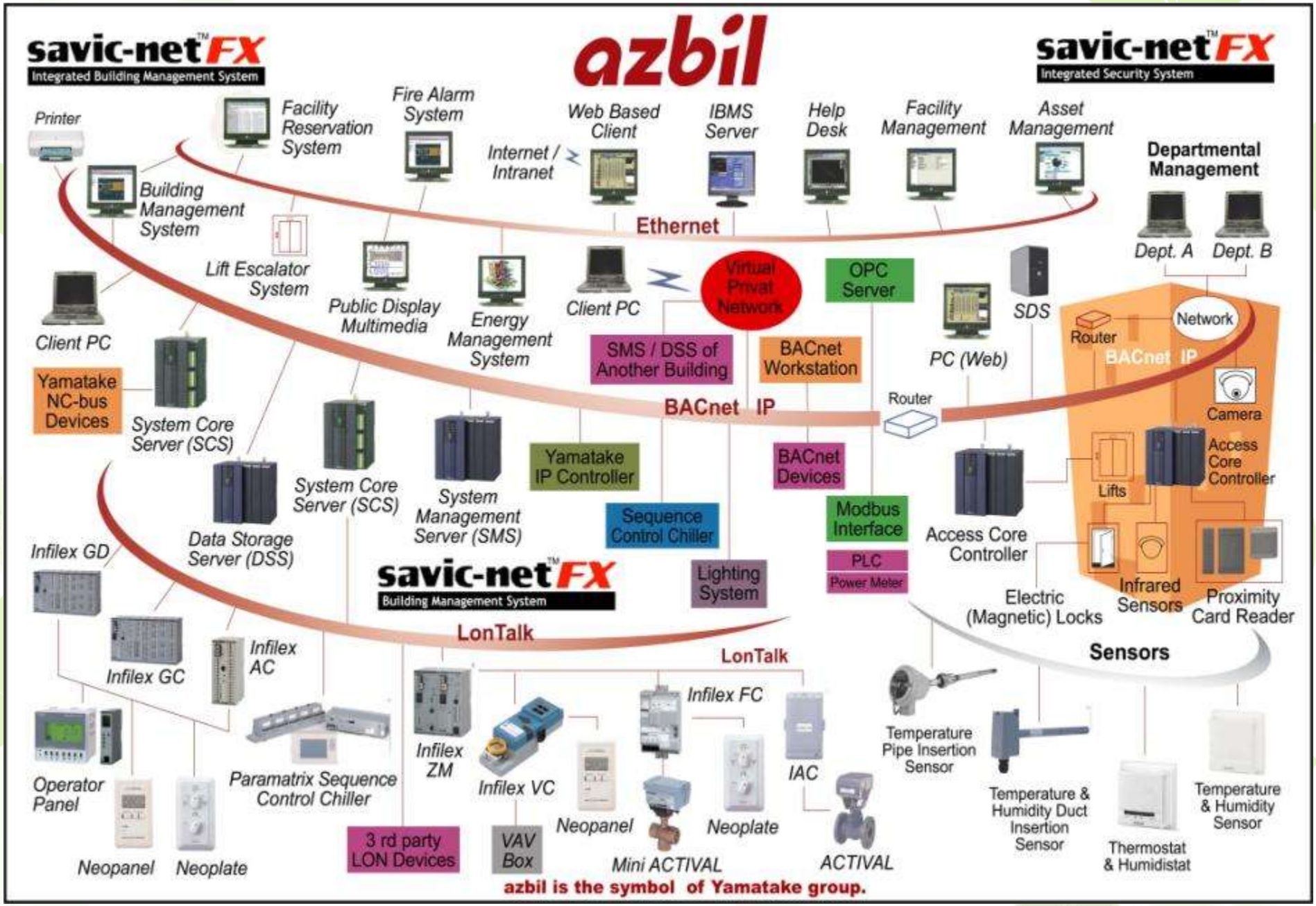
azbil BERCA


Advanced
Automation
Azbil solves issues in a wide array of industries, from oil refining, chemical, iron and steel, pulp and paper to automobiles, electrical/electronic, semiconductor, and foods and beverages; through the provision of products, solutions, instrumentation, engineering and maintenance service to support optimal operation of the customers' facilities throughout their lifecycle.
Collaborating with people involved in production, we develop advanced measurement and control technologies, and strive to realize a production site where workers can develop their own skills in safety, thus creating new value for our customers.
FIELD
CENTRAL CONTROL ROOM
INDUSTRIAL FURNACE
FACTORY FLOOR
CONVEYOR
Building
Automation
Azbil develops and manufactures an extensive range of building automation products; from building management systems and security systems through to application software, controllers, valves and sensors; thus realizing high functionality and quality.
These products and services are provided through an integrated framework, ranging from instrumentation design to sales, engineering, maintenance, energy-saving solutions and facility operation and management. We also apply original environmental technologies to create business and production spaces where people can work efficiently and in comfort while contributing to reducing the environmental impact.
UTILITY CABINETS
SENSING DEVICES USER TERMINAL
CONTROL NETWORK
CENTRAL CONTROL ROOM

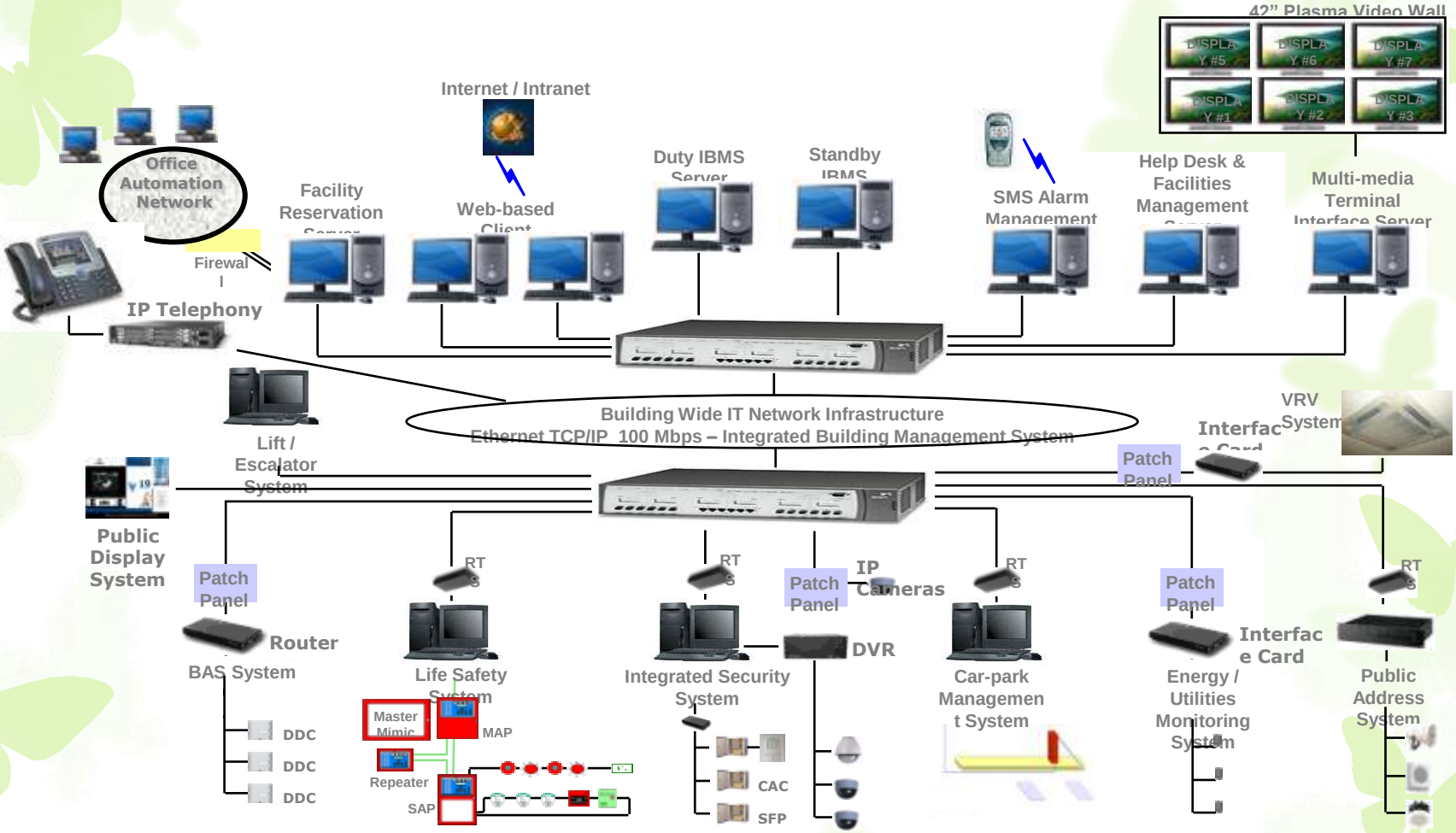
azbil

Building Management System

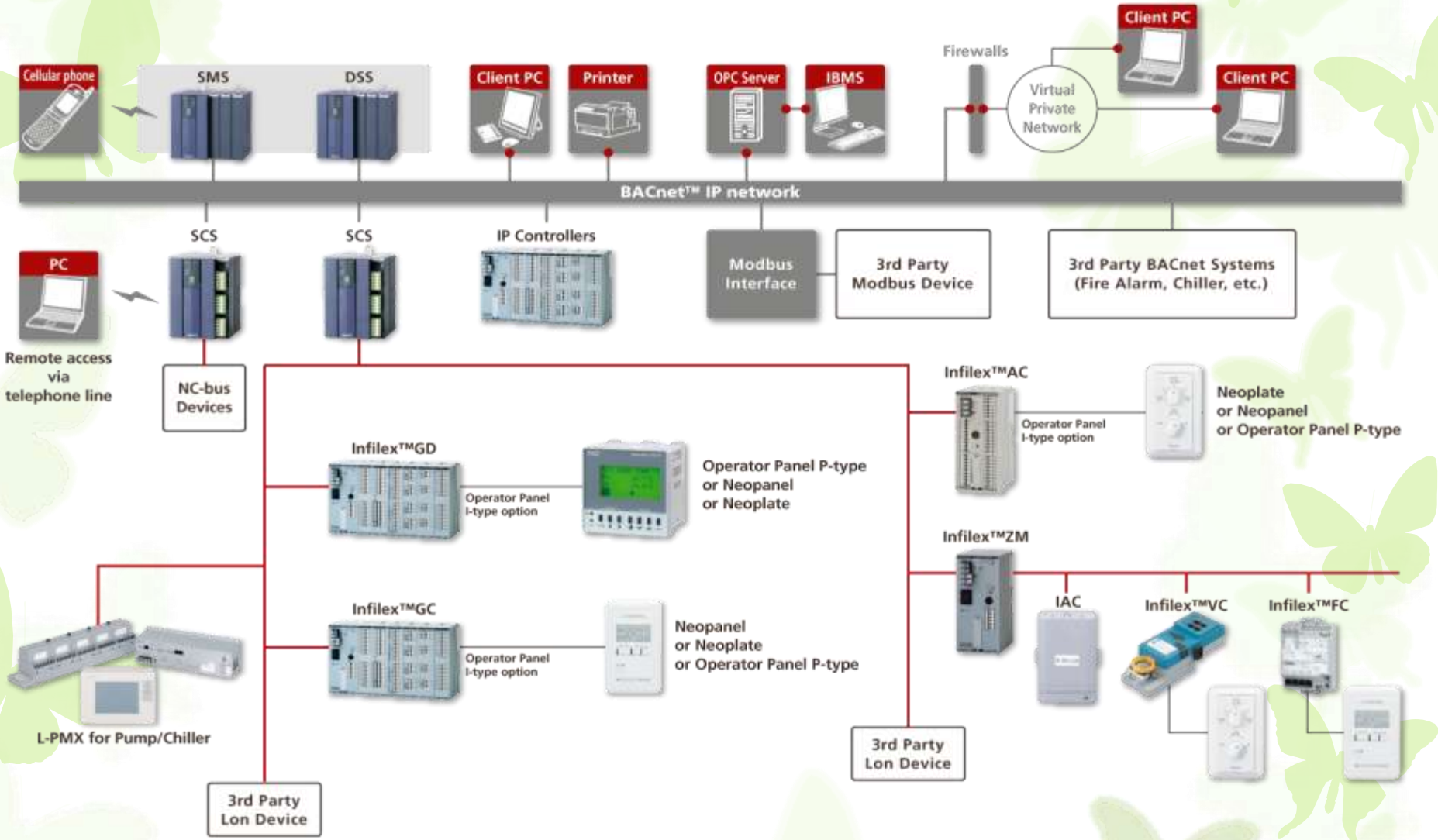
savic-net™FX


savic-net™FX
Integrated Building Management System
azbil
savic-net™FX
Integrated Security System
Printer
Facility Reservation System
Fire Alarm System
Web Based Client
IBMS Server
Help Desk
Facility Management
Asset Management
Internet / Intranet
Ethernet
Departmental Management
Dept. A
Dept. B
Building Management System
Lift Escalator System
Public Display Multimedia
Energy Management System
Client PC
Virtual Privat Network
OPC Server
SDS
Client PC
PC (Web)
Router
Network
BACnet IP
SMS / DSS of Another Building
BACnet Workstation
Yamatake NC-bus Devices
System Core Server (SCS)
BACnet IP
Router
Camera
Yamatake IP Controller
BACnet Devices
Access Core Controller
Lifts
System Core Server (SCS)
System Management Server (SMS)
Sequence Control Chiller
Modbus Interface
Data Storage Server (DSS)
Access Core Controller
Infilex GD
PLC
Power Meter
Electric (Magnetic) Locks
Infrared Sensors
Proximity Card Reader
savic-net™FX
Building Management System
Lighting System
LonTalk
Sensors
Infilex GC
Infilex AC
LonTalk
Infilex FC
Temperature Pipe Insertion Sensor
Operator Panel
Paramatrix Sequence Control Chiller
Infilex ZM
Infilex VC
IAC
Temperature & Humidity Duct Insertion Sensor
Temperature & Humidity Sensor
Neopanel
Neoplate
Neopanel
Neoplate
3 rd party LON Devices
VAV Box
Mini ACTIVAL
ACTIVAL
Thermostat & Humidistat
azbil is the symbol of Yamatake group.

IBMS Schematic Structure



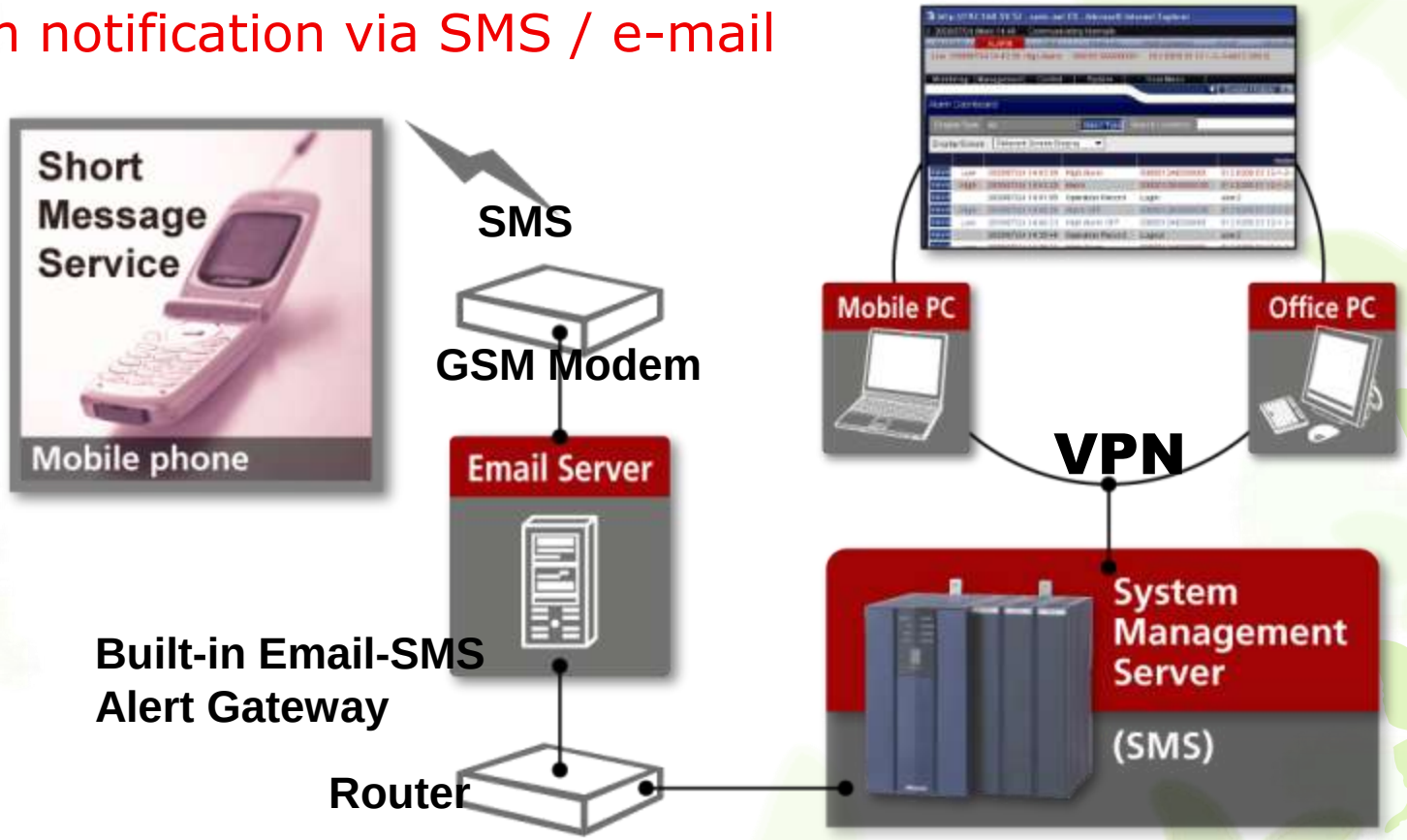
BMS <BAS> Schematic Structure



Features of savic-net *FX*

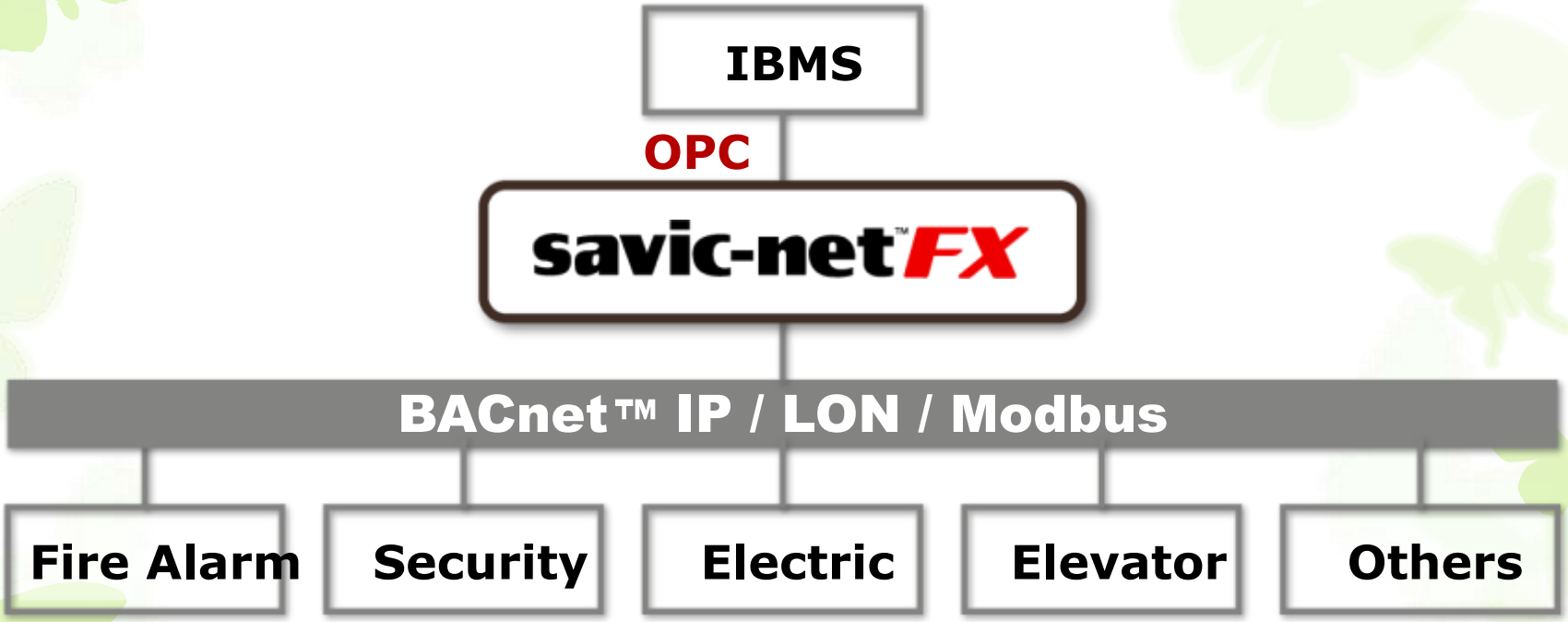
Anytime and Anywhere

- Anytime and Anywhere real-time access by the Web based operation
- Alarm notification via SMS / e-mail



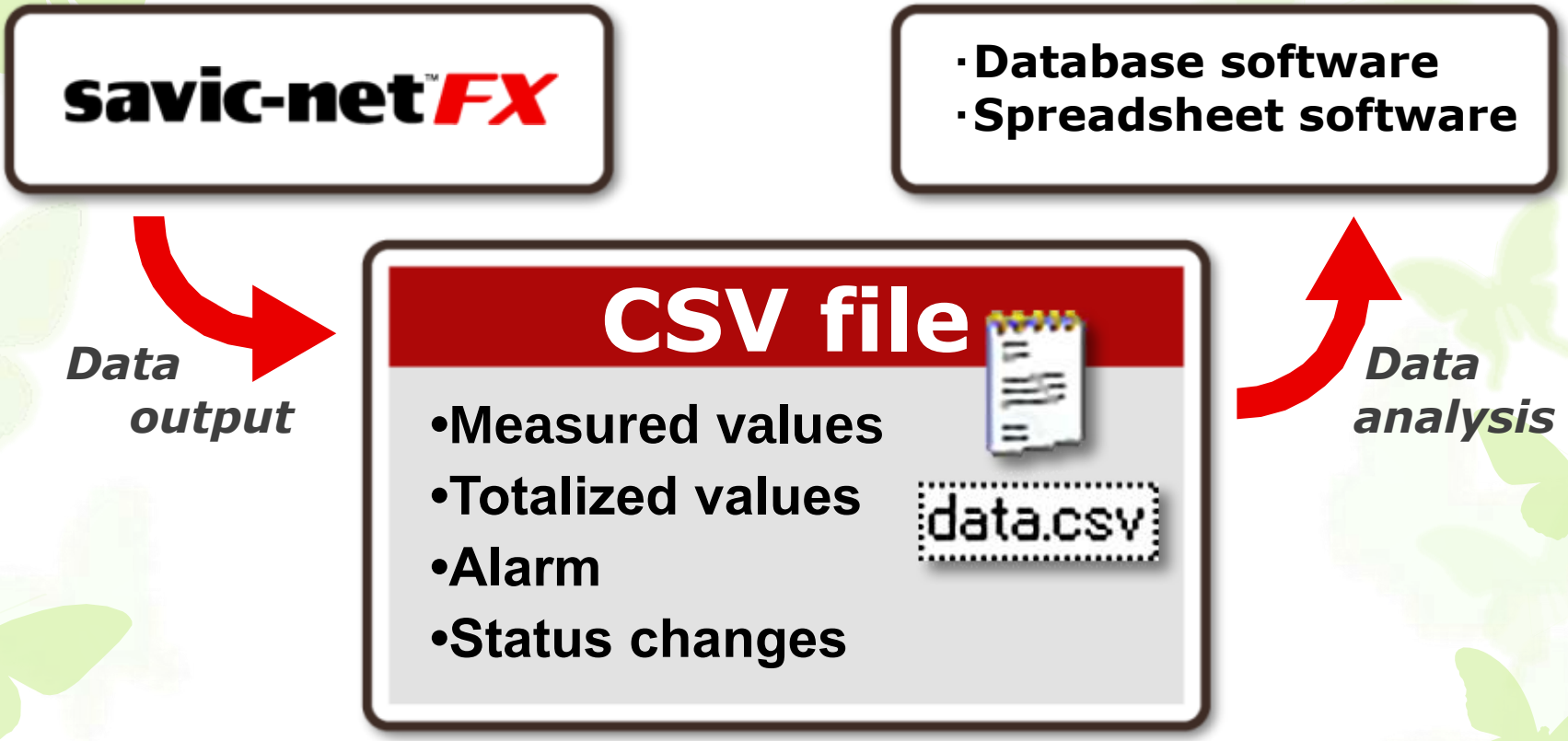
Open Protocol Integration

- Full open system integration through BACnet IP / LON / OPC / Modbus

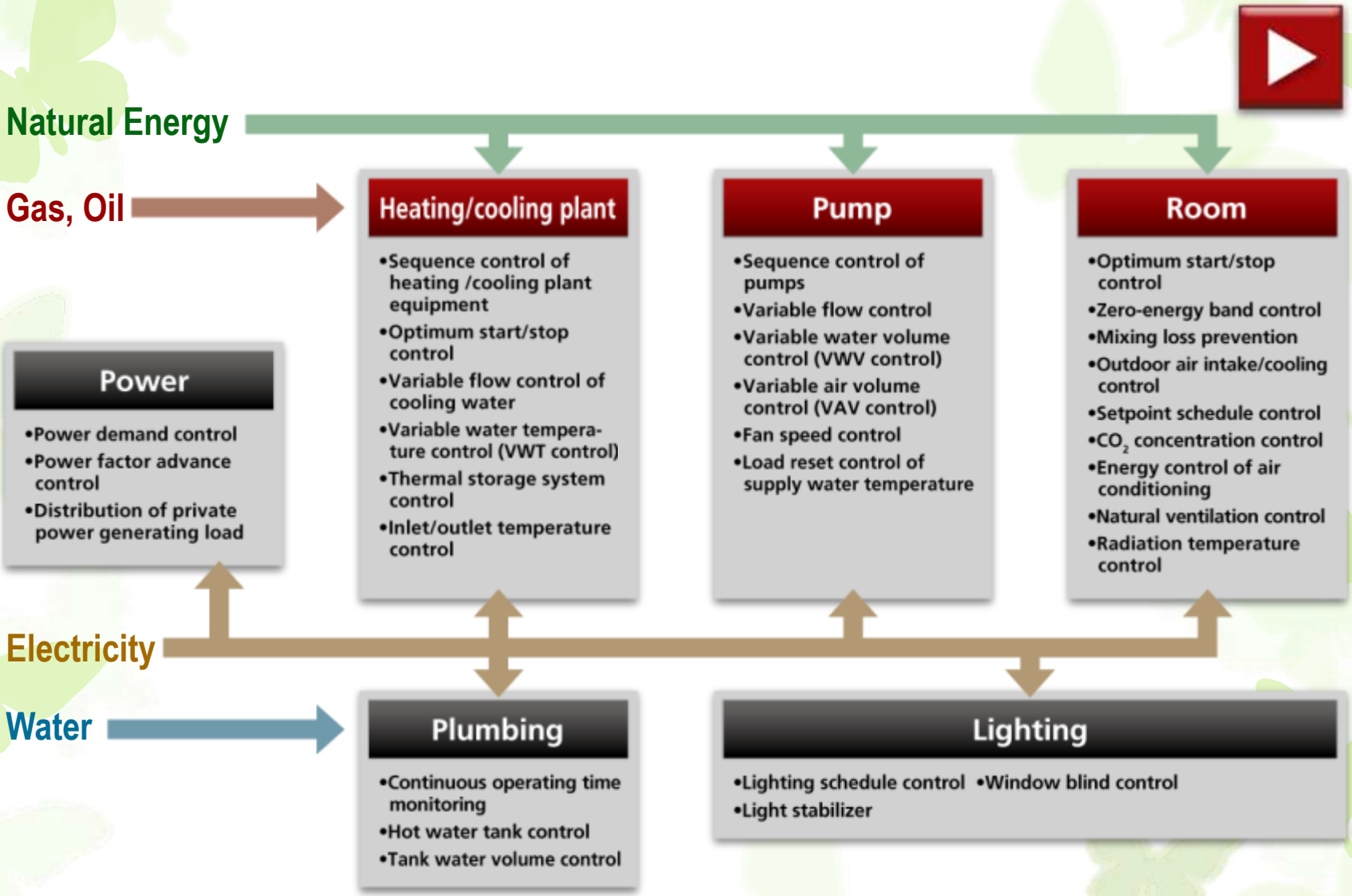


Open Data

- Record data can be output for customer use



Energy-saving

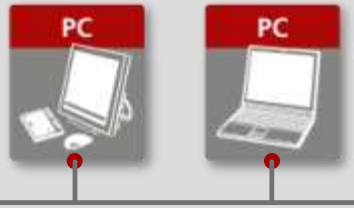


Scalability

Up to 5,000 objects

System Servers
Management
Integration Server (

Client PC



- 5,000 objects / MIS
- Manages all web operation displays.
- History data storage.

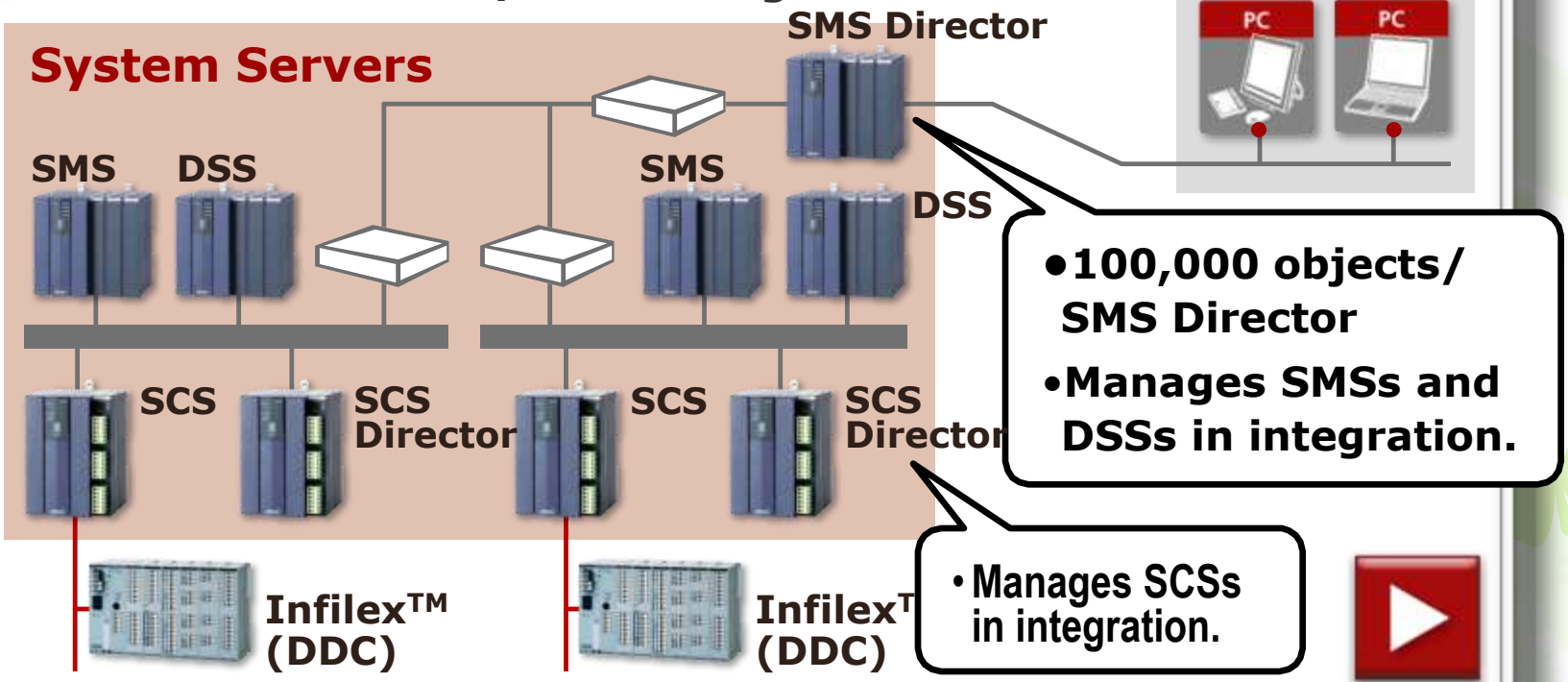
System Core Server (SCS)

- 1,000 data points / SCS
- Manages DDCs in integration.

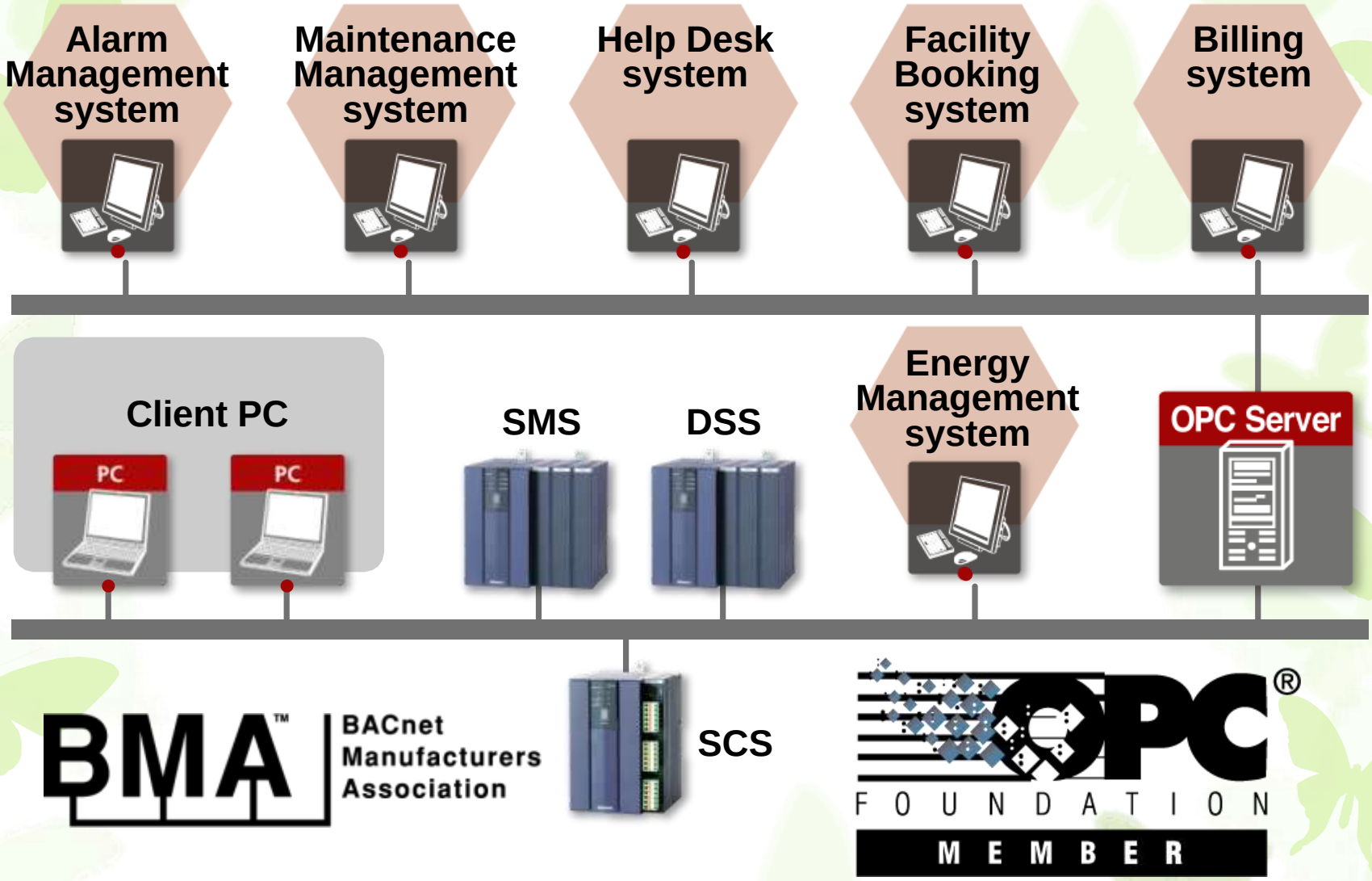
Infilex™ (DDC)

Scalability

More than 30,000 objects



Expandability



BMA™ BACnet Manufacturers Association

OPC® FOUNDATION MEMBER

LonTalk Controllers

- LonTalk Controllers of various types
- Each controller stores weekly operation schedule of individual equipment.
- The automatic operation of equipment continues even if the communication with SCS fails.

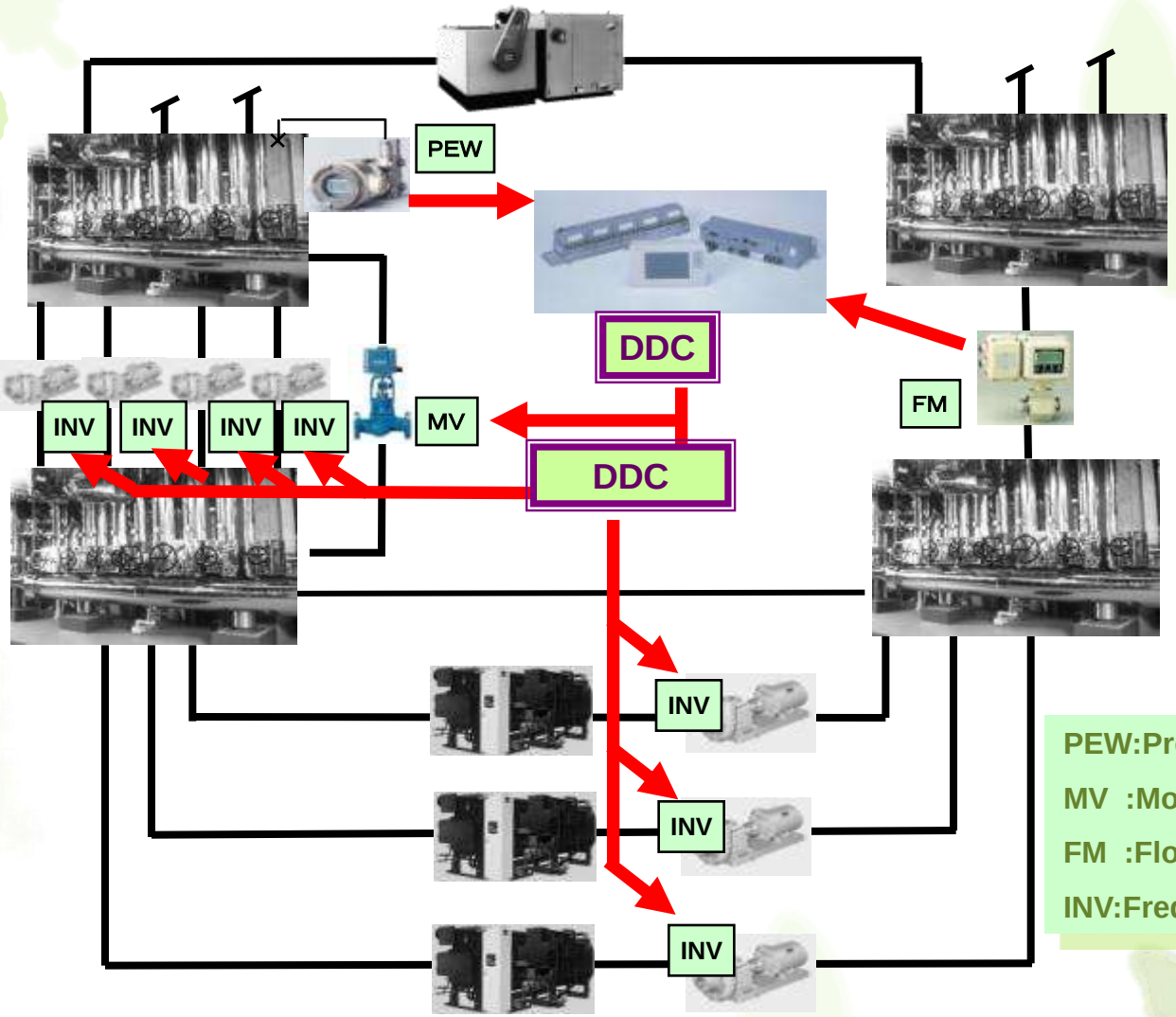
Infilex GC Multipurpose Controller (WY5311)	**Infilex VC** VAV Controller with Damper Actuator (WY5306)
Infilex GD Multipurpose Data Gathering Panel (WY5310)	**Infilex FC** Fan Coil Unit Controller (WY5305)
I/O modules I/O modules for Infilex GC/GD (RY50XX)	**IAC** Intelligent AHU Controller (WY7307)
Infilex AC AHU Controller (WY5317C)	**PMX-III** Paramatrix III (WY7400)
Infilex ZM Zone Manager (WY5322)	**Operator Panel** Panel-mount type(QY5100)/Integral type(RY5001)

IP Controllers

- IP Controller connects to Ethernet directly. (Can be used with SCS.)
- Client PC accesses to each IP Controllers.

Infilex GC (IP type) Multipurpose Controller (WY5511)	**Infilex ZM (IP type)** Zone Manager (WY5522)
Infilex GD (IP type) Multipurpose Data Gathering Panel	**IP adaptor for PMX-III** IP adaptor for Paramatrix III (BCY4310)
Infilex AC (IP type) AHU Controller (WY5517C)	

Chiller Load Sequence Schematic



PEW:Pressure transmitter

MV :Motor valve

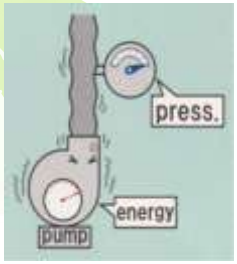
FM :Flow meter

INV:Frequency drive unit

Chiller Energy Savings

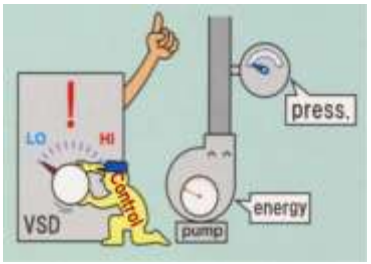
Energy Savings for Chillers

Constant Speed



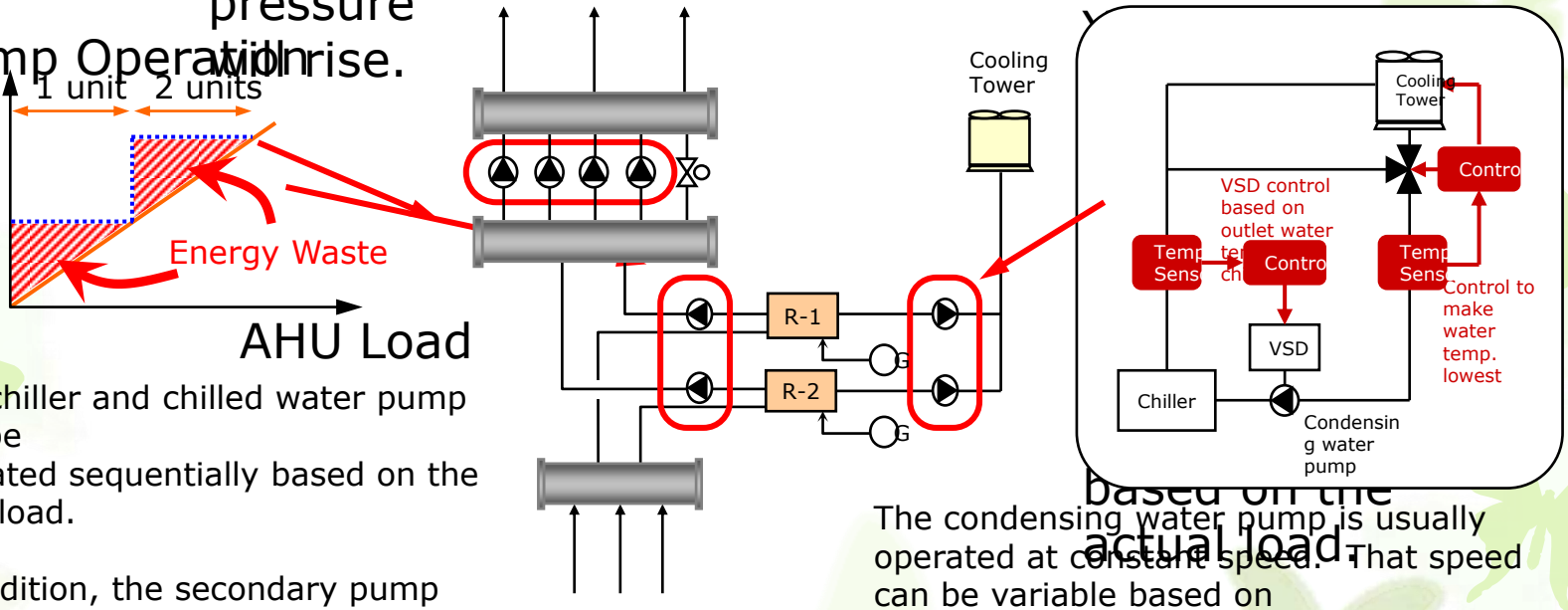
When HVAC load decreases, supply water pressure will rise.

Variable Speed



The VSD of secondary water pumps shall be controlled to reduce a pressure by [illegible] based on the actual load.

Sequential and Variable Control



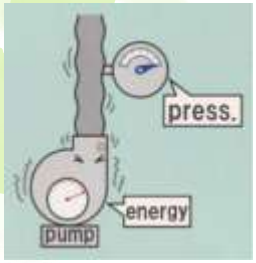
The chiller and chilled water pump can be operated sequentially based on the heat load.

In addition, the secondary pump should be controlled with variable speed to reduce unnecessary electric power waste.

The condensing water pump is usually operated at constant speed. That speed can be variable based on the water temperature which is sensed chiller load.

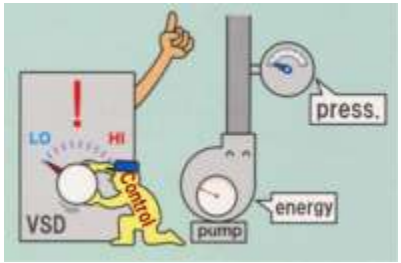
Energy Savings for Chillers

Constant Speed



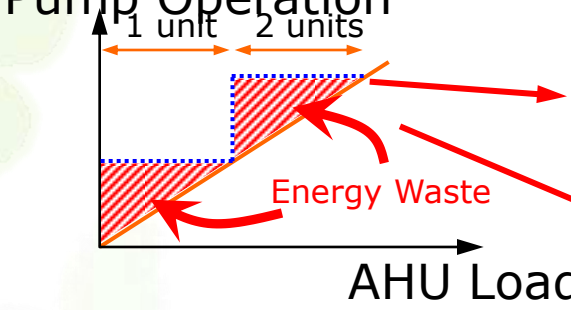
When HVAC load decreases, supply water pressure will rise.

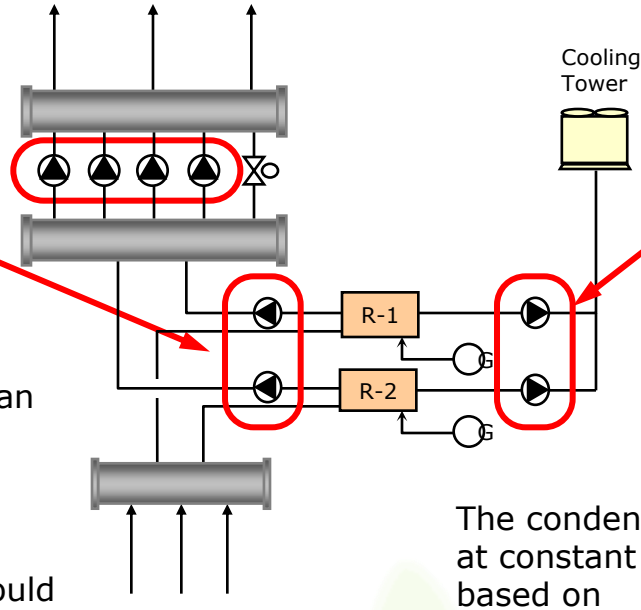
Variable Speed

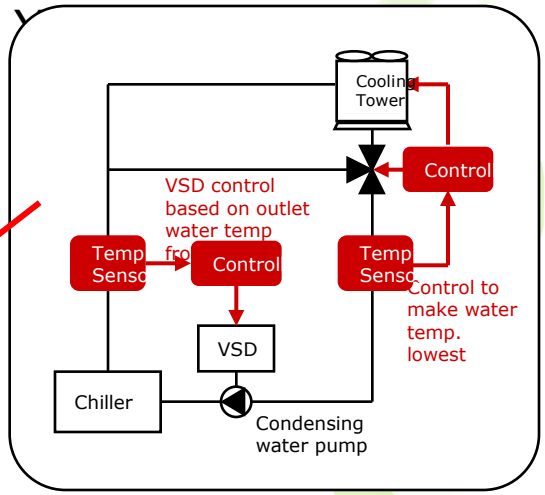


The VSD of secondary water pumps shall be controlled to reduce a pressure by

Sequential and Variable Control







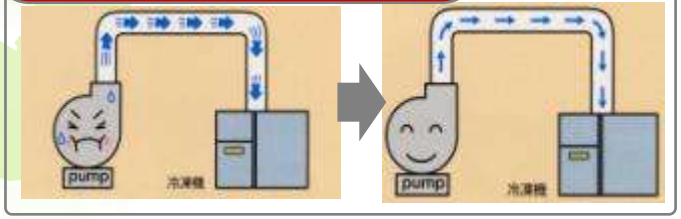
The chiller and chilled water pump can be operated sequentially based on the heat load.

In addition, the secondary pump should be controlled with variable speed to reduce unnecessary electric power waste.

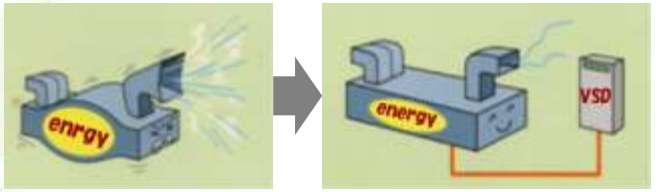
The condensing water pump is usually operated at constant speed. That speed can be variable based on the water temperature which is sensed chiller load.

Energy Saving Execution

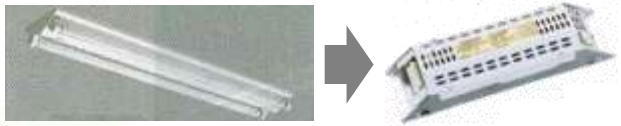
Pump Control



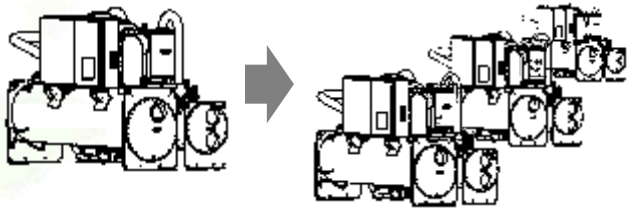
Fan Control



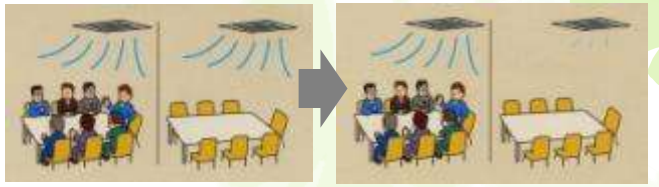
Efficient Product



Efficient Facility



Ventilation Control



Energy Savings

For the **IMMEDIATE EFFECT**

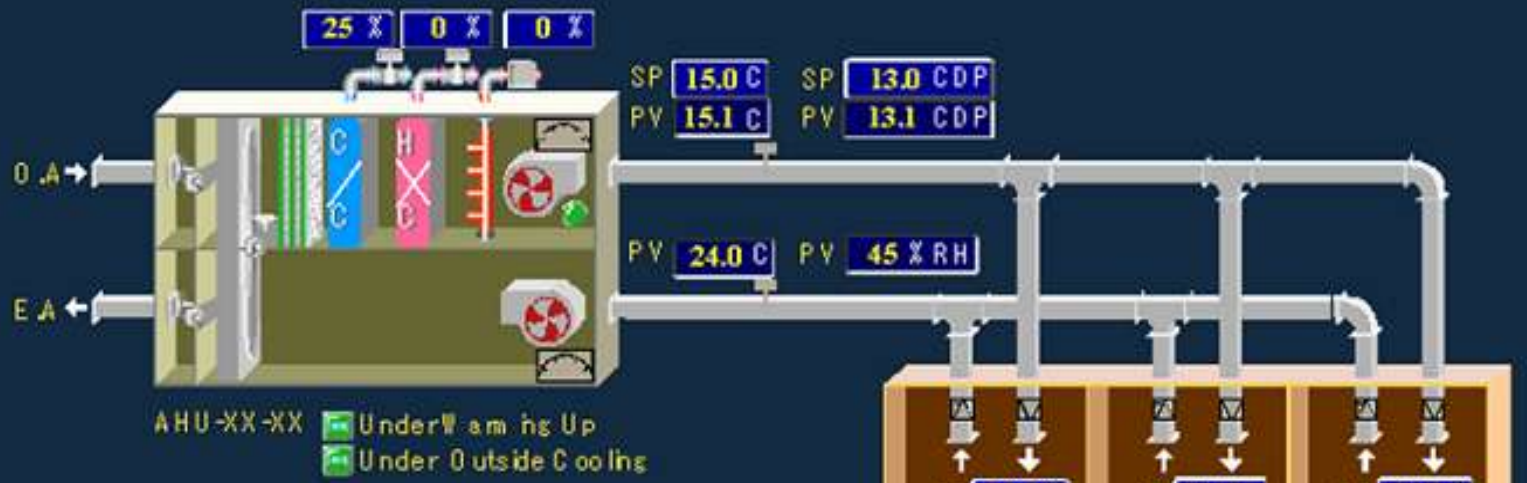
For the heat source

- Heat source operation optimizatio
- Cooling water flow optimization
- Outdoor air volume optimization
- AHU supply air volume optimizatio

Energy-saving effect is verified and evaluate based on the BEMS data

What's VAV Control

Achieving space comfortable environment in desired condition.
Saving fan energy with VSD control.

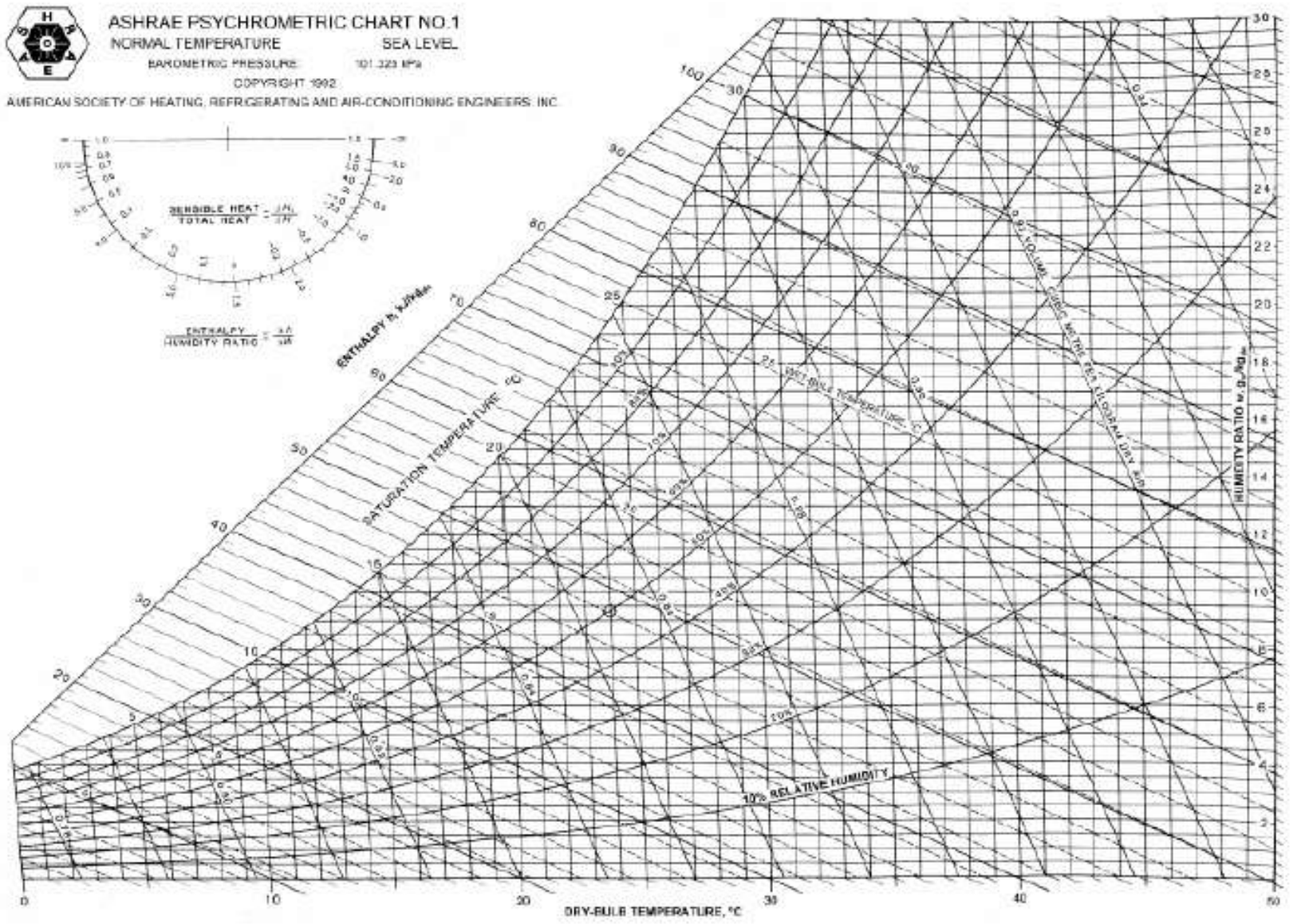


1. By applying variable air volume control we can achieve comfortable environment.

2. Proportional to supply air volume decrease, VSD will be control to reduce fan energy comsumption.

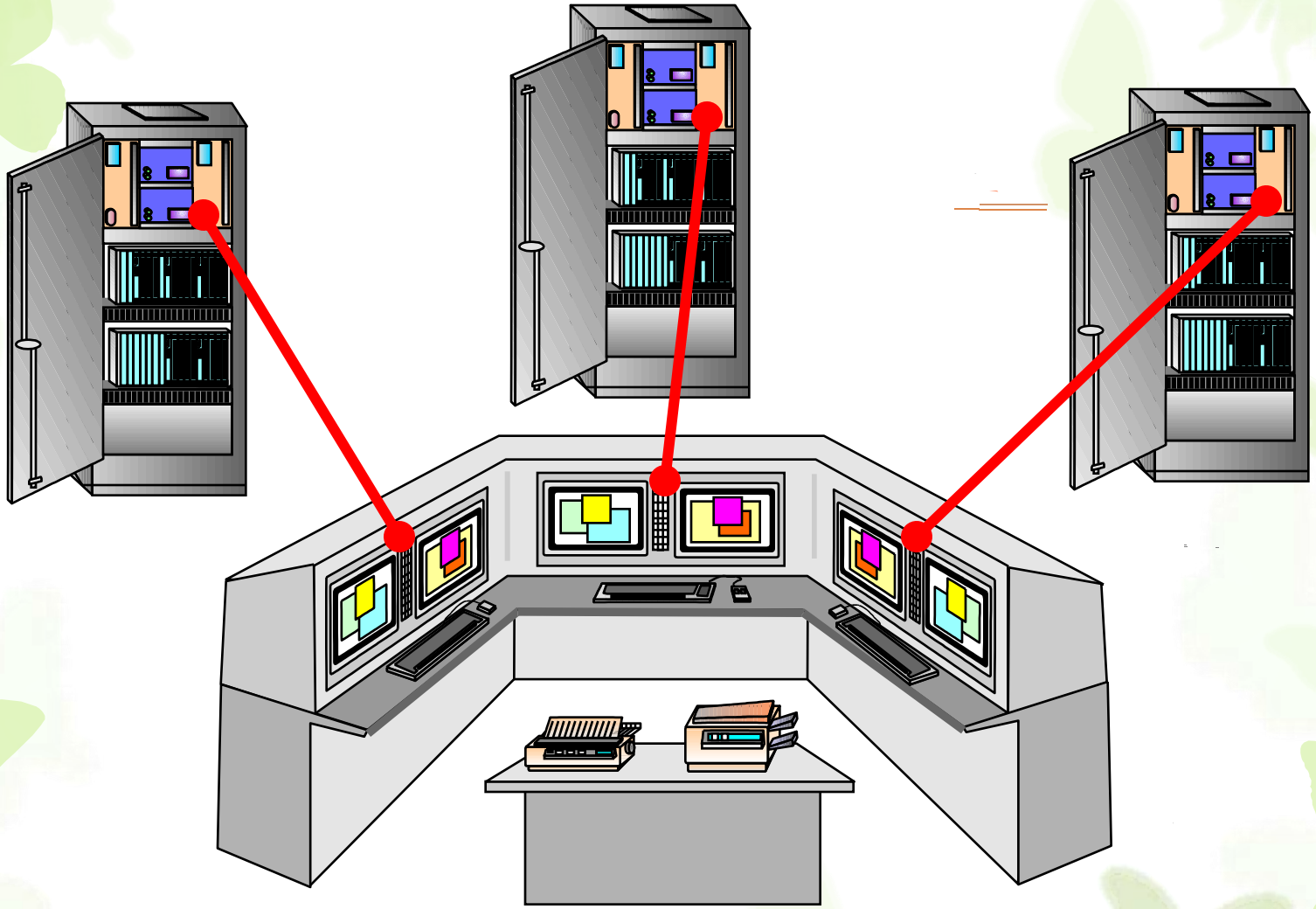
3. Effective in solving chilled water return temperature problem.

VAV	XXF Room 1	XXF Room 2	XXF Room 3
Flow Measurement	790 CMH	790 CMH	790 CMH
Flow Demand	800 CMH	800 CMH	800 CMH
Maximum Flow	1000 CMH	1000 CMH	1000 CMH
Minimum Flow	300 CMH	300 CMH	300 CMH
Pressure States			
Control States			
VAV Failure			


ASHRAE PSYCHROMETRIC CHART NO.1
NORMAL TEMPERATURE
SEA LEVEL
BAROMETRIC PRESSURE: 101.325 kPa
COPYRIGHT 1992
AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC.
SENSIBLE HEAT / TOTAL HEAT = ΔH / Δh
ENTHALPY / HUMIDITY RATIO = Δh / Δω
ENTHALPY, h, kJ/kg dry air
SATURATION TEMPERATURE, °C
WET-BULB TEMPERATURE, °C
VOLUME, CUBIC METRE PER KILOGRAM DRY AIR
HUMIDITY RATIO, w, g/kg dry air
10% RELATIVE HUMIDITY
DRY-BULB TEMPERATURE, °C

SCADA overview

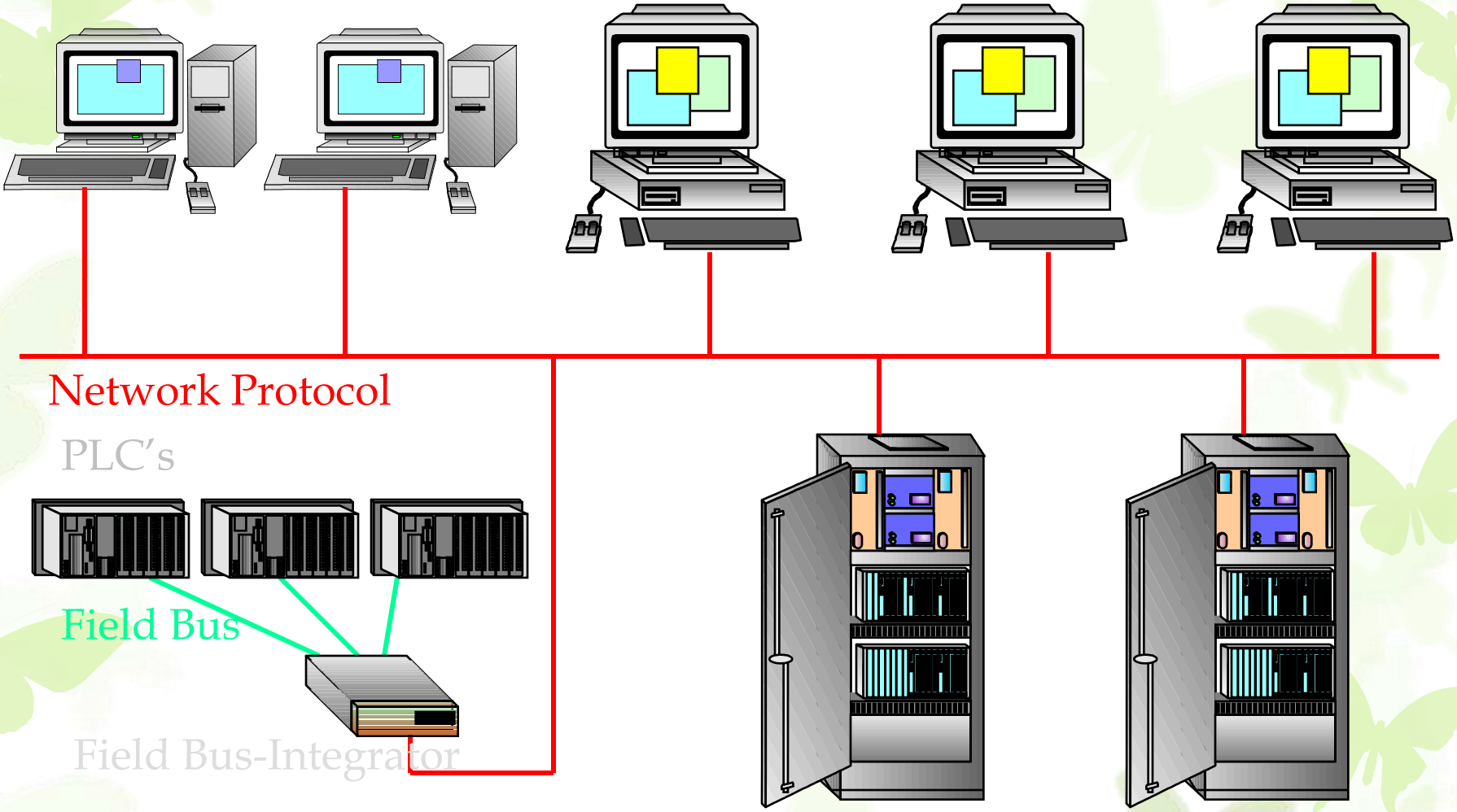
Traditional Control



Traditional Control 2nd

- Dedicated Consoles
- Point to point communication
- No network
  - No remote access
  - No remote diagnostic

Distributed Control

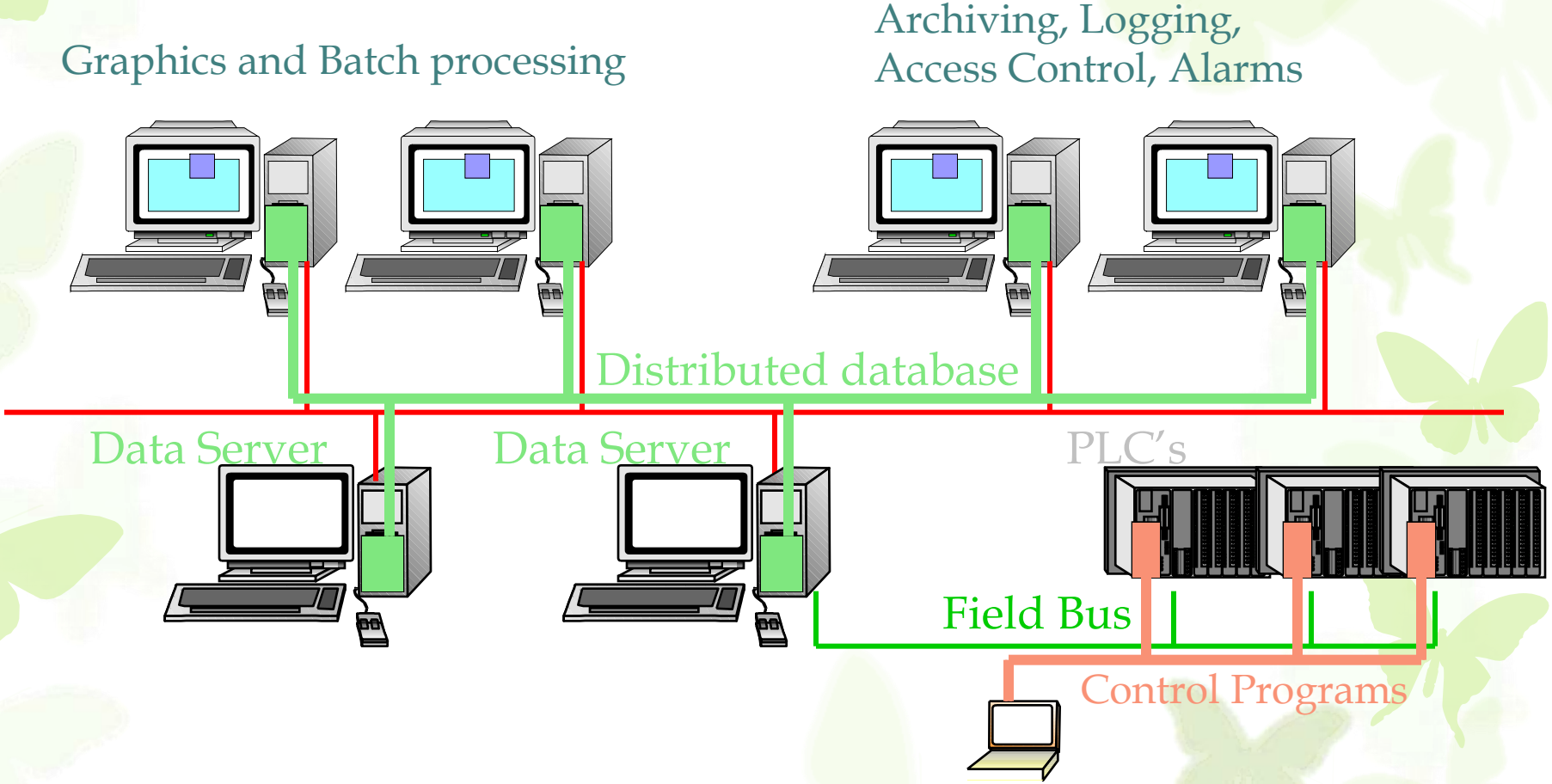


Distributed Control 2nd

- Advantages:
  - Distributed databases/ programs created from a single development environment (also in front end processor)
  - Distributed access
  - Distributed diagnostic
  - Display ‘everything everywhere’
- Disadvantages:
  - None of the DC systems are compatible to each other
- Difficult:
  - Integration of various field bus components

SCADA ?

Supervisory Control **And** **Data Acquisition**



Harmonas DEO

Advance Automation System

azbil BERCA

PT. Azbil Berca Indonesia.

Harmonas-DEO

- History
- System Architecture
- DEO Nodes – DOSS, DOHS
- Operations & Engineering
- DEO Node – TSS for OperationAnywhere
- DEO Nodes - DOPC, DGPL, DOFC

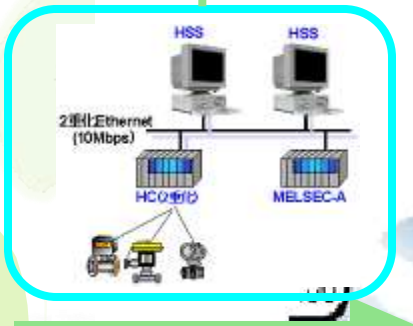
System History & Migration Path

Upgrade

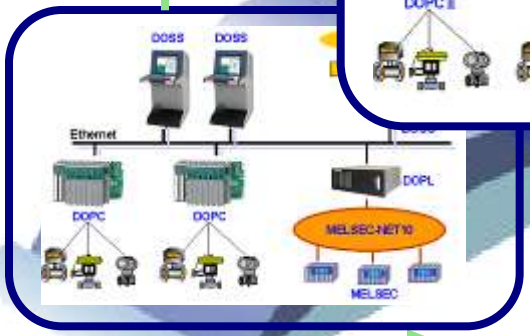
Release Harmonas Concept
- PC Based HMI
- Ethernet I/F
- Visual Engineering （RTC）
- Redundant controller

Enhanced to large size plant
- Area, Unit management
- Upgrade Controller capacity
- New I/O module
- PLC Gateway

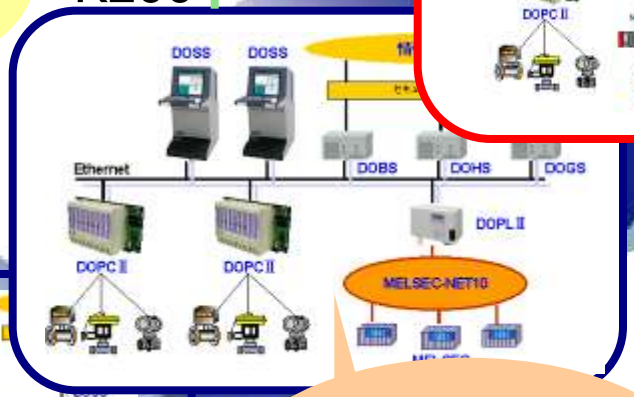
~R30



R100

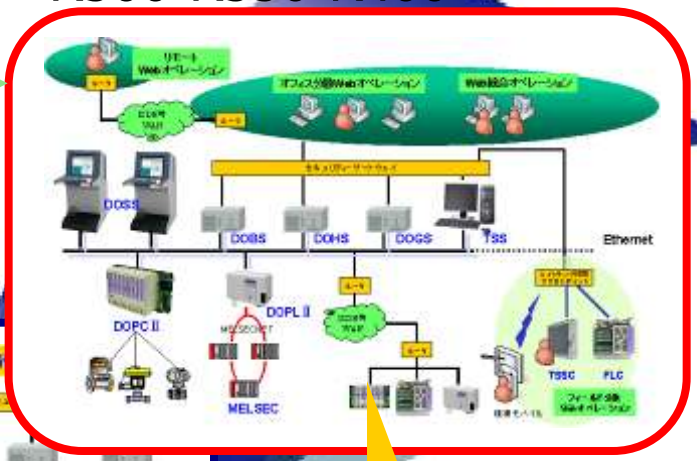


R200



Release New Controller
- Triple redundant DOPC-II
- New PLC I/F: DOPL-II
- Open History DB

R300-R330-R400



WEB operation
- Real time WEB server
- Report on Ethernet
- Field operation device
- Operation by network client PC

WindowsNT3.51 → Windows NT4.0 → Windows2000 → WindowsXP

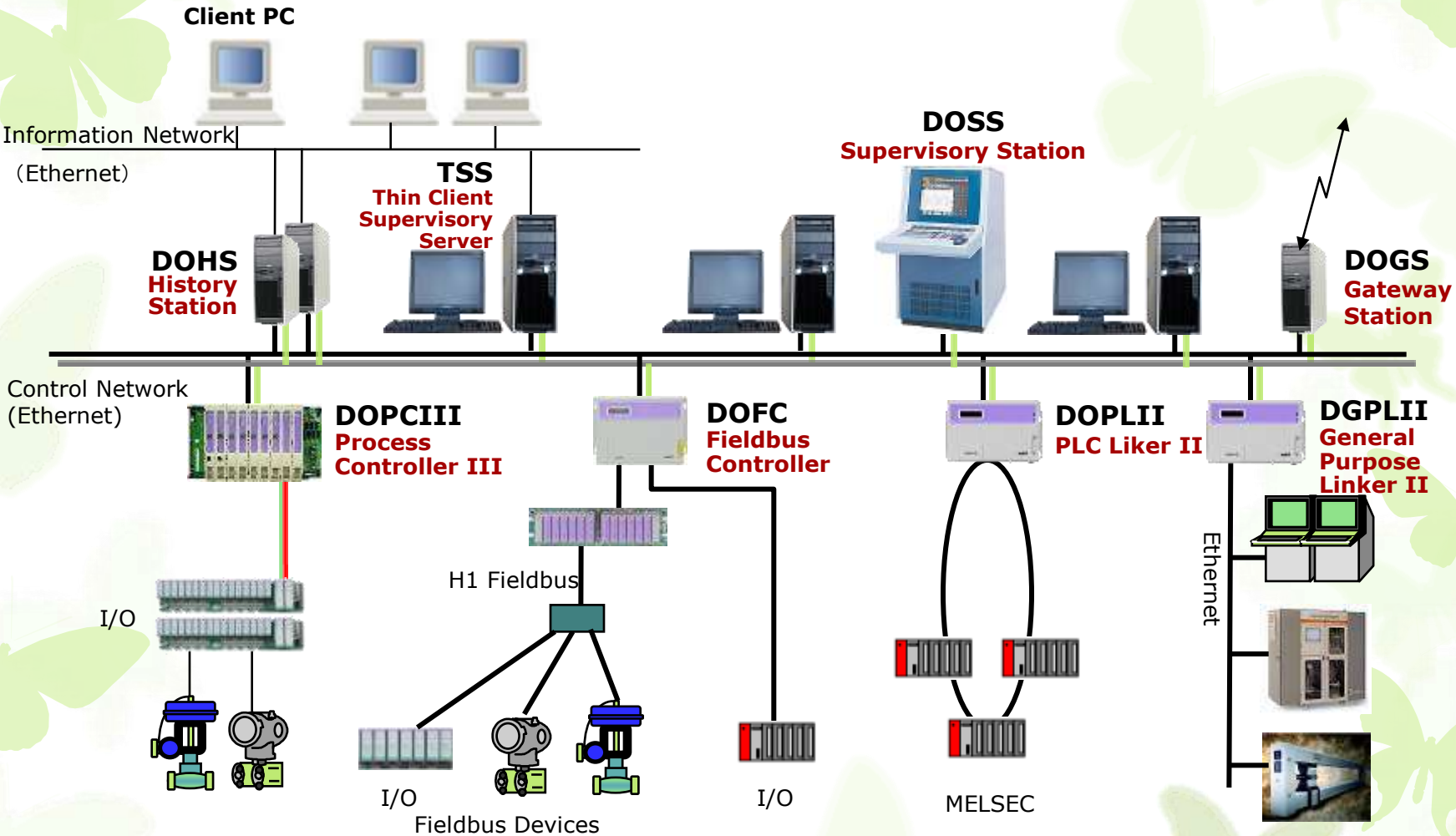
Windows 2000 Server　Windows Server 2003

Harmonas　**Harmonas－DEO**

DEO - Features

- **Open System Software**
  - **Windows 7 and associated software**
  - **Operator Friendly Human-Machine Interface**
- **Open System Connectivity**
  - **Ethernet, TCP/IP**
  - **Flexible connectivity for information system**
  - **Data reference on MS EXCEL, ACCESS, IE, etc.**
  - **Subsystem integration**
- **Foundation Fieldbus interface**

Harmonas-DEO System <Minimum architecture>



Nodes abbreviation

Name	Description
DOSS	DEO Open Supervisory Station
DOSS_H	DEO Open Supervisory Station with Open History Station
DOHS	DEO Open History Station
DOGS	DEO Open Gateway Station
DOPC III	DEO Open Process Controller
DOPL II	DEO Open PLC Linker
DOFC	DEO Open Fieldbus Controller
DGPL	DEO General Purpose Linker

System Capability

Capacity	60,000 parameters / DOSS
System Components	Max. 126 Nodes
	DOSS 32
	DOPC/DOPLII 96
Nodes DEO-NET	Redundant
Communication Speed	10M/100M Bits Per Second
Communication Protocol	Ethernet TCP I/P Protocol

Human Interface (DOSS, DOSS_H)

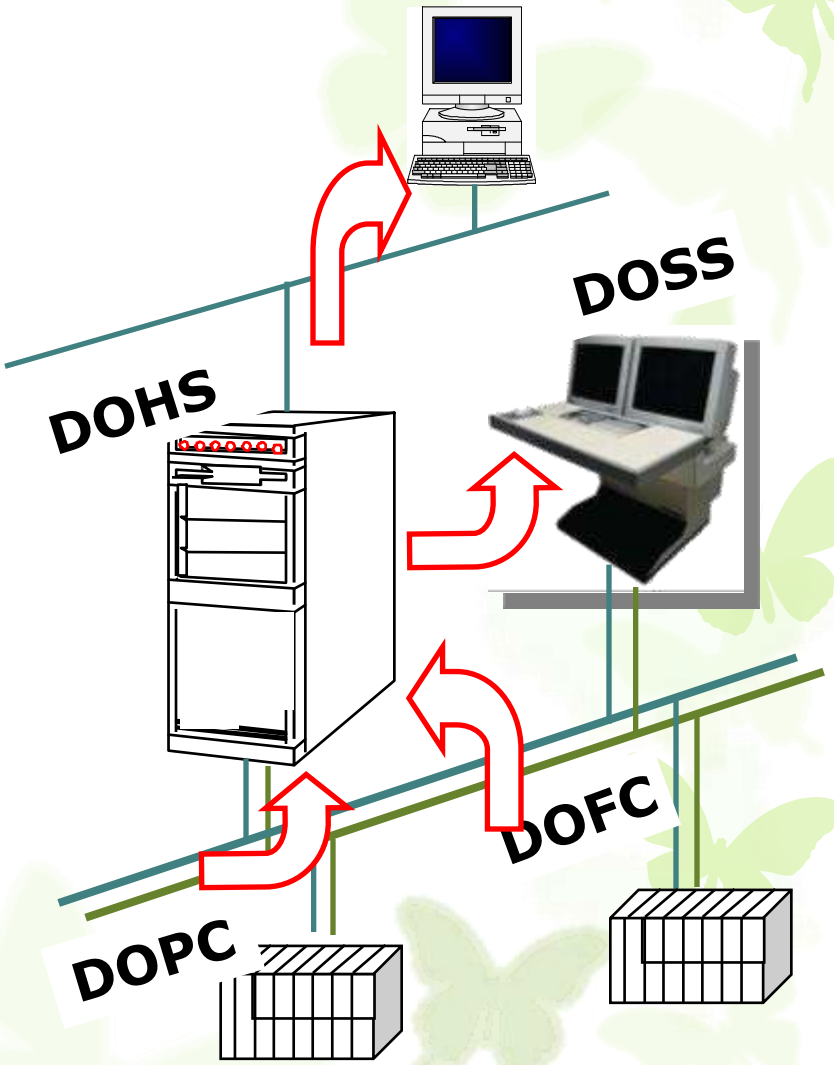
Graphic	: 400 Displays / DOSS
Group	: 400 Displays / DOSS
Trend	: 400 Displays / DOSS
Alarm indication	: 200 Alarms / Summary Display
Operator Message	: 200 Messages/Summary Display
Type of Report	: Daily, Monthly, and Annual

DOSS : Open Supervisory Station

- Various Hardware
  - Desktop Model
  - Flat Console Model
  - Full Console Model
- Redundant Hard Disk Drive
  - RAID (Disk mirroring)
- Pointing device, Keyboard
  - Touch screen, Trackball or Mouse
  - Operator keyboard
  - Engineering Keyboard

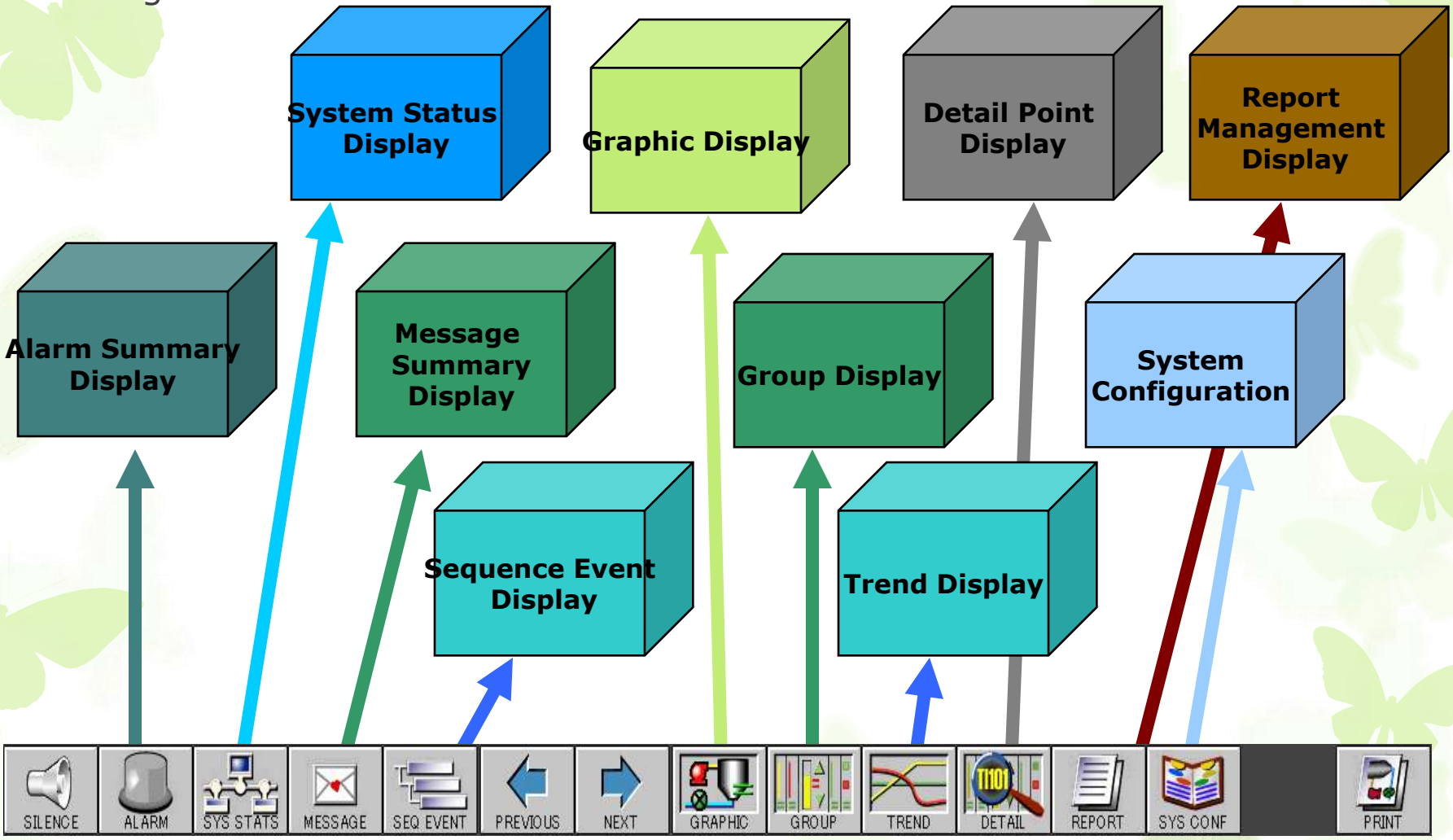
DOHS : DEO Open History Station

- **High Performance Process Data Collection**
  - Periodic basis/Event basis
  - 1 second minimum
  - Long Term Storage
  - Archive data on Removal Media
- **Various events collection**
  - Alarms/Messages/Operator Changes
- **High Reliability**
  - Disk mirroring
- **Open Architecture**
  - Open to Information Network
  - User Friendly GUI by MS Excel, IE



DOSS : Operation

- Quick Call-up from Operation Toolbar
- Configurable Icon Based or Character Based Tool Bar

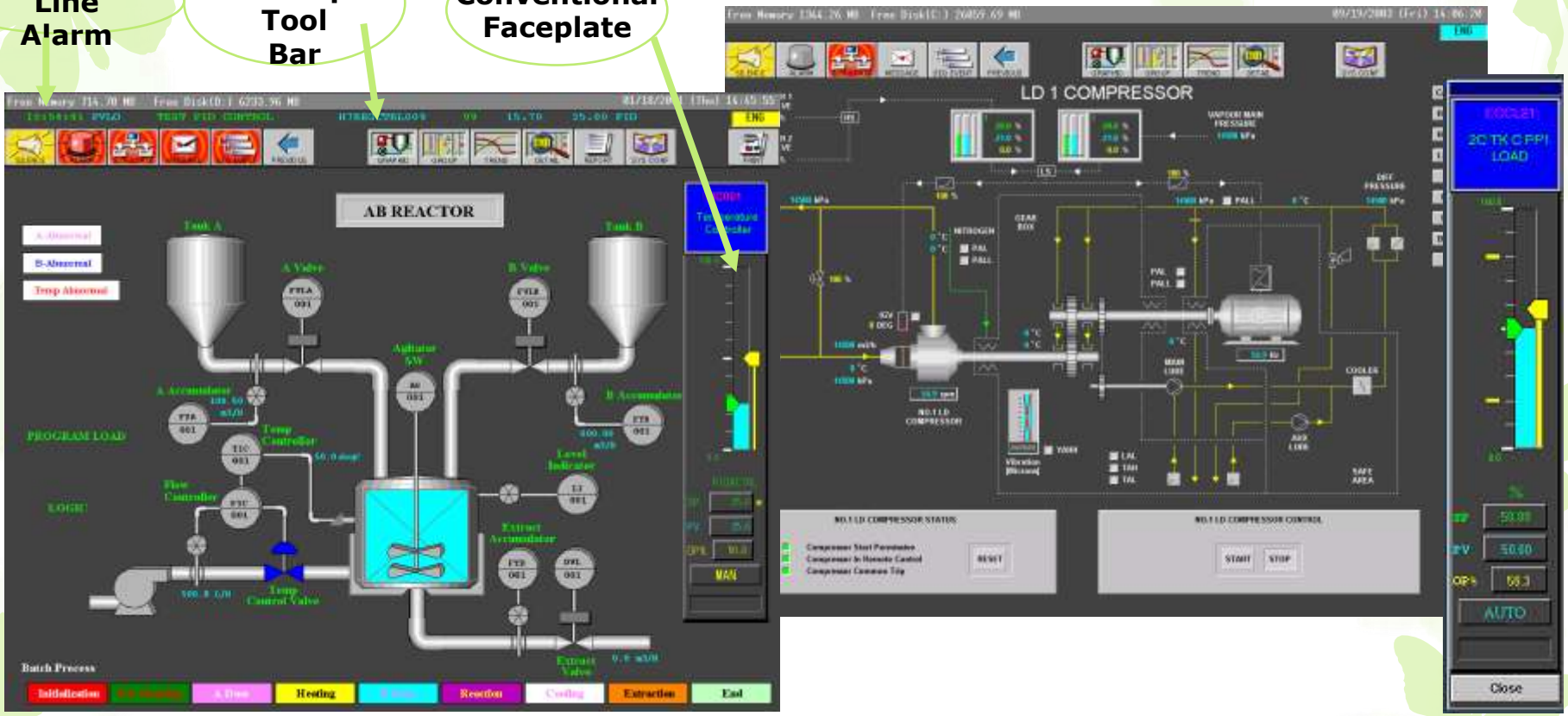


Operation – Graphic Display Layout -

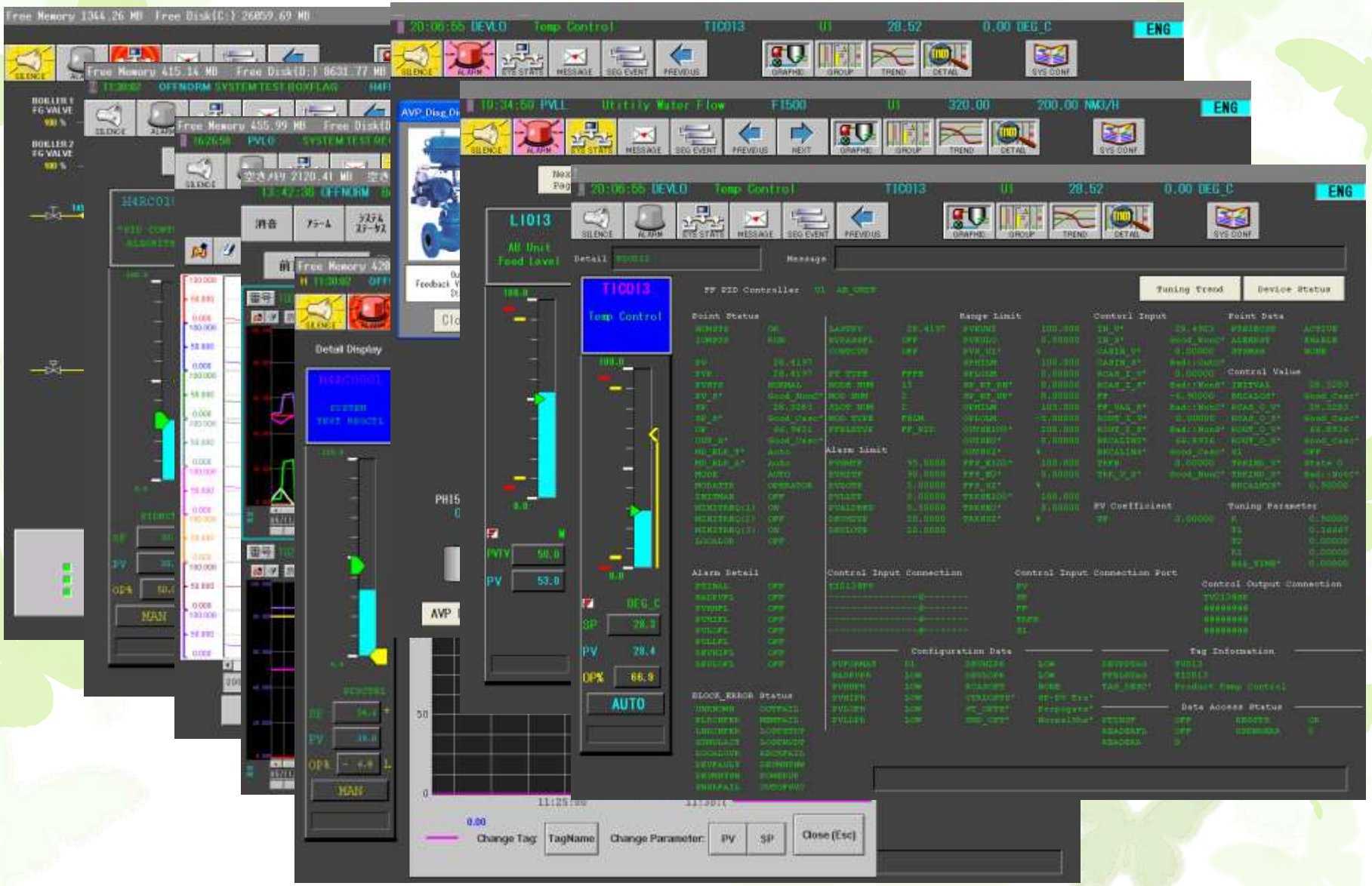
One Line Alarm

Display Call-up Tool Bar

Conventional Faceplate

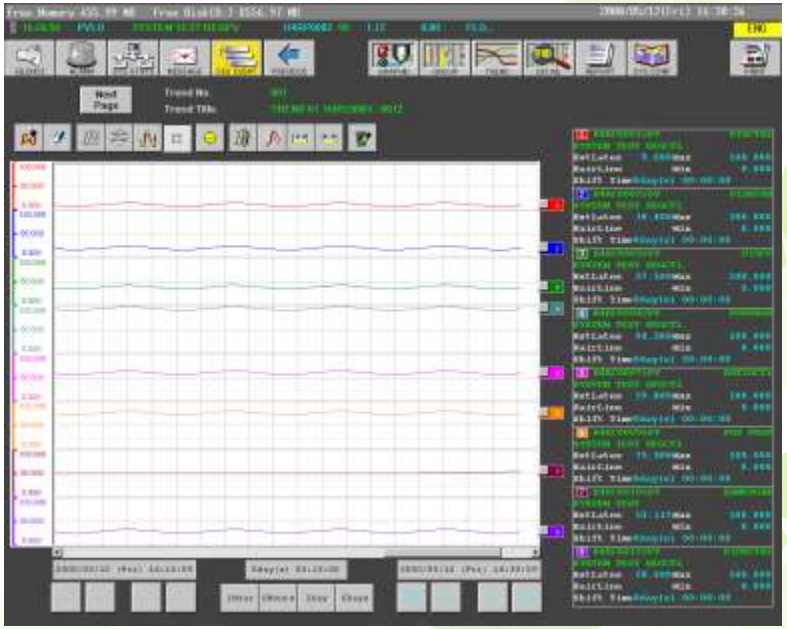


DOSS Displays -Process Operation Displays-



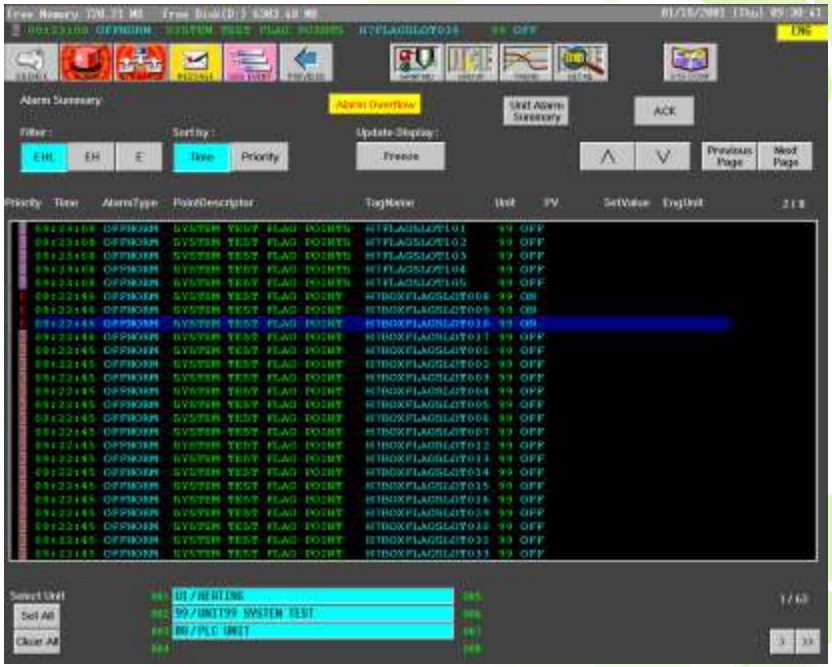
DOSS Displays - Trend Display -

- Multi-function Standard Trend Display
  - Periodical Data collection and storage
    Scan cycle : 1 second minimum
  - Concurrent Data Update
  - Data Insertion to Historical Data Base
  - Interaction of History Data
- Functions in Standard Trend
  - Deviation Monitoring
  - Hair Line Cursor
  - …Etc…



DOSS Displays – Alarm Summary -

- Unit Management
  - Indicate Dedicated Process Unit
  - Max. 500 Units
- Filtering
  - Alarm Priority Level Filtering
- Sorting
  - By Alarm Priority Level
  - By Alarm Time



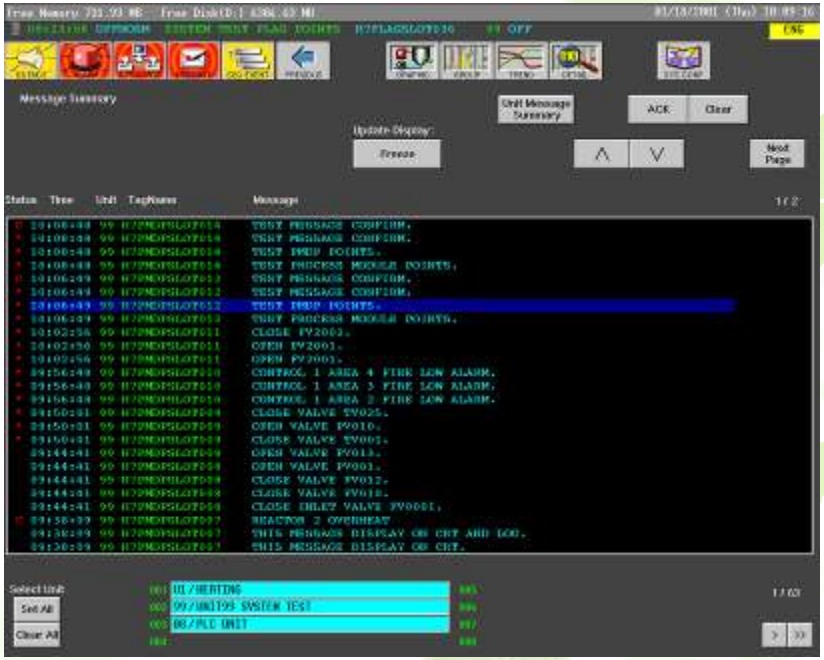
- Freeze Updating
  - Update of Display can be temporarily frozen when large numbers of alarms are generated

DOSS Displays – Message Summary & Sequence Event -

- Unit Management
  - Unit-wide message indication
  - Max.500 Units

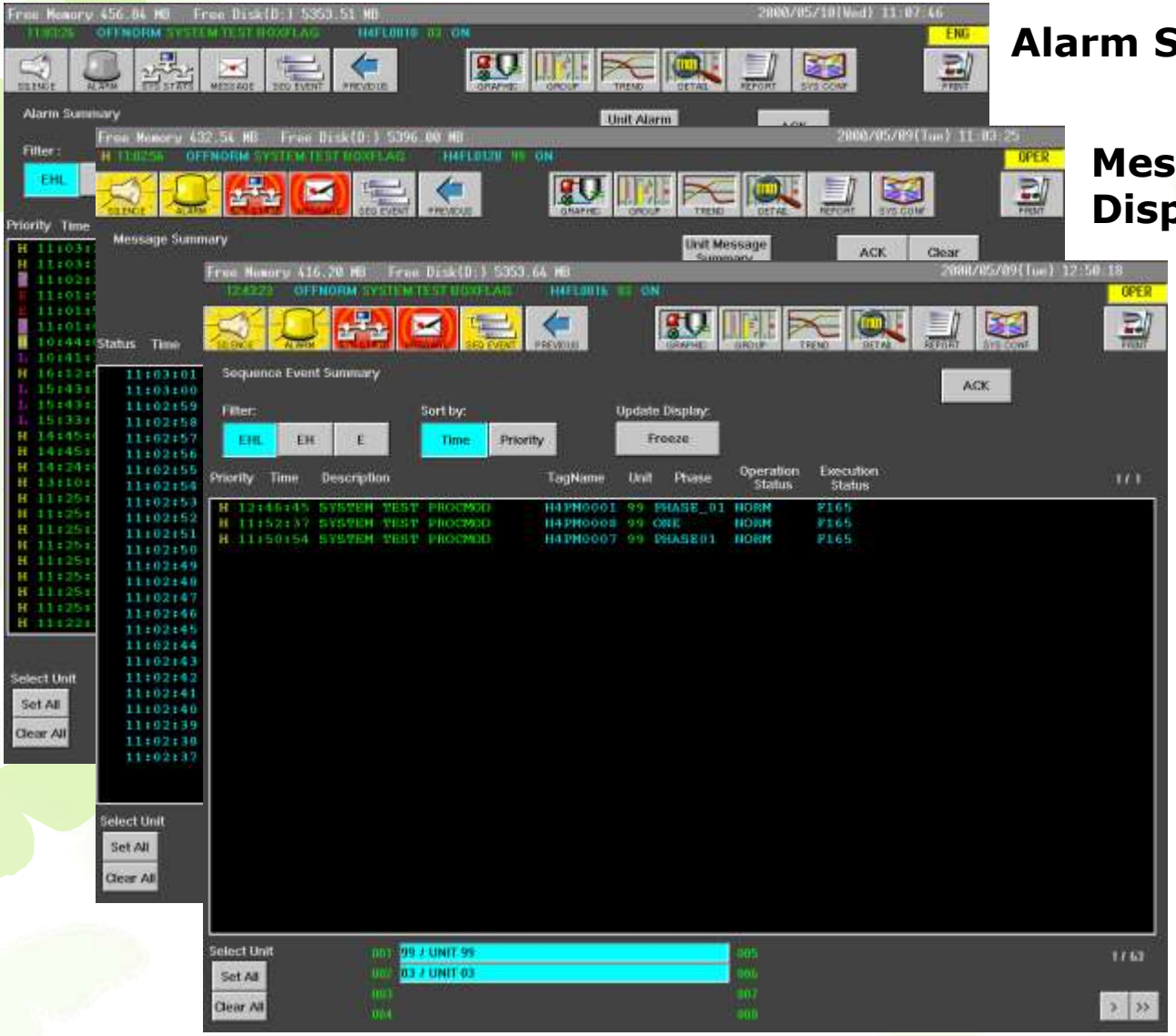
- Freeze Updating
  - Update of Display can be temporarily frozen when large numbers of message are generated

- Sequence Step Indication
  - Indicate Real Time Sequence steps overview of Sequence program status



Message appears for operator action and confirmation.

DOSS Displays –Alarm & Event-

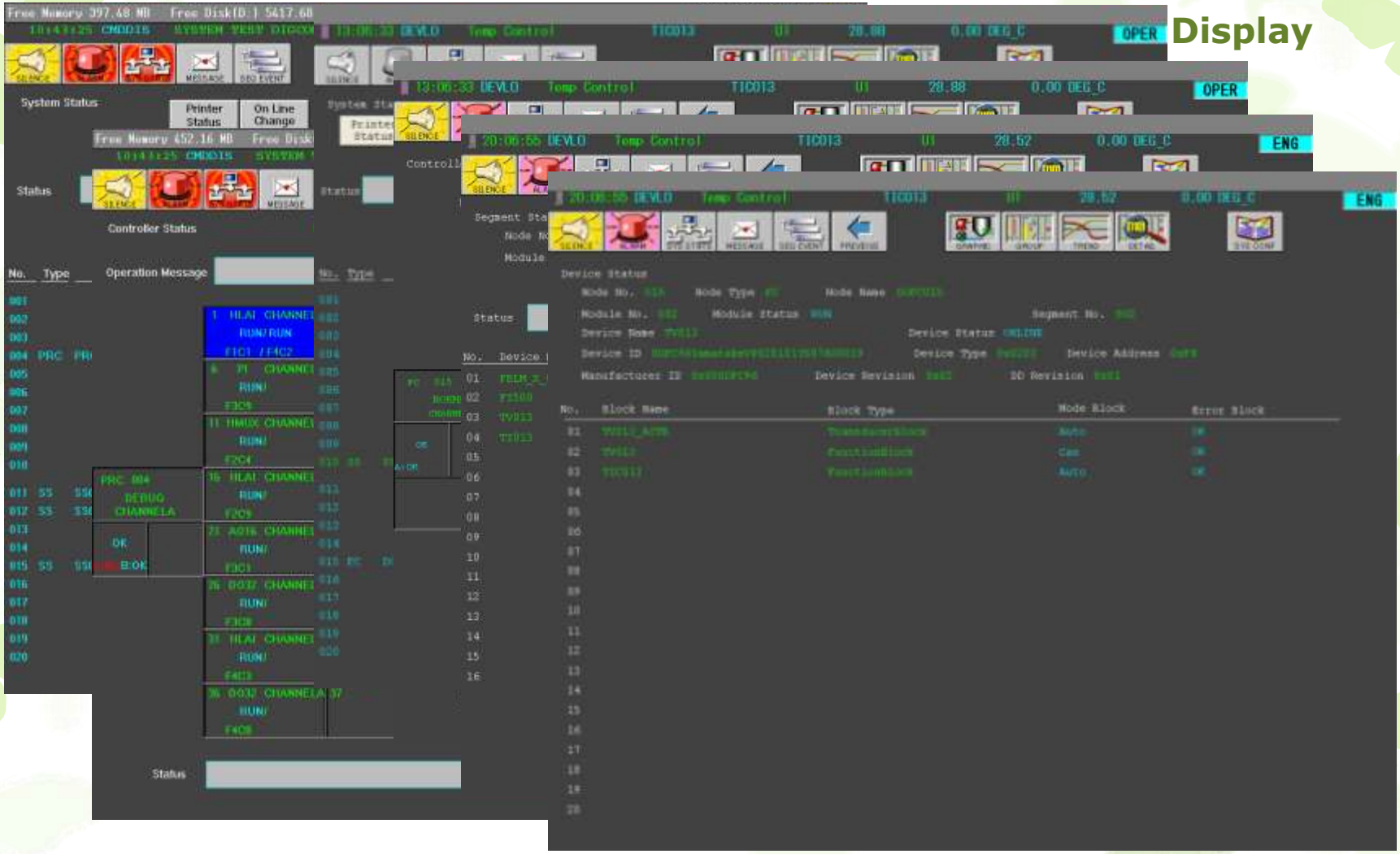


Alarm Summary Display

Message Summary Display

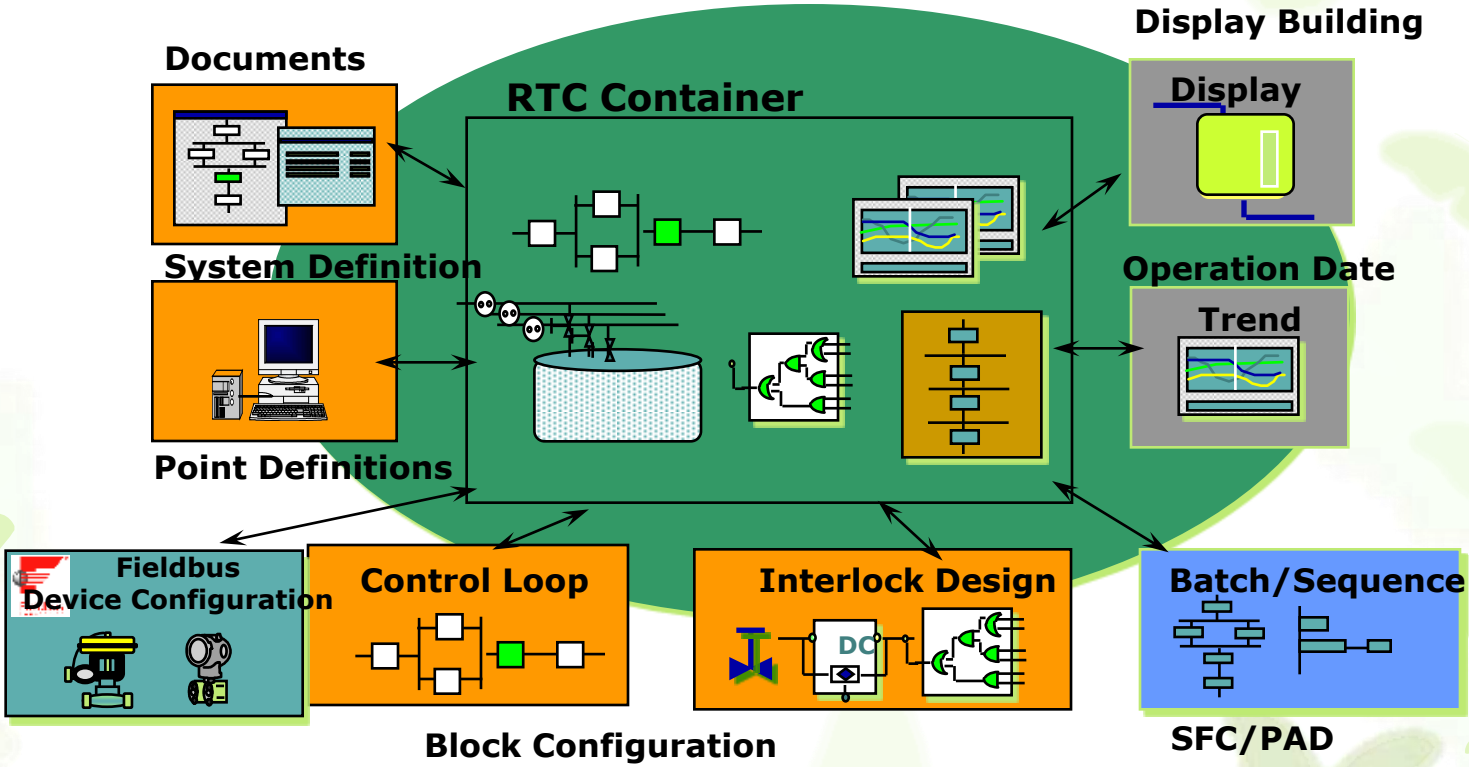
Sequence Event Display

DOSS Displays –System Monitoring-



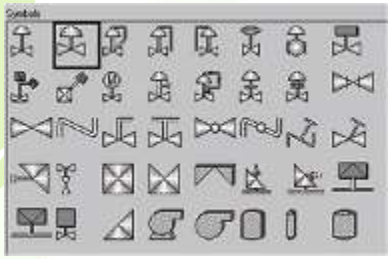
DOSS Engineering – Engineering Environment

- Control Application Builder and Library
- Easy Implementation of a control solution
- Unified Database and documentation

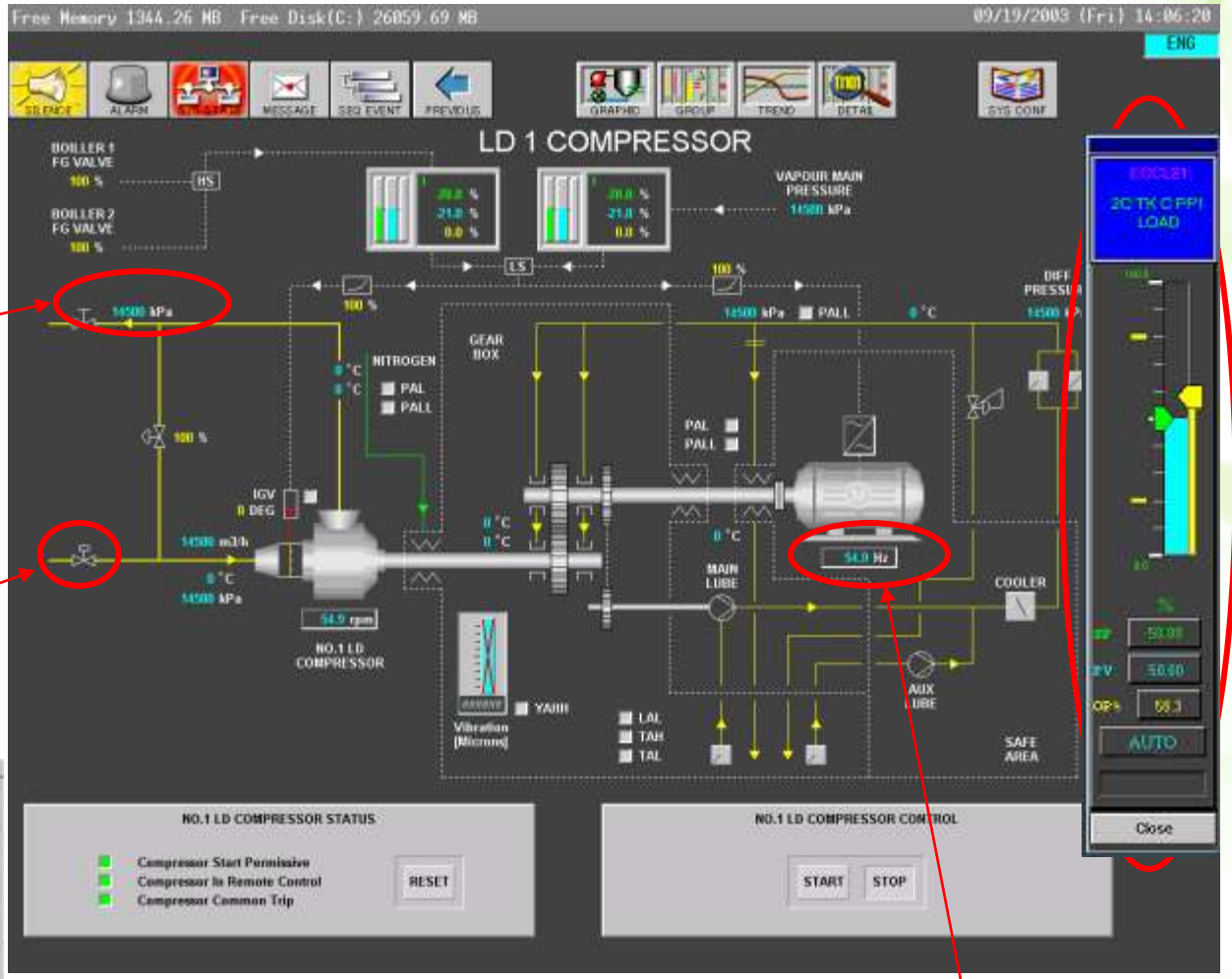


Add Variables

Add Shapes



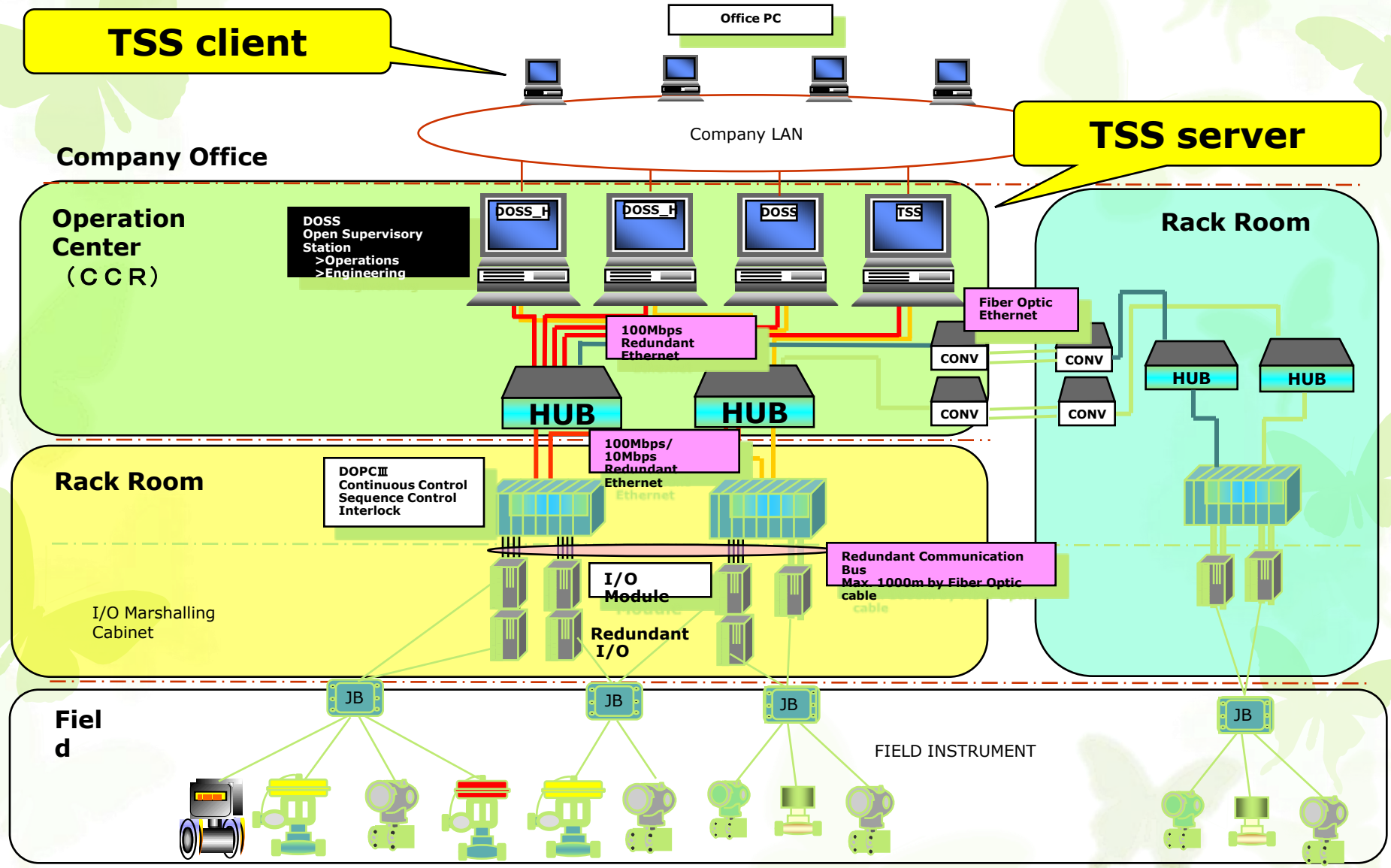
Shape Library



Add Faceplate

Invoke Faceplate

OperationAnywhere - System Architecture

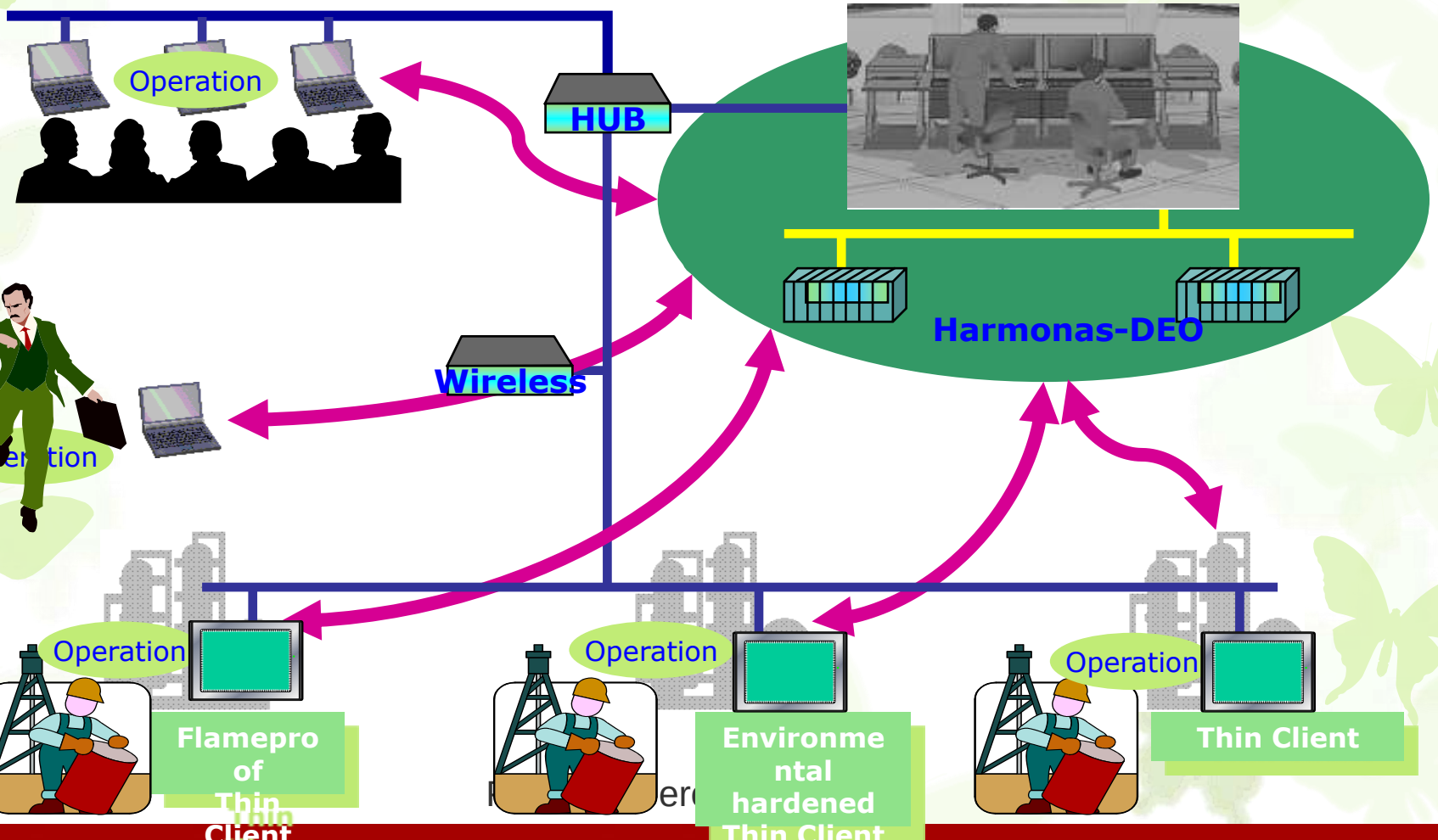


Field Operation (Virtual Control Room)

Plant Operation capability with various kinds of scheme ex.

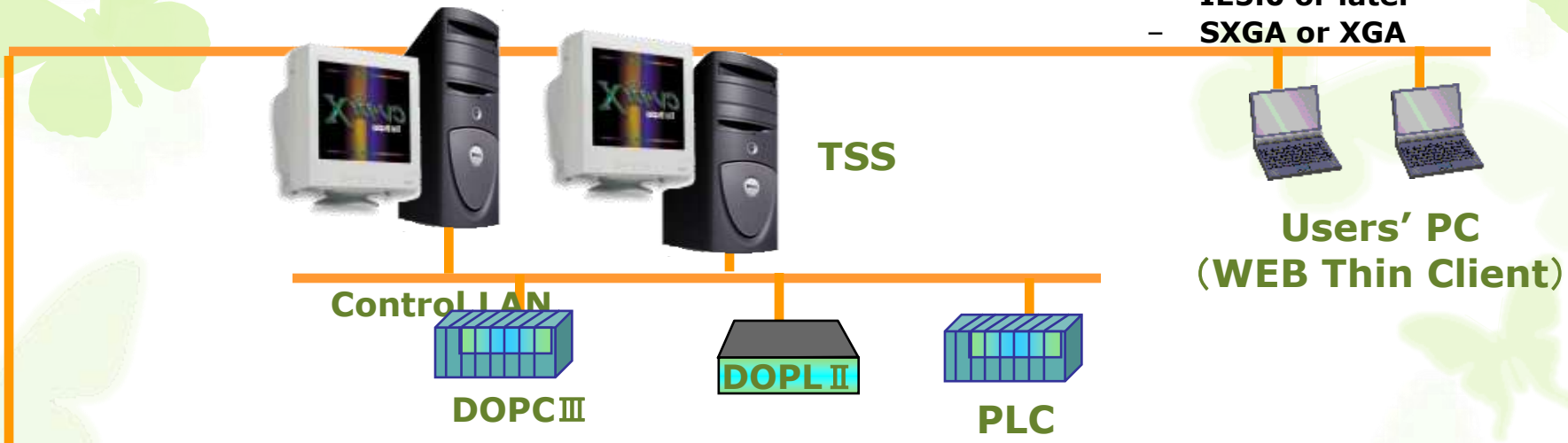
- Field Operation (Virtual Control Room)
- Integrated Operation (Full WEB-based, Multi-Systems)
- Global Operation (Global network)

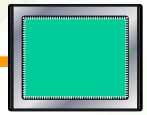
- Mobile Operation
- Station at Hazardous area
- Web-based Engineering

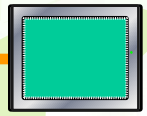


OperationAnywhere Specifications

- Compatible to DEO displays
- Alarm annunciation
- Web Browser
  - IE5.0 or later
  - SXGA or XGA







TSS Client
Windows CE
Field Station

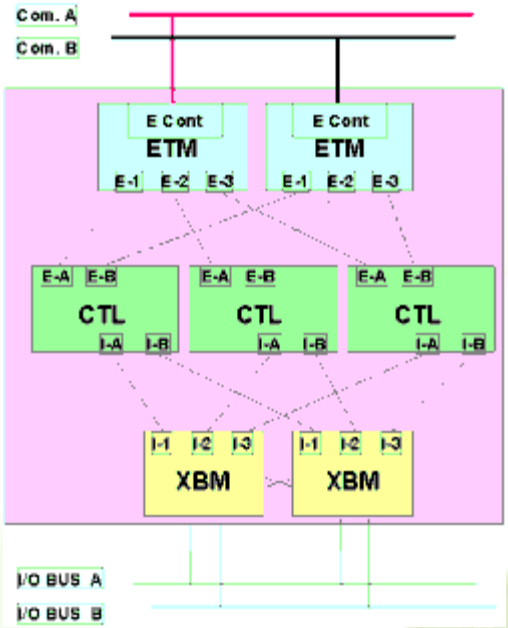
TSSC
Windows CE
Flameproof Station

· No. of Users / Server	: 10 (Concurrent Users)
· Client PC Display resolution	:1280×1024 or 1024×768
· Client PC OS	:Windows2000、XP、98, 7
· No. of Graphics	: 400 / server
· No. of Group Disp.	: 400 / server
· Tuning Disp.	:Various(including Tuning Trend)
· Trends	: 200
· Alarms	: 200
· Operation messages	: 200
· Data Update	: 1sec min.
· Process Manipulation	: Accepted（Read-Only/Opr/Sup/Eng）
· Alarm annunciation	:Buzzer (Both server & client)
· Alarm flicker	:Accepted

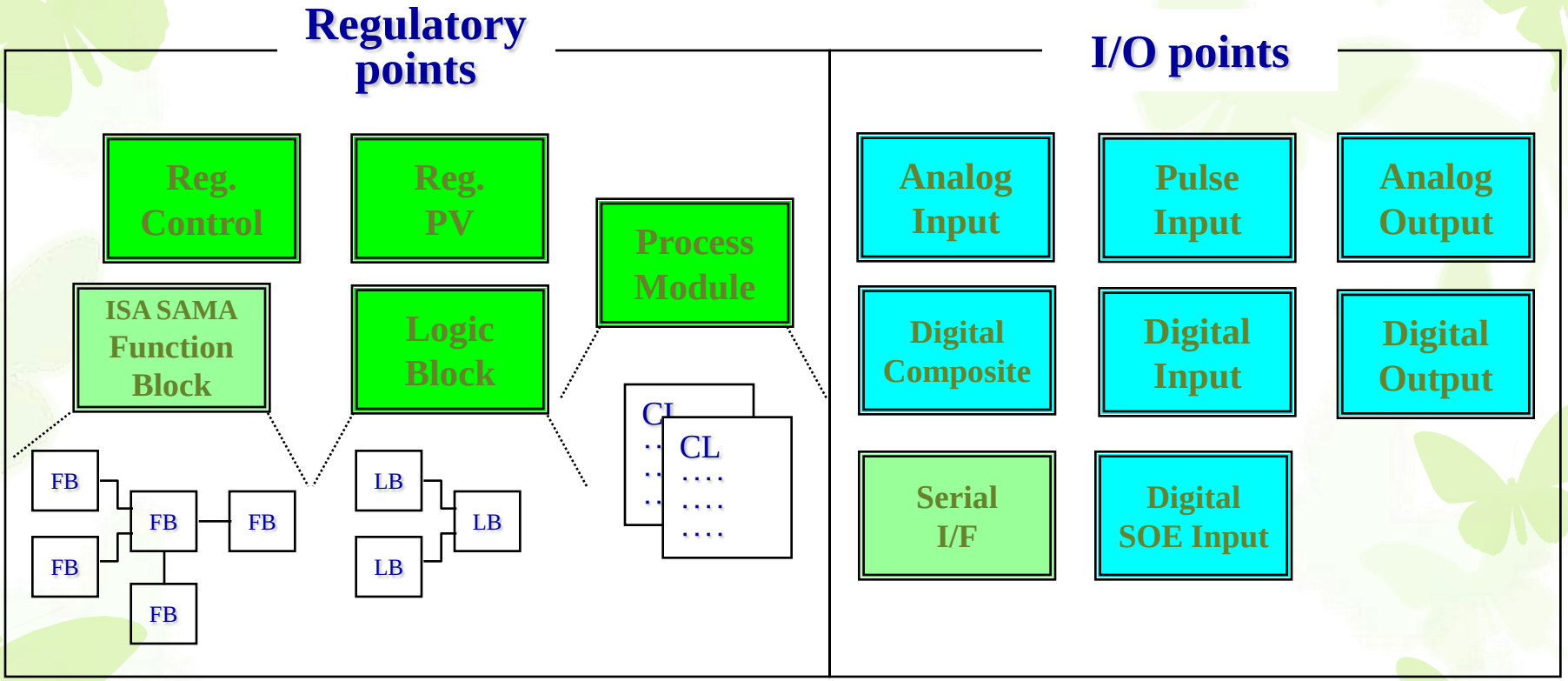
DEO Controller – DOPC-

- Multi-function controller
  - Control loops
  - Logic & Sequence controls
  - I/O Processing
- Redundancy
  - Triple Control module redundancy
  - I/O Bus (called X-Bus)
  - I/O module (option)
- Distributed I/O capability (optical fiber cable available)
- Live maintenance
- Subsystem integration by SIM
- IO Form Factor:
  - File Type IO
  - Distributed IO
  - Distributed IO w/Signal Condition

DOPC III



DEO Controller – Control Data Point -



Most of functions (except for ISA SAMA block) and serial I/F is compatible with others DCS

DEO Controller – Capacity -

ITEM	DESCRIPTION	SPECIFICATION	
1	***CAPACITY***		
	Regulatory Control	640	Loops
	Regulatory PV	320	Loops
	Process Module	512	Points
	Logic	320	Blocks
	Digital Composite	1024	Points
	I/O Module	120	Modules/DOPCIII
2	***PERFORMANCE***		
	Communication Throughput	10,000	Parameters/Sec./ DOPCIII
	Memory Unit	48,000	MU
	X-Bus Communication Rate	5	MBPS

DEO Controller – Distributed I/O Module-

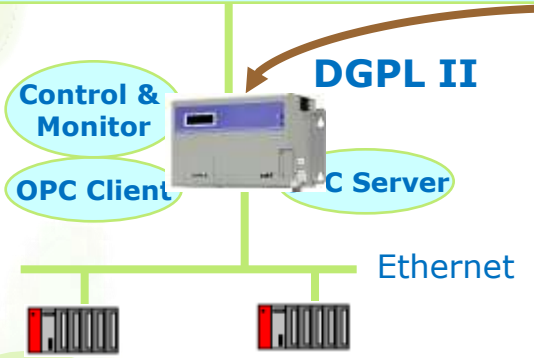
- Minimizes installation space
- Unified sizing including serial interface and fieldbus link modules
- Power-on maintenance
- DIN-rail mounting enables installation into customer's supplied panels

Module type	# of points / module
High-level analog input	16 points
Low-level analog input	16 points
RTD input	16 points
Digital input	32 points
Digital sync input	32 points
Digital input with SOE	32 points
Pulse input	8 points
Pulse sync input	8 points
Analog output	16 points
Digital output	32 points
Relay digital output	16 points

DGPL II - DEO Subsystem Integration -

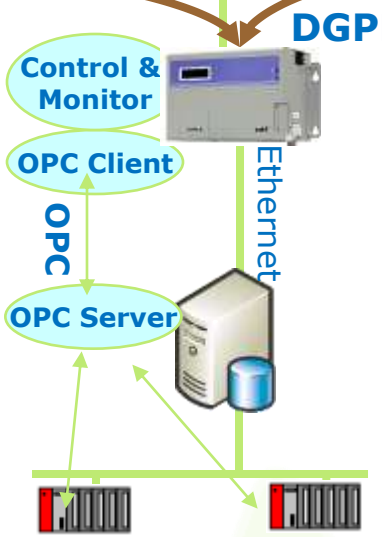
Unified "Instrument Object" for subsystem data

- Identical data presentation & operation with Native DEO data point



Modbus-TCP/RTU PLC,
MELSEC, SYSMAC, FA-M3 etc.

Embedded OPC Server- DGPL Ⅱ



DCS, QCS, PLC, SCADA etc.

Remote OPC - DGPL Ⅱ

Peer Communication support

- **Peer control communication among DEO control and subsystem**
- **Bridge subsystems with DGPL-DGPL peer communication**

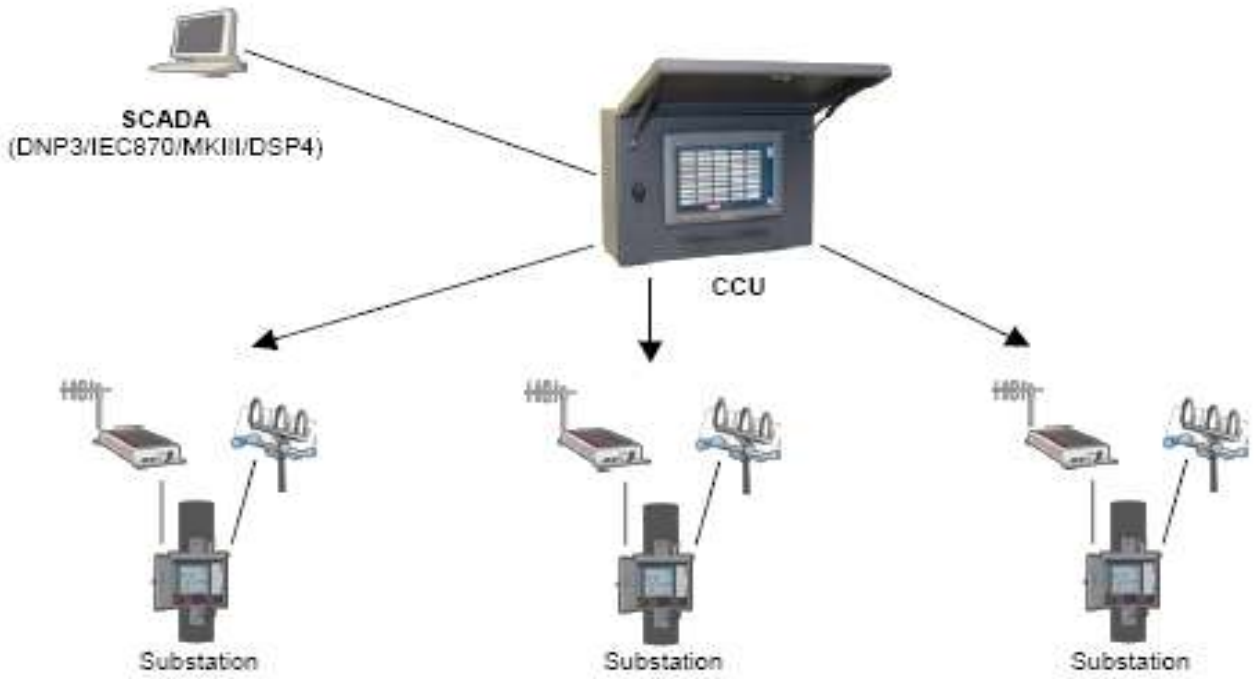
SCADA

smart grid networks

azbil BERCA

Provide smart solutions for electrical network automation and digital communication, enabling cost efficient operation for infrastructure network owners by giving them fast and secure control.

www.smartgridnetworks.net



SEKIAN & TERIMAKASIH