



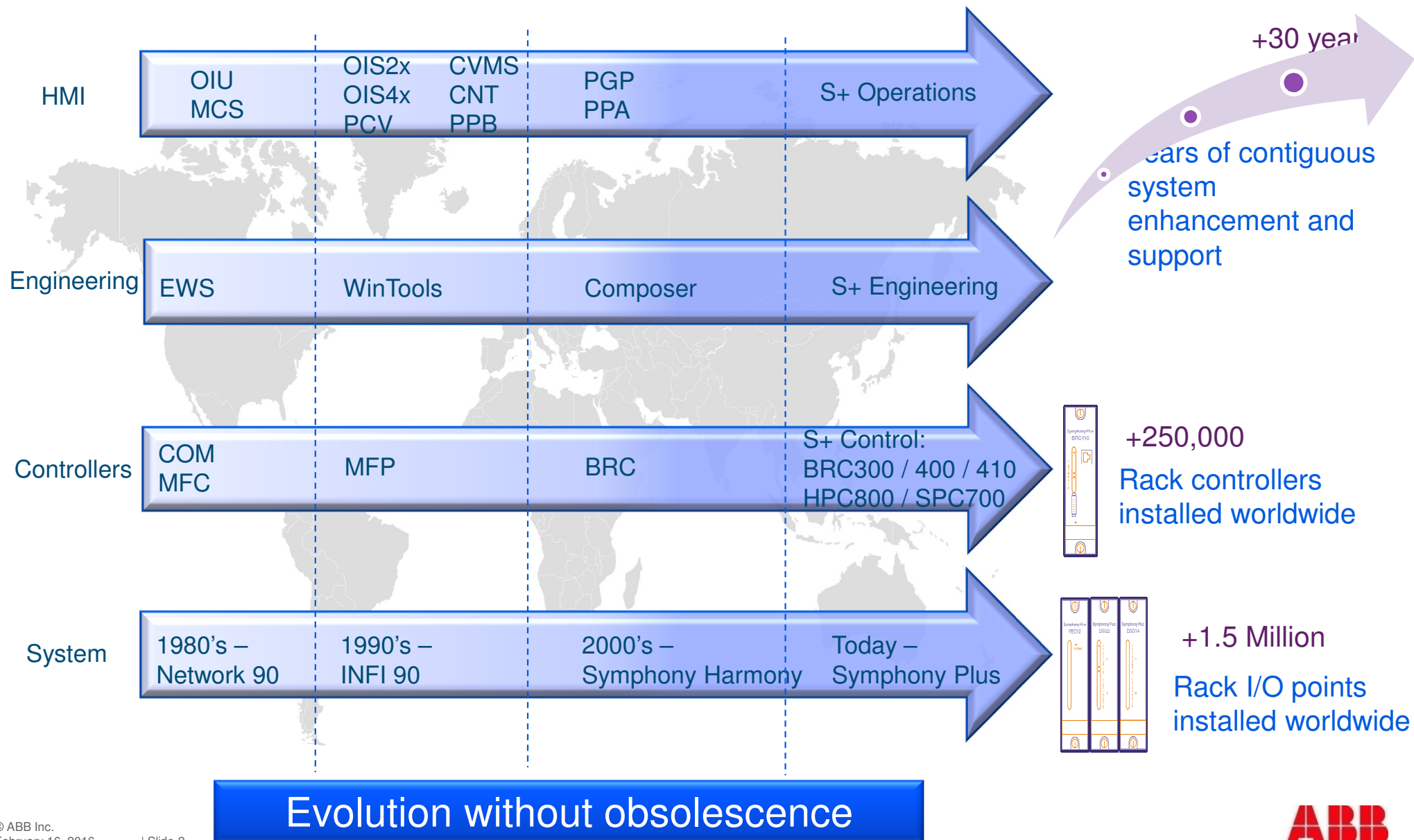
Jim Day | ABB Users Group, Anchorage | Feb. 24-25, 2016

Symphony Plus

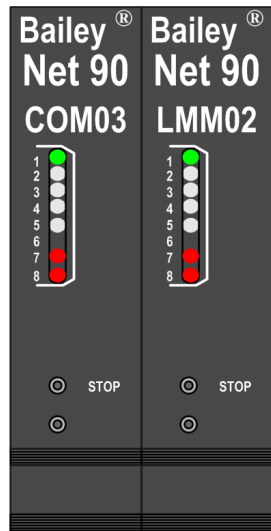
Life cycle updates

HR Series Control and I/O

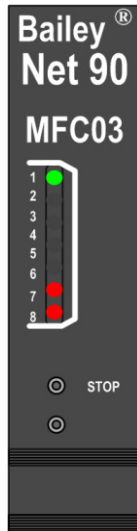
Background: Contiguous life cycle management



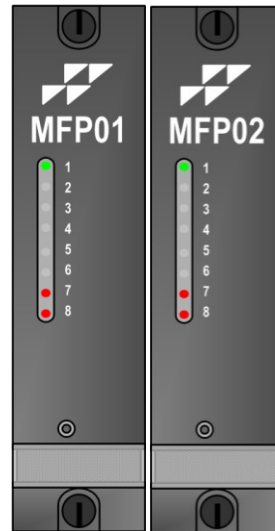
Harmony Controllers A long Heritage of Success



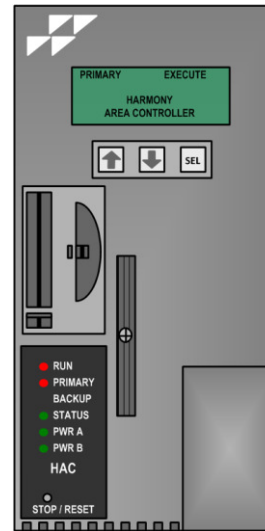
COM / LMM
1980



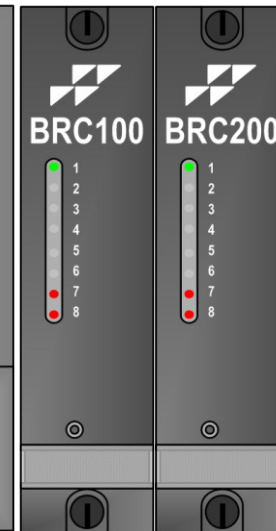
MFC
1984



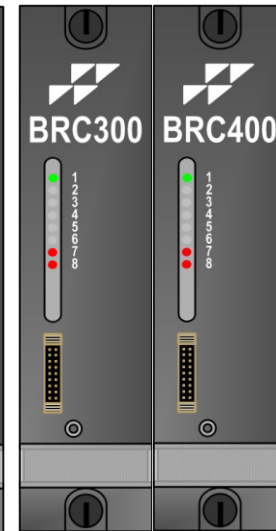
MFP 01 / 02
1990



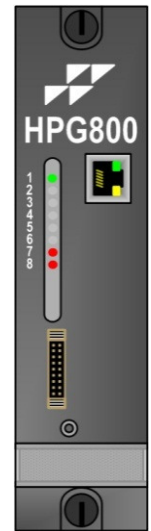
HAC
1999



BRC100 / 200
2000



BRC300 / 400
2003 / 2004



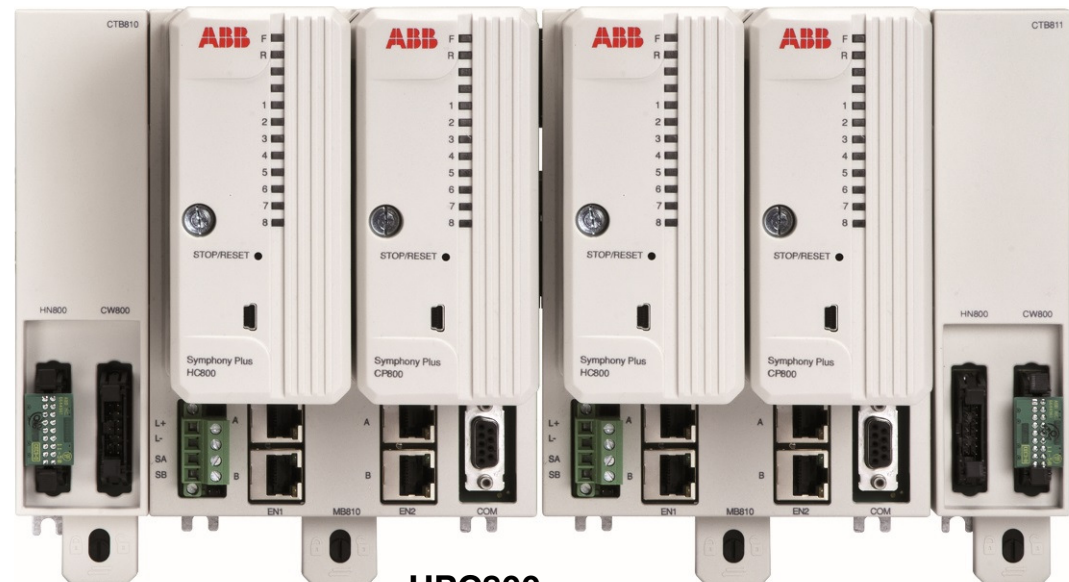
HPG
2009



SPC700
2015



BRC410
2011



HPC800
2012

Symphony Plus

S+ Control & I/O Rack: New Faceplates



- **Harmony Rack Modules**
 - Grey Front Plates
 - Module Nomenclatures: IMxxxx or Inxxxx
 - **Transferred to Limited lifecycle 2015**
- **S+ Rack Modules**
 - White Front Plates
 - Module Nomenclatures: SPxxxx
 - Original Price of Grey Modules
 - Std Factory Lead Time 8 weeks
 - Hardware refresh and power supply redesign in progress thru 2017
 - DSM04 -2016



Approx. 24,000 modules shipped in 2015

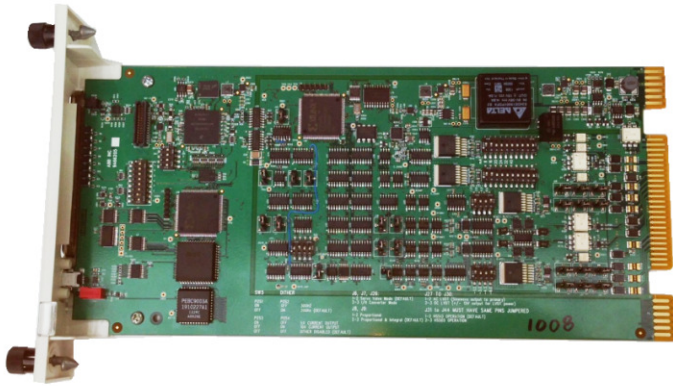
Symphony Plus

S+ Turbine SPHSS13 New Module



- Direct replacement for IMHSS03, IMHSS04, IMHSS05, SPHSS03, SPHSS04, and SPHSS05 modules
- Supports AC and DC LVDT's
 - Note: DC LVDT's in non-redundant arrangements for release Rev A
- Supports PI and P-Only control
- Current-drive output circuits
- Increased servo output capability up to 300 mA
- New high reliability design
 - Latest available analog & digital component technology
 - Processor, Expander Bus ASIC, dual-port RAM, EPROM, SRAM, FPGA, PAL, ADC, DACs and Sine wave generator IC
 - Single circuit board architecture (no daughter boards)
 - Active current limiting servo outputs
 - Self resettable fuses on all I/O lines
 - No socketed chips
 - Surface mount design

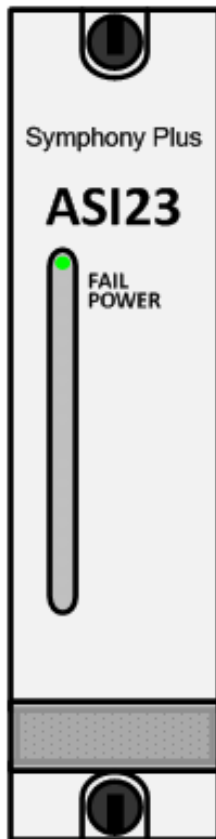
Symphony Plus S+ Turbine SPHSS13



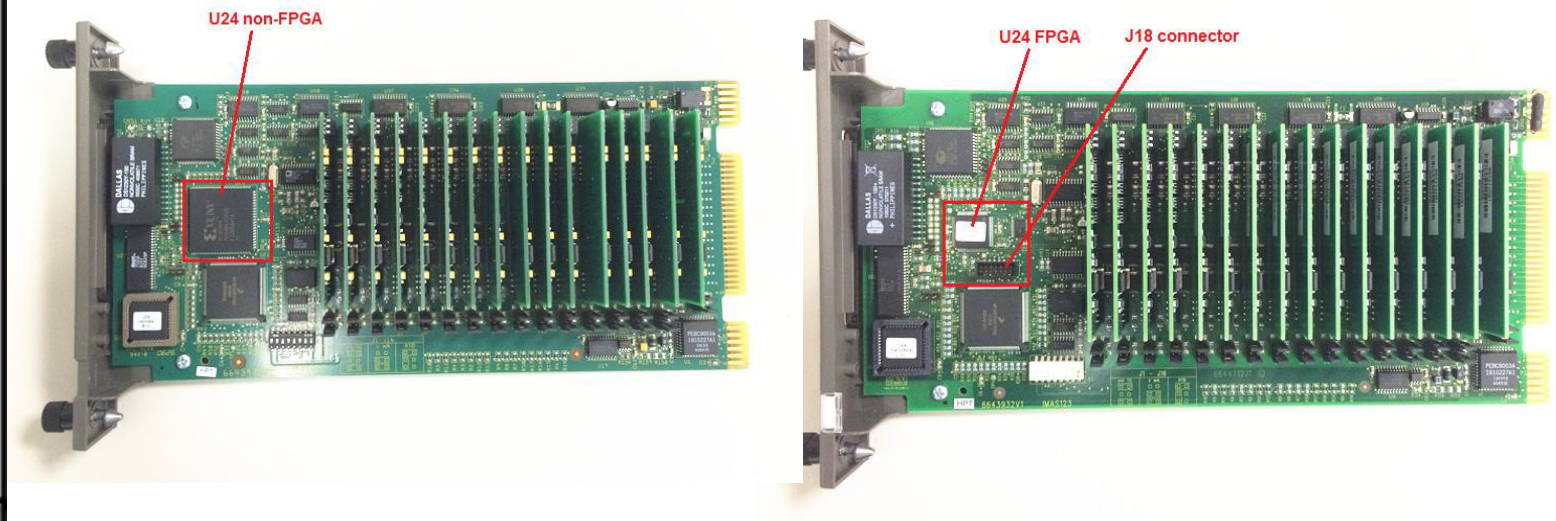
- Fast input-to-output response time (< 2 msecs)
- Interfaces to Function Code 55 in all of its modes
- Makes use of existing related products (NKHS03 cable and NTHS03 termination unit)
- User friendly configuration (dipswitches & jumpers)
- Available test-points and 4-20 mA outputs for local testing and/or tuning (recorders and meters)
 - Feedback, scaled feedback and demand
- Compatible with BRC300/400/410 (firmware M4) and HPC800 (firmware A_3)
- Elimination of HSS02 (FC150) compatibility settings
- Servo output with dual redundant coils
- Hot-swap capable
- Same level of electrical isolation (MMU from field) as HSS03
- More accurate LVDT signal conditioning
- Automatic Feedback calibration
- Automatic demodulator gain calibration

Symphony Plus

S+ Control & I/O Rack: ASI23 Field Alert



SPASI23 and IMASI23 modules manufactured between May 31 2011 and June 30 2015 may have a problem where the input values and slave module status go into bad quality momentarily and recover automatically. The time of bad quality lasts from 250 ms to 1.25 second



Recommend upgrade to FPGA B

Those modules that do not have a J18 connector, do not have the problem and do not need to be upgraded

Symphony Plus

S+ Control & I/O Rack: BRC300/400/410,HPG800

- **Latest Firmware M_5**

- No SOE when using Harmony Block I/O (Must remain M_1 or older) L_9 recommended
 - Supports IOR8X0 and HGS running in the same controller with some limitations
 - Bad quality exception reporting from enhanced blocks corrected (M3 and M4)
 - Redundancy link failure using HGS with ethernet cable removed has been corrected
 - BRC utilization spiking every 20 hours has been corrected
 - Additional Cybersecurity enhancements

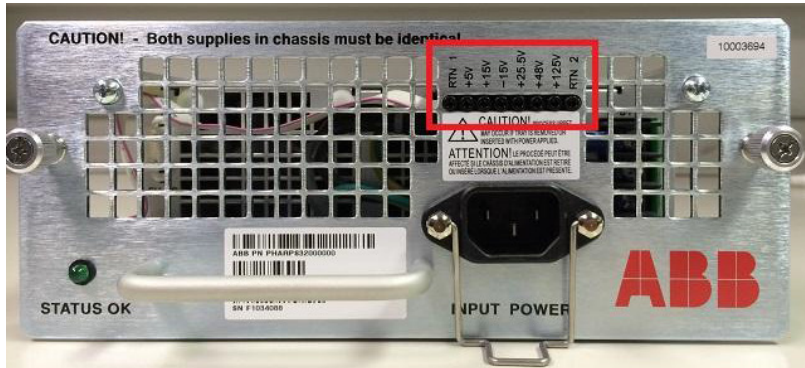
- **FPGA code updated to rev F .Highly recommended to upgrade**

- Recommended to be done on all BRC3/4 series controllers and NPM22, and RIO22
- Hardware with controlway daughter board assemblies (XU15 populated) must be returned
- Could be done online, one module at a time but not recommended
- Corrected loss of control without red lighting module

FPGA revision F provides stability improvements for modules that are installed at locations where excessive electrical noises present. Excessive electrical noise may result in some BRC300/400/410 modules with prior revisions of FPGA: to red light or exhibit other anomalies where memory corruption is suspected, such as incorrect block output values or frozen block output values. In parallel with addressing any potential sources of electrical noise, it is also strongly encouraged that all BRC300/400/410 and NPM22 modules be upgraded to FPGA revision F at the next opportunity to take advantage of these enhancements.

Symphony Plus

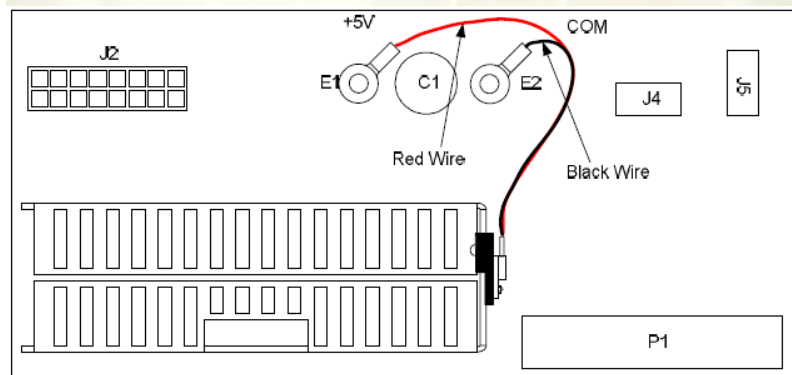
S+ Control & I/O Rack: MPS III Field Alert



For Power tray's manufactured between March 2010 and April 2015
See Technical Bulletin 2VAA004914C

Visually inspect the power supply tray. The part 258709A1 should be installed only if the power supply tray meets **ALL** conditions listed below.

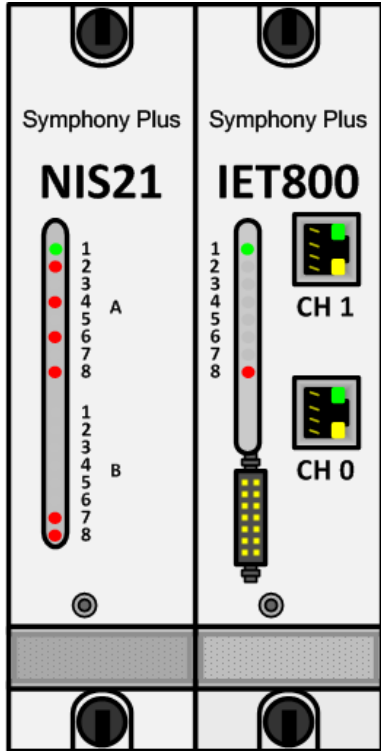
1. There are test jacks on the frontplate.
2. There is no sticker label, "WE-EN-14-142" or "C4452" on the lower part of the frontplate
3. Mount ABB Part 258709A1:
4. Connect ABB Part 258709A1 to E1 & E2



Symphony Plus

S+ Control & I/O Rack: IET800 Ethernet CIU

Firmware A_6 released

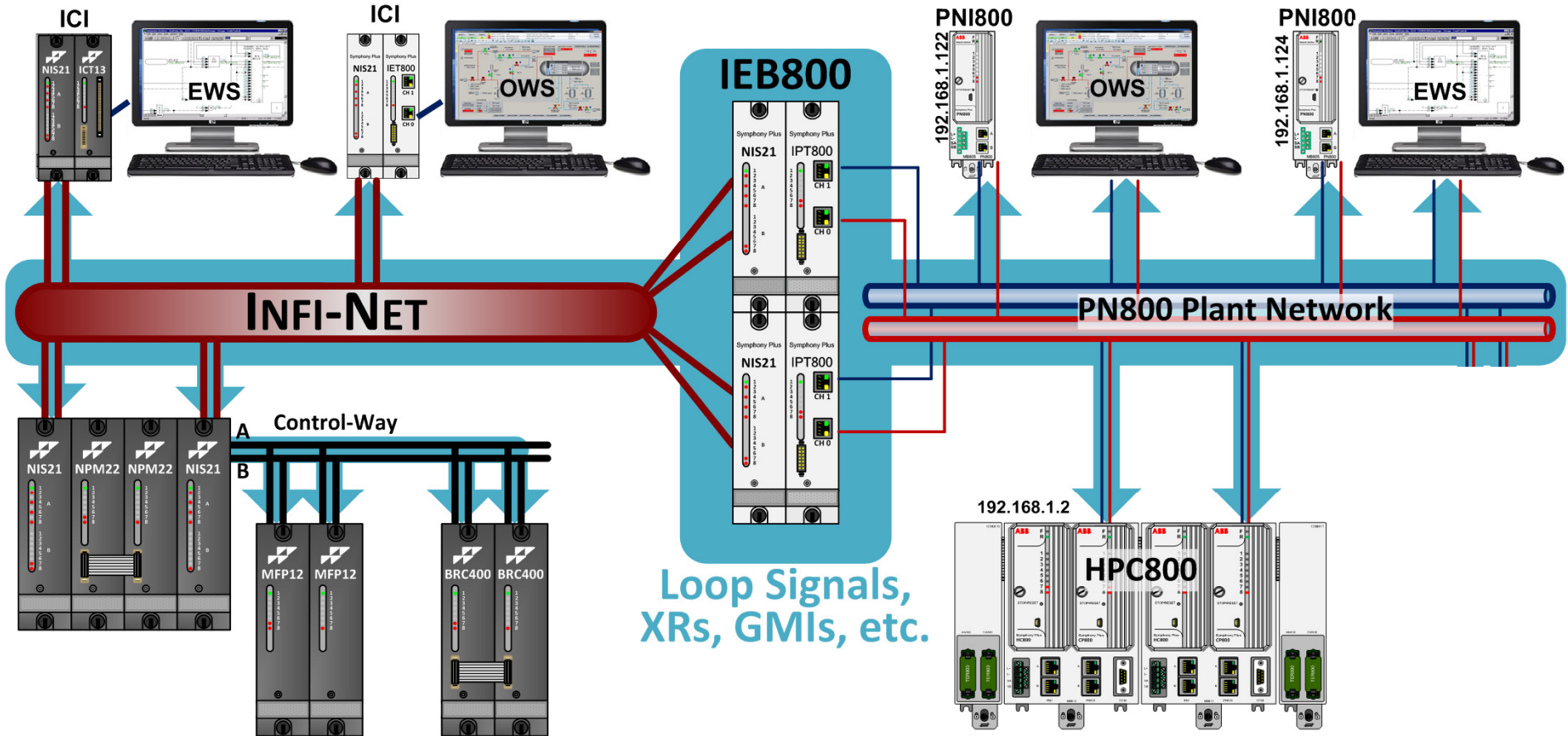


- 1). Battery no longer required
- 2). Security certificate updated now until 2/2035
New certificate needed with Composer 5.1 and newer. Installed with SPE 1.1 and newer
- 3). Red-lighting after removing several hundred tags from 800Xa connectivity server corrected

Symphony Plus – Technology Update

Infi-Net to Ethernet Bridge – SPIEB800

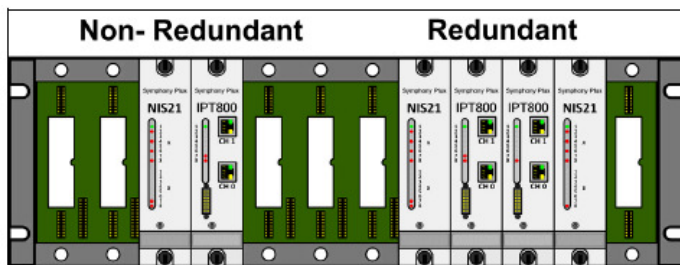
Note: one side must be loop 1



*Completely Seamless (transparent & bi-directional)
communications bridge between INFI-Net & PN800 Plant Net*

Symphony Plus – Technology Update

Infi-Net to Ethernet Bridge – SPIEB800- FW A_2



•Recommend upgrading all IPT800 firmware to A_2:

- The IPT800 is not passing time synchronization information when it is the only node type on the PN800 network as been resolved.
- The IPT800 loses its IP address when the power system is powered down but the IPT800 remains plugged in to the module mounting unit (MMU) has been resolved.
- IPT800 red lighting with LEDs 2 and 4 after running for a period of time has been resolved
- Added new status bits indicated in the table in red supported by Composer 6.2 sp1

Byte	Bit							
	7	6	5	4	3	2	1	0
1	ES	MODE		CIO	TYPE			
2			SIO					
3	PCUs	MOV		BKCFG	BKSTS	RINGS		PSI
4	NSF	RER1	RER2	TER1	TER2	RID1	RID2	RCF
5	RESERVED							
6	ETYPE							
7	RESERVED							
8				NDT1	NDT2	NCD1	NCD2	
9	CW800A	CW800B	BAT LOW	NET SWAP	NET MISMATCH	NET IDLE1	NET IDLE2	
10	RESERVED							
11	PSA	PSB						
12	RESERVED							
13	RESERVED							
14	Module nomenclature (0x4)							
15	Revision letter (ASCII)							
16	Revision number (ASCII)							

TER1	10	CNET 1 transmit error: 0 = no, 1 = yes
TER2	08	CNET 2 transmit error: 0 = no, 1 = yes
RID1	04	Receiver idle on channel 1: 0 = no, 1 = yes
RID2	02	Receiver idle on channel 2: 0 = no, 1 = yes
RCF	01	Ring communication failure: 0 = no, 1 = yes
NDT1	08	NIS loop relay drive transistor 1 failure: 0 = no, 1 = yes
NTD2	04	NIS loop relay drive transistor 2 failure: 0 = no, 1 = yes
NCD1	02	NIS receive channel 1 disable: 0 = no, 1 = yes
NCD2	01	NIS receive channel 2 disable: 0 = no, 1 = yes

Symphony Plus

S+ Control & I/O: HPC800 Latest Firmware



- HC800: Firmware A_5 Recommended upgrade
- Function code 227 now supports device strings PPER(Primary Peripheral Error) and BPER (Backup Peripheral (Error) in support of the CI850 module via function code 226
- Backup HC800 now copies the loop/node/module address from the Primary when a new backup is installed
- HC800 Firmware A_5 no status error now if time sync port not configured and no cable in the port.
- Ethernet Link Status update interval was reduced from 10 to 1 second for Modbus TCP communications
- Added time sync and modbus port id on diag. menu
- Added support for undefined channel and suppression of bad quality.
- CP800: Firmware A_5 Recommended Upgrade
- Duplicate IP address now identified
- Must be used if communicating with SPC700
- Alarms on loss of PN800 connection

Symphony Plus

S+ Control & I/O: HPC800 Future

- Tentatively planned for June 2016
 - Support for ANSI “C” programming
 - Support for Modbus TCP and RTU I/O thru new FC.



Symphony Plus

S+ Control & I/O: PDP800 PROFIBUS DP



HPC800 controller seamlessly integrates field devices through its PDP800 PROFIBUS interface module

- Profibus DP-V0, -V1 and -V2
- Master & Line Redundancy
- Up to 125 Profibus Slaves per PDP800
- Up to 8 redundant PDP800's can be connected to 1 HPC800 or BRC500
- Up to 2 redundant PDP800's can be connected to 1 SPC700 or BRC300
- Up to 4 redundant PDP800's can be connected to 1 BRC410 or BRC400
- Latest Firmware A_8 better diagnostics and tuning.
- FC 227 toggling has been corrected
- FC227 spec 4 now automatically configured to set max retry's based on baud rate.

Symphony Plus

S+ Control & I/O: HAI805 / HAO805 HART I/O

Latest Firmware A_3



- HART I/O Modules
 - HAI805 – 8 Analog Inputs
 - HAO805 – 8 Analog Outputs
 - Dedicated HART modem for each I/O Channel
 - Communicate to all Controllers via [Redundant] HN800
- Secondary /Tertiary HART variables:
 - Variables available in Controller (can be used in control strategy)
 - Update rates: less than .25 sec
 - Up to 4 secondary/tertiary variables per channel or device to the controller
 - 8-channel input card provides up to 40 variables to the controller

Symphony Plus

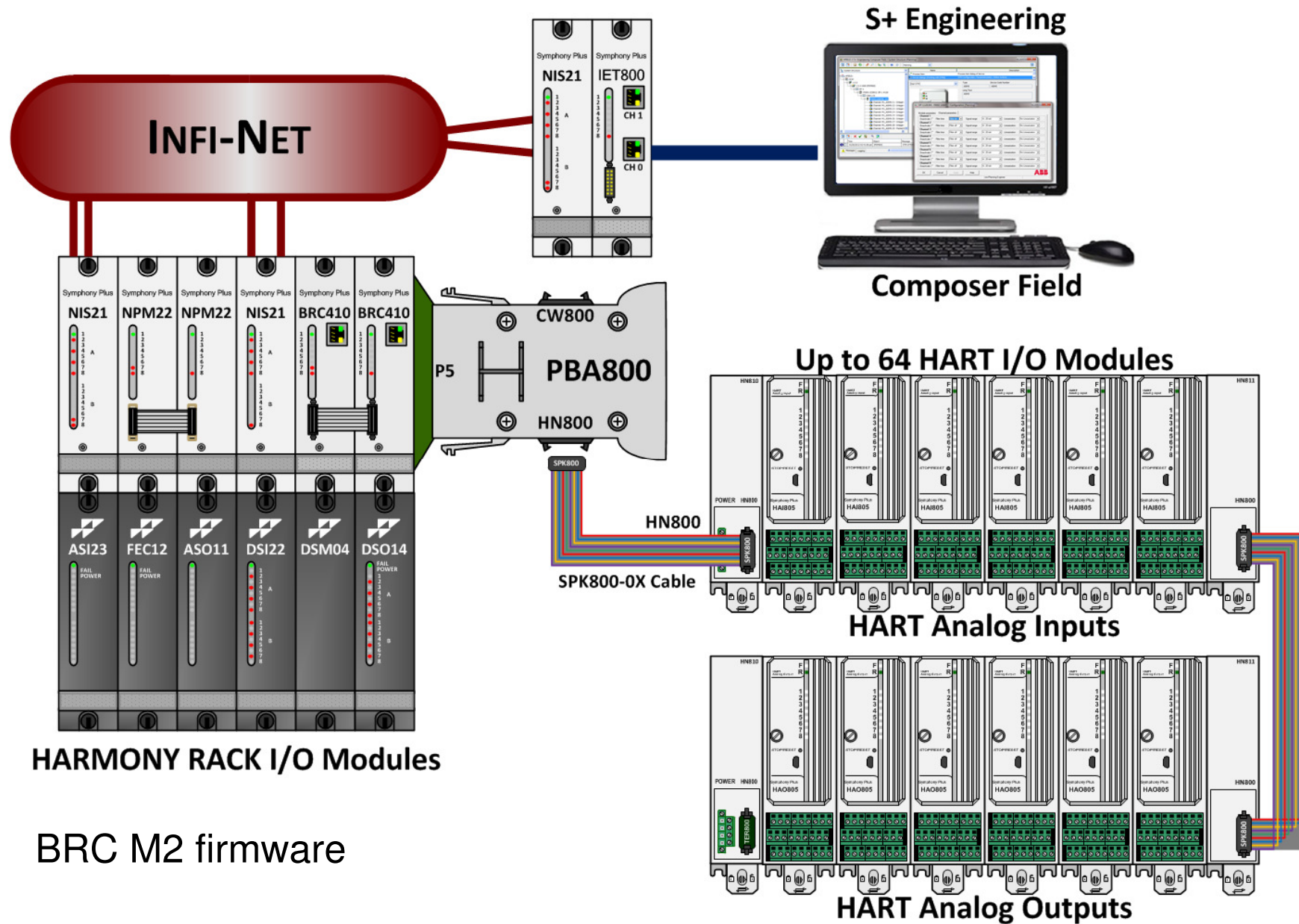
S+ Control & I/O: PNI800 Communications Interface



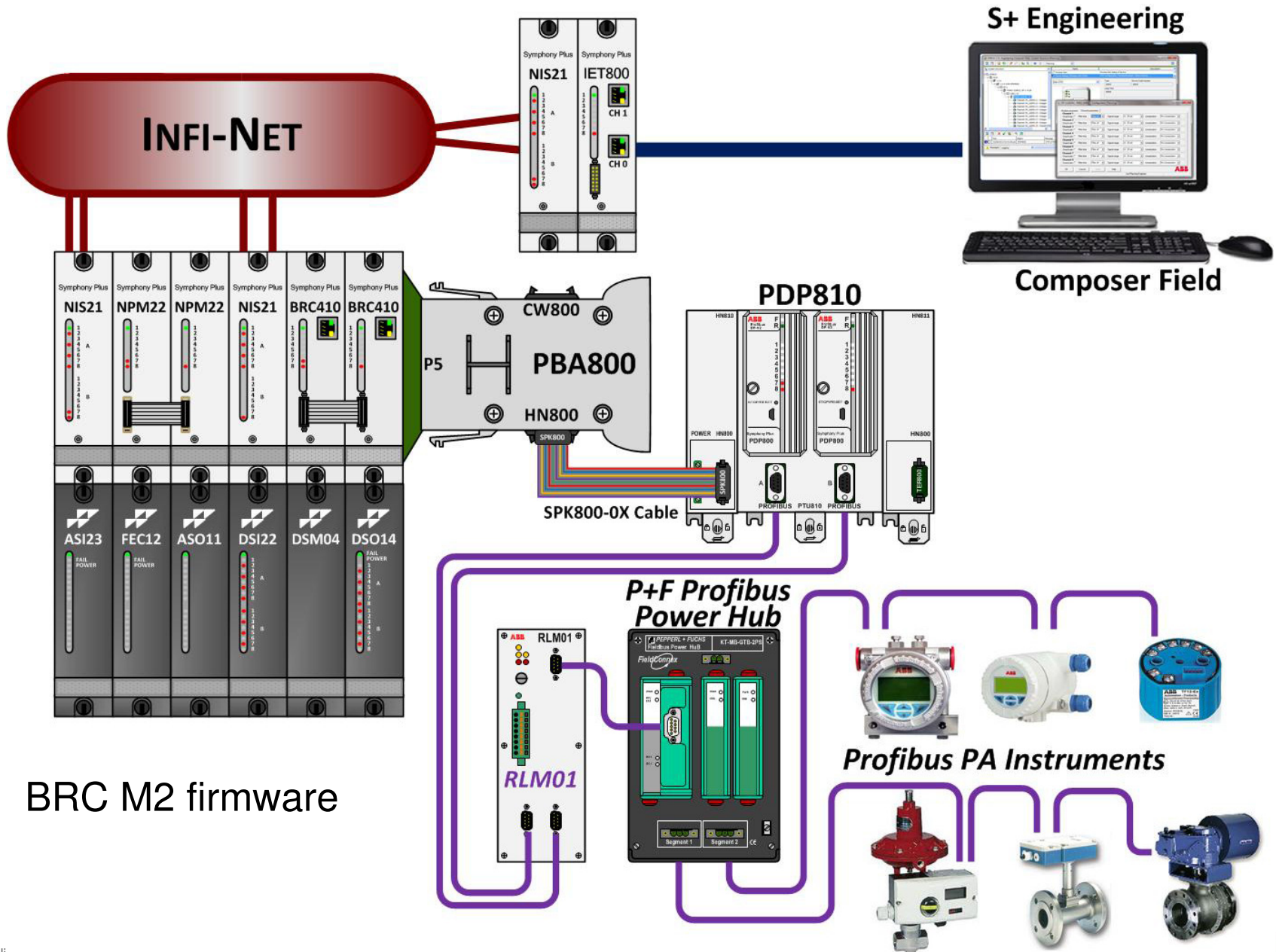
■ PNI800:

- Computer Interface to PN800
- CIU for PN800 S+ Plant Network
- Preserves current SW interface for existing Composer Harmony & S+ Operations applications!
- One required for each HMI (S+ or 800Xa)
- One for every 10 engineering applications(monitors and tune, inspect...etc)unless VPNI is available
- Latest firmware A_5
 - Added duplicate node address testing
 - Corrected slow MSDD and RCM updating
 - Slow PC updates when CPU near 100% or anti-virus scanning has been corrected
 - Additional cybersecurity corrections

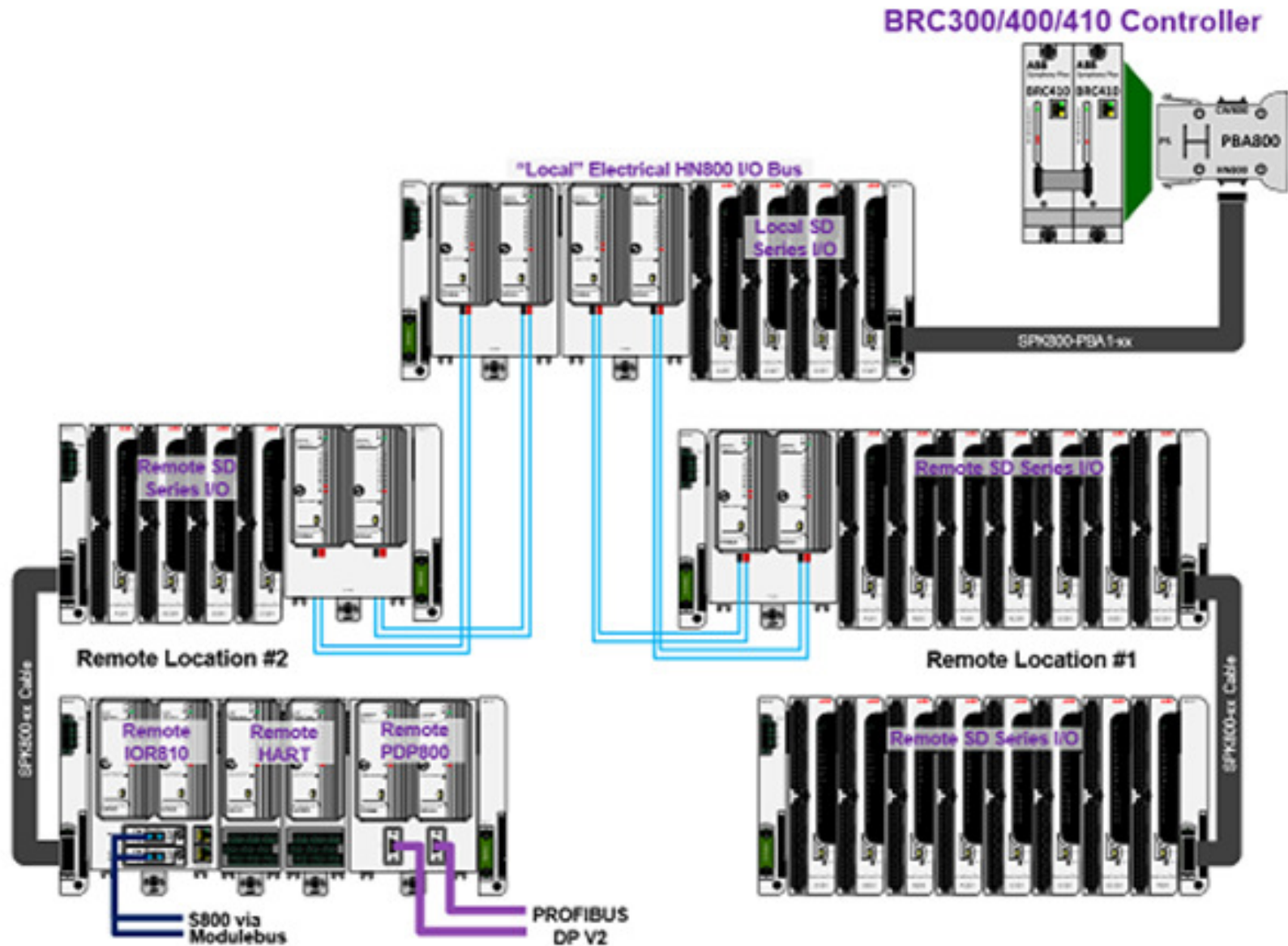
Adding Hart I/O to Rack



Adding Profibus to Rack



Adding SD I/O to Rack



Symphony Plus

S+ Control & I/O: SPC700

Based on field proven technology:

- INFI 90 FC based
- INFI 90 exception reporting
- Composer tools enhanced with field device management capabilities



SPC700:

- Executes INFI 90 function codes
 - MRAM instead of NVRAM(no battery)
 - Composer 6.2 (SPE1.0)
 - 10,000 Blocks (MFP)
 - 1500 modbus TCPIP points (6/2016)
 - Batch, UDF and C language(6/2016)
 - BRC / HPG functionality
 - Control network interface to Ethernet based plant network
 - Turbine control step change loop response ≤ 20 msec
 - Up to 1000 I/O ≤ 250 msec
-
- Simultaneous support for Symphony Plus I/O, Harmony Rack I/O, Harmony Block I/O, and S800 I/O

Symphony Plus

S+ Control & I/O: SPC700

Based on field proven technology:

- INFI 90 FC based
- INFI 90 exception reporting
- Composer tools enhanced with field device management capabilities



SPC700: Firmware A_1

- Undefined block support added
- Backup SPC700 never completes has been corrected
- Backup SPC700 red-lighting when inserted in base has been corrected

Tentatively planned for June 2016 firmware

- Batch, UDF, CLIF and C programming
- Modbus TCP using new Function Code
- 1ms SOE

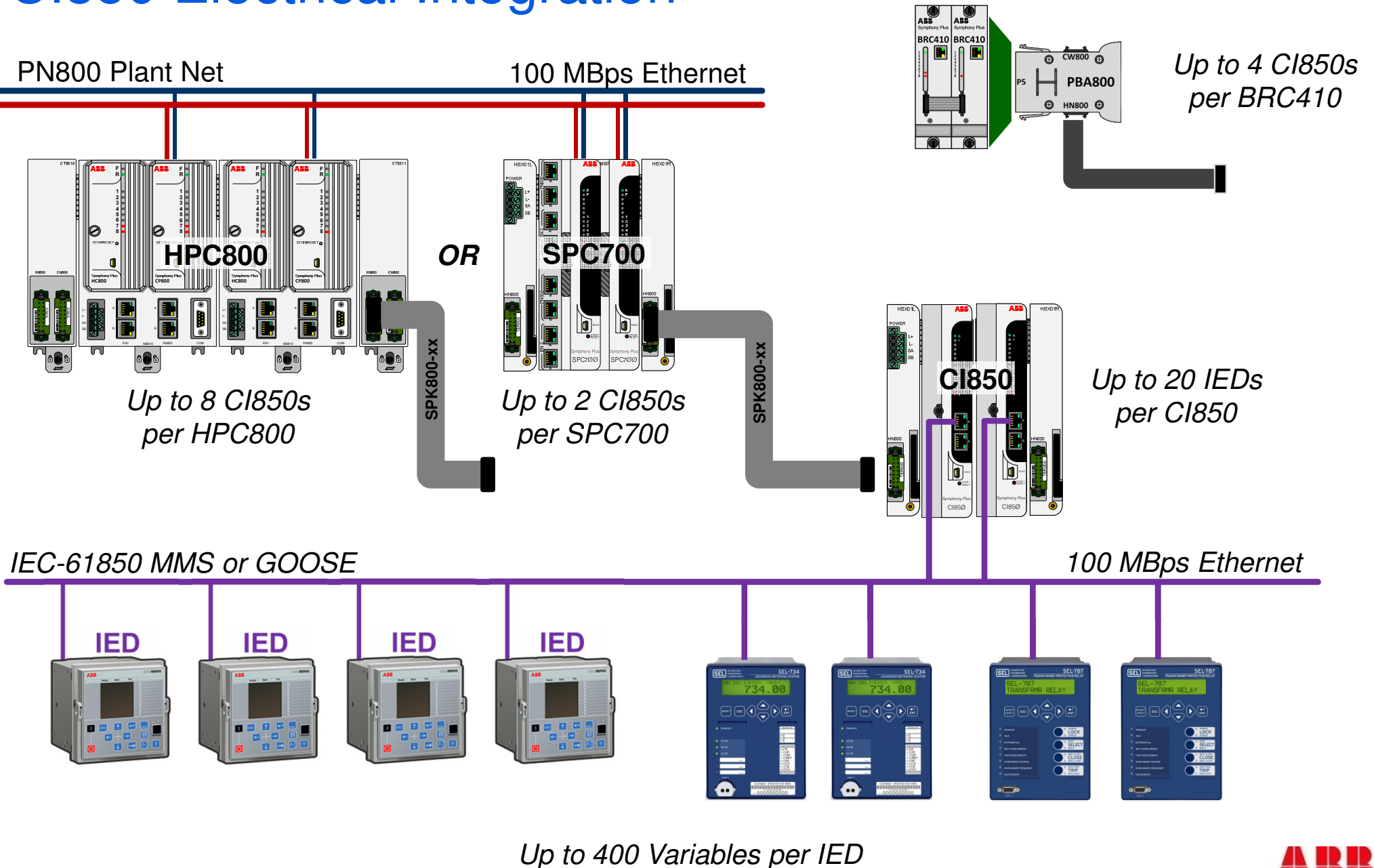
SD Series Communications

CI850 Key Product Specifications released 2014



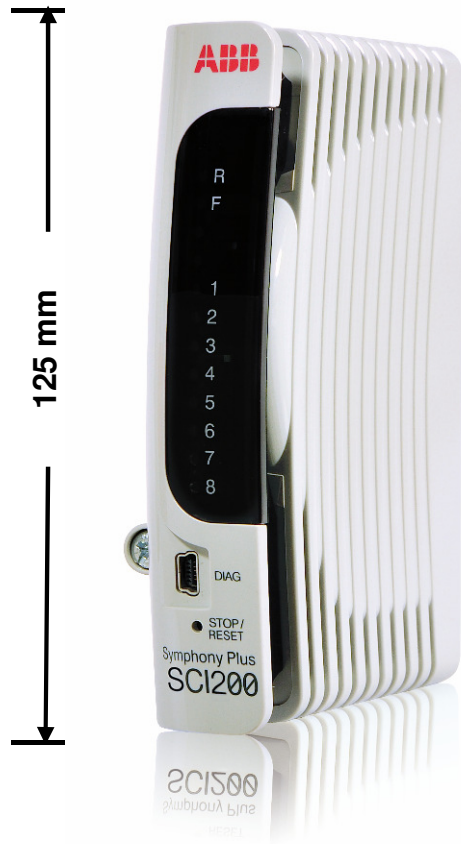
Property	Characteristic / Value	
Microprocessors	A: S+ Comm. Platform: MCF54418 @ 250 MHz (385 MIPS) B: IEC61850 Protocol: MCF5475 @ 266 MHz (410 MIPS)	
Memory	A: 128 MB DRAM, 4 MB ROM B: 128 MB DRAM, 8 MB ROM Inter-processor: 32 KB Dual-port RAM	
Power Requirements	200 mA @ 24 VDC +/- 10%, 4.8 W (per module)	
Dimensions: [Module mounted in Base]	MB855 Single:	W = 51 mm, H = 190 mm, D = 127 mm
Temperature Range	Operating: Storage:	-20 to +70 deg C -40 to +85 deg C
Relative Humidity (Non-Condensing)	20% to 95% from 0 deg C to 55 deg C, 20% to 45% from 55 deg C to 70 deg C	
Air Quality	Standard:	ISA S71.04 G1
Programming	Data modeling according to IEC61850-7-3/4 MMS Client according to IEC-61850-7-2 GOOSE publisher & subscriber	
Capacity	Up to 20 IED's each with up to 400 variables	
Communications Ports	HN800, Redundant RS485 @ 4.0 Mbps 2x 100 Mbps Ethernet (IEC61850 Network)	

SD Series Communications CI850 Electrical Integration



SD Series Communications

SCI200 Multi Protocol Communications Interface



Property	Characteristic / Value	
Microprocessor / MIPS	MCF54418 @ 250 MHz = 385 MIPS	
Memory	128 MB DRAM, 512 kB NVRAM, 4 MB Flash	
Power Requirements	150 mA @ 24 VDC +/- 10%, 3.6 W (per module)	
Dimensions: [Module(s) mounted in Base]	MB605 Single:	W = 45 mm, H = 125 mm, D = 127 mm
Temperature Range	Operating: Storage:	-20 to +70 deg C -40 to +85 deg C
Relative Humidity (Non-Condensing)	20% to 95% from 0 deg C to 55 deg C, 20% to 45% from 55 deg C to 70 deg C	
Air Quality	Standard: Optional:	ISA S71.04 G1 ISA S71.04 G3
Supported Protocols	IEC-60870-5-104 Master & Slave [Future: DNP 3.0, Ethernet IP]	
Performance	t.b.d.	
Ethernet Ports (EN 1A & 1B)	10/100 Ethernet TCP	
Controller Interface	Redundant HN800 (RS485 Differential @ 4.0 MBps)	

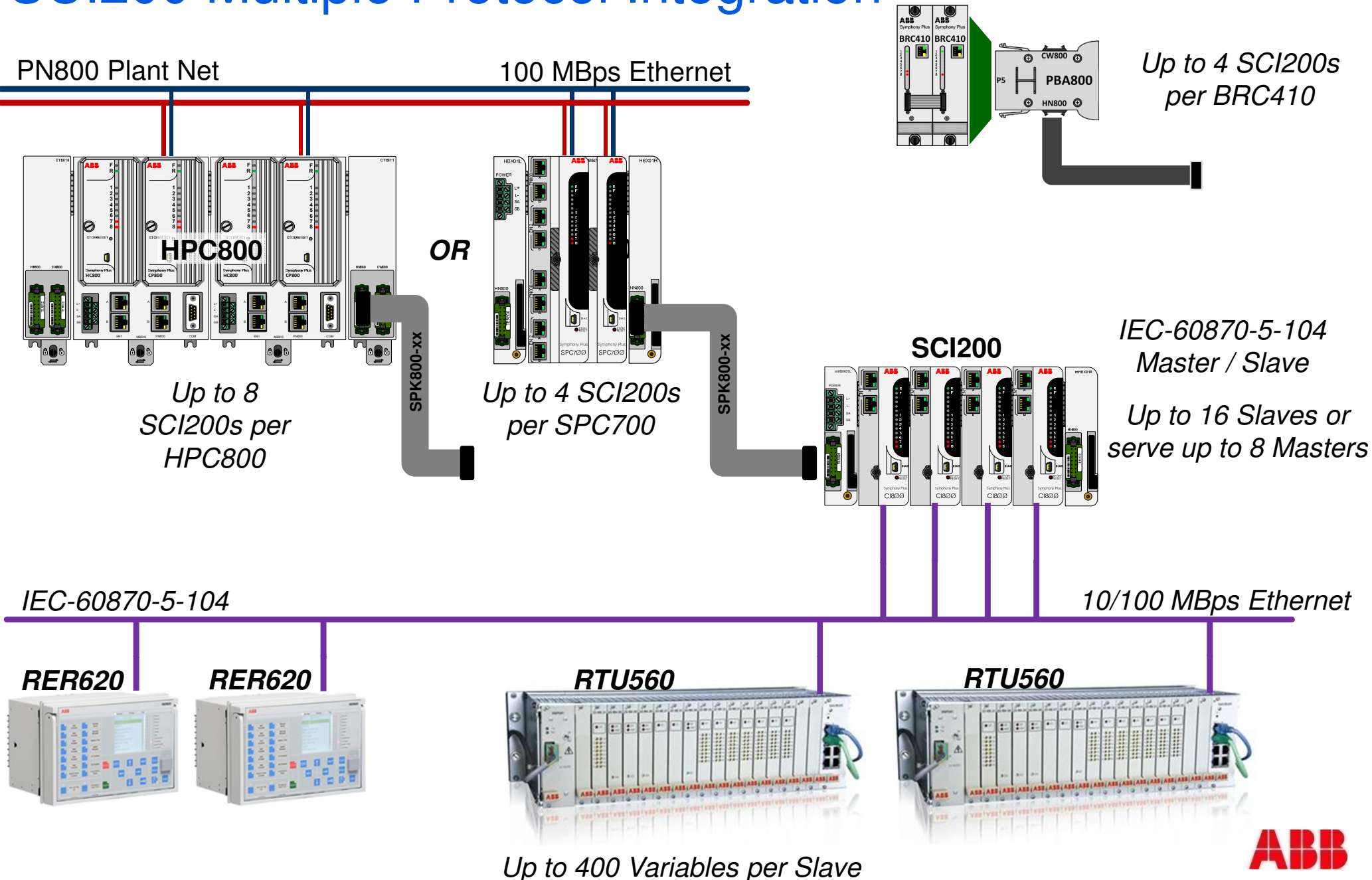
Targeted 1st qtr 2016 IEC 104

Targeted 4th qtr 2016 DNP and EtherIP

Targeted 2nd qtr 2017 Profinet

SD Series Communications

SCI200 Multiple Protocol Integration



SD Series I/O Overview

I/O Module Summary



#	Module	I/O Type	Description / Properties
1	AIØ1	16 AI	4-20 mADC / 1-5VDC, Group Isolation, 16-bit ADC
2	AIØ3	8 RTD	2/3/4 Wire RTDs, 100 Ω Platinum U.S. & European Standards
3	AIØ4	16 TC / mV	-100 to +100 mV, 0 to +100mV or Type: B/E/J/K/L/N/R/S/T/U TC's
4	AOØ1	16 AO	4-20 mADC / 1-5VDC, Group Isolation, 12-bit DAC
5	DIØ1	16 DI	24 / 48 VDC Digital Inputs, SOE (1 msec resolution)
6	DIØ2	16 DI	110 VAC / 125 VDC Digital Inputs, SOE (10/20 msec resolution)
7	DIØ3	16 DI	24 VDC Digital Inputs
8	DIØ4	16 DI	48 VDC Digital Inputs
9	DOØ1	16 DO	24/48 VDC Open-Collector DO, max 250 mADC
10	DOØ2	16 DO	24/48 VDC Open-Collector DO, Short-Circuit detection & protection
11	PIØ1	8 PI	Modes: Freq.(5 Hz to 100 kHz), Period (1µs to 30sec), Count (0 to 1.073B)
12	AIØ2	16 AI	HART AI, 1x16 Group Isolation, 4-20 mADC, 16-bit ADC (24 hart variables)
13	AOØ2	16 AO	HART AO, 1x16 Group Isolation, 4-20 mADC,, 12-bit DAC (20 hart variables)
14	AIØ5	8 AI	HART AI, Individual CH Isolation, Dedicated ADC & HART modem per CH
15	AOØ5	8 AO	HART AO, Individual CH Isolation, Dedicated DAC & HART modem per CH
16	ADØ1	4x(AI,AO, DI,DO)	1x8 Group Isolated HART on Analog I/O, 24/48 VDC DI's
17	ADØ2	4x(AI,AO, DI,DO)	1x8 Group Isolated HART on Analog I/O, 110VAC/125VDC DI's

Symphony Plus – SD Series I/O is designed for extremes

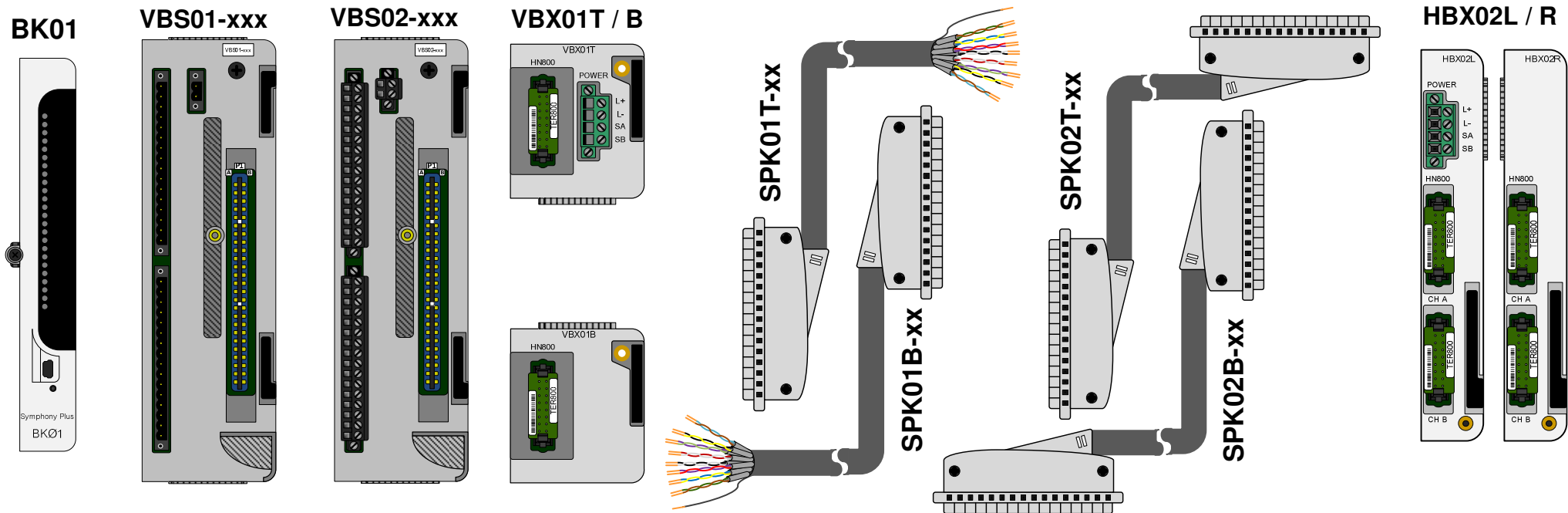


Property	Characteristic / Value
Density	1,500 I/O in 19" Rack
Operating Temperature Range	-20 to +70 ° C(-4 to 158F)
Corrosive Environments	G3 Conformal Coating
Low Power Requirements	I/O Modules 1 to 3 W, SPC700 3.6W

Approx. 21,000 SD shipped in 2015

SD Series I/O – STEP 2.5

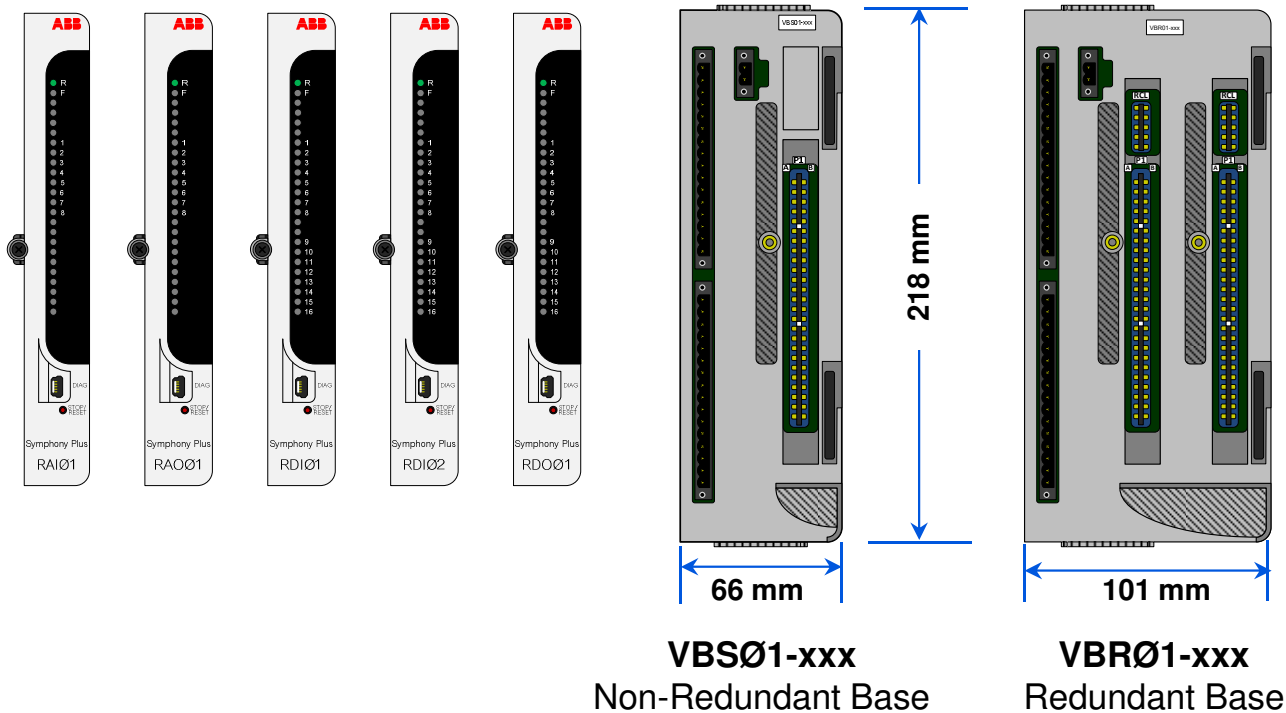
Additional SD Series I/O Accessories



#	Part No.	Description	Technical Specifications / Notes
1	BK01	SD Series I/O Blank Module Base Cover	Used to cover spare I/O Module Bases
2	VBS0X-xxx	Vertical Base, Single module [xxx = FPH, FPN, EPD, CJC]	Allows SD Series I/O to be mounted in vertical column
3	VBX01T/B	Vertical Bus Extender [Top/Bottom]	HN800 Bus Extenders for Vertical Column mounting
4	SPK01T-xx	S+ I/O Marshaling Cable, Flying Leads, xx = length (meters)	☐ 8-pairs, twisted/shielded #24 AWG ☐ Available in lengths of 1, 2, 3, 4, 5, 6, 10 & 30 meters
5	SPK02B-xx	S+ I/O Marshaling Cable, 5.08 mm Plug End, xx = length	
6	HBX02L	HN800 Bus Extender Dual [Left], with +24 VDC Power connection	“Enhanced” HBX02L/HBX02R Bus Extenders provide separate connectors for CH A and CH B. Uses same SPK800-xx cable.
7	HBX02R	HN800 Bus Extender Dual [Right]	

SD Series I/O – 2Q 2016

Redundant I/O Modules & Bases



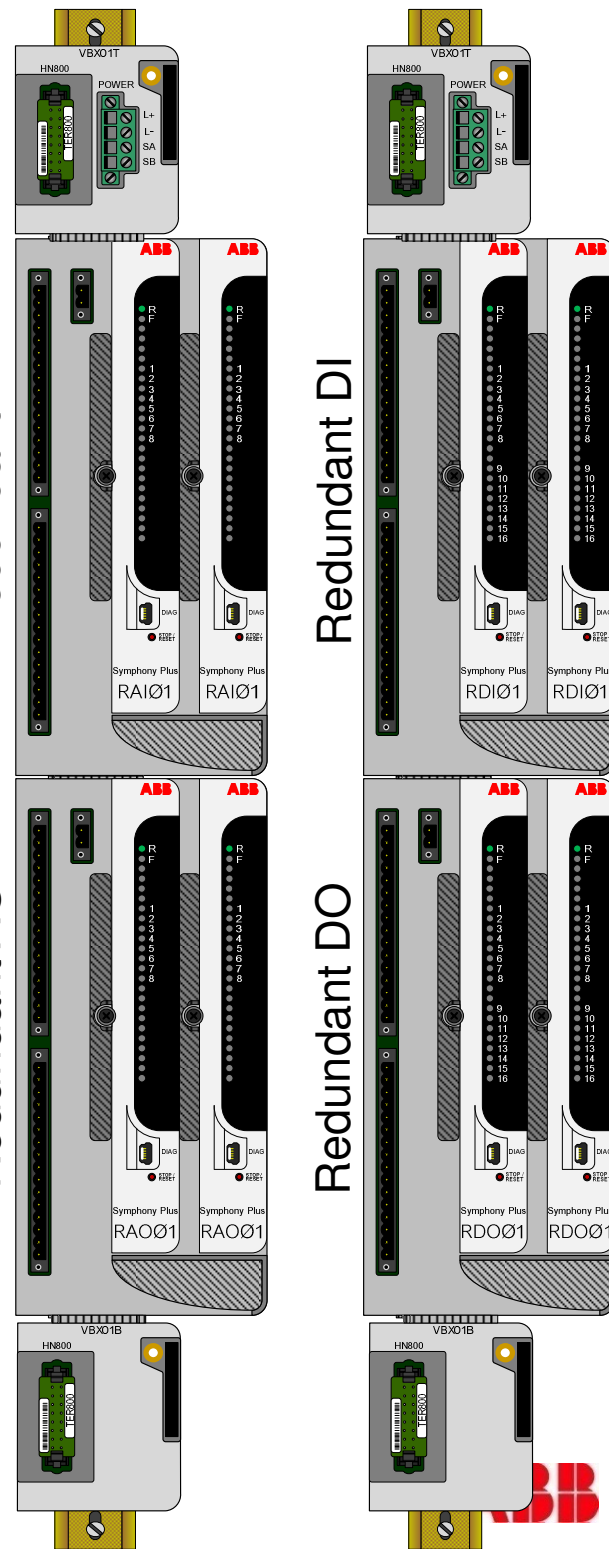
#	Module	I/O Type	Description / Properties
1	RAIØ2	16 AI	Group-Isolated (1-5 VDC, 4-20 mADC) 24 hart variables
2	RAOØ2	16 AO	Group-Isolated (1-5 VDC, 4-20 mADC) 20 hart variables
3	RDIØ1	16 DI	24 / 48 VDC Digital Input
4	RDIØ2	16 DI	110 VAC / 125 VDC Digital Input
5	RDOØ1	16 DO	24 – 48 VDC Digital Output, max 250 mADC
6	VBRØ1-xxx	16 CH	Vertical Base Redundant Modules: [xxx = FPH, FPN, EPD]

Redundant AI

Redundant AO

Redundant DI

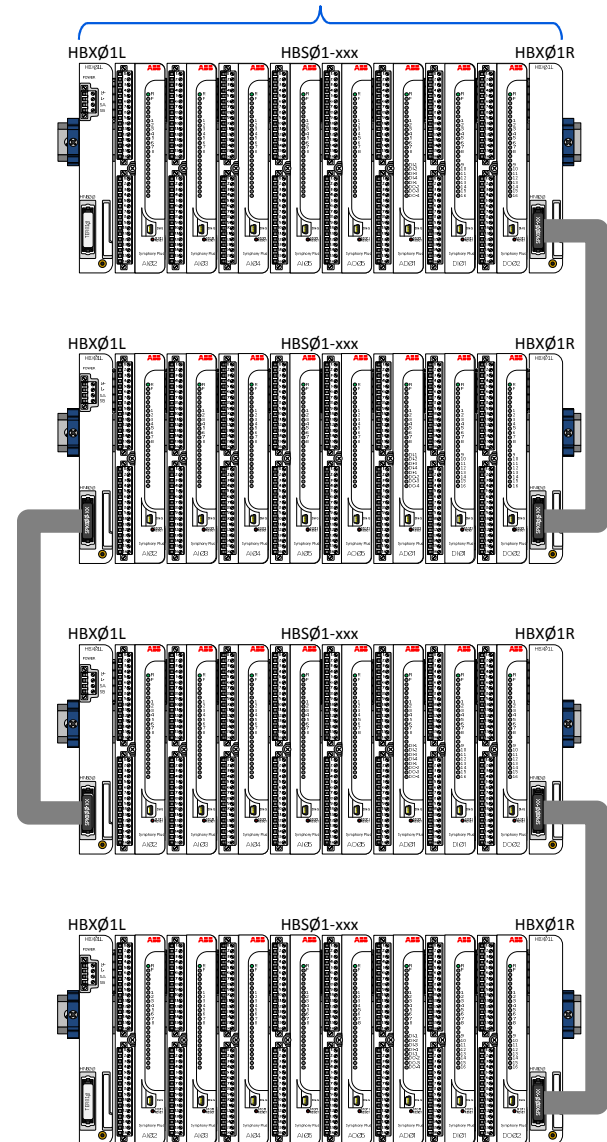
Redundant DO



SD Series I/O system overview

Horizontal Bus

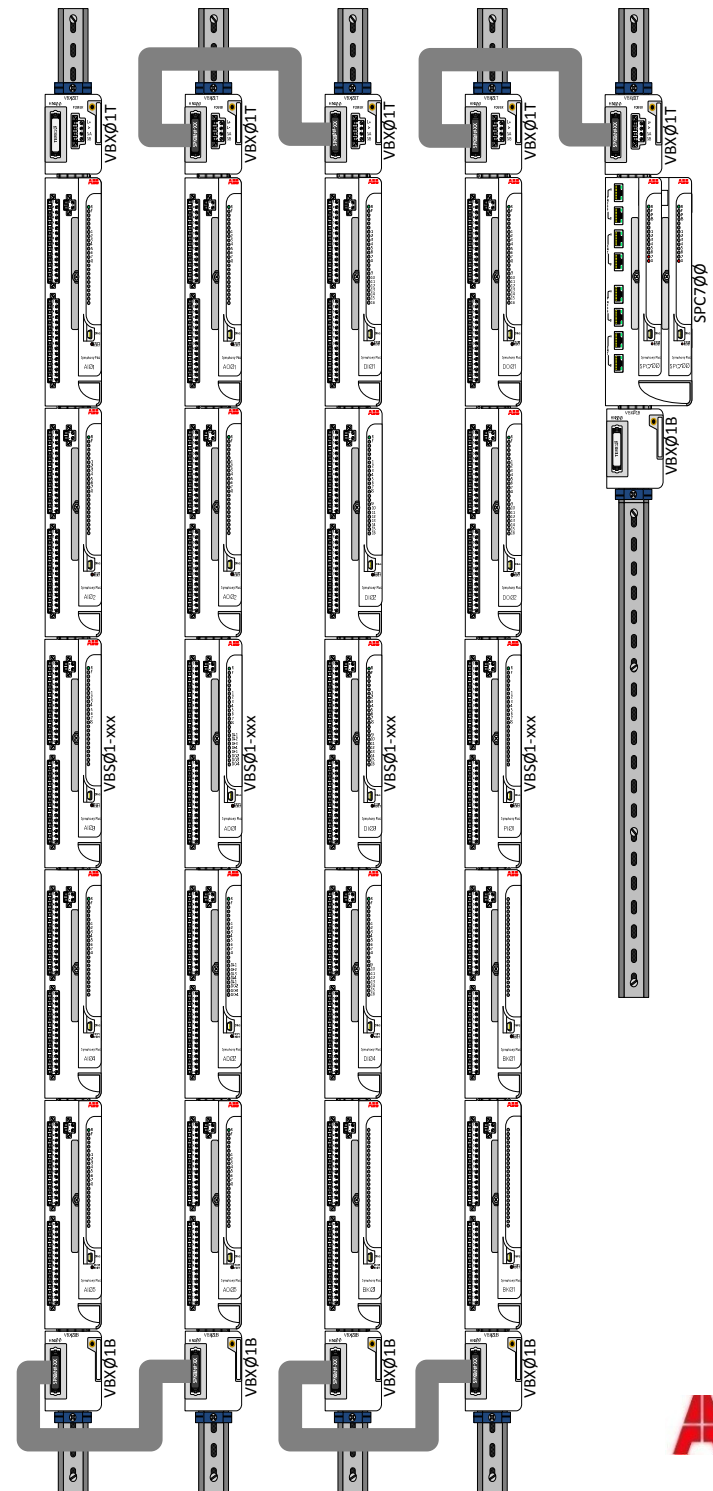
- Physically connected bus extenders & bases form HN8ØØ electrical **Bus Segments**
- Each horizontal Bus Segment can support up to 24 I/O modules (power)
- Up to 8 horizontal Bus Segments can be connected using SPK8ØØ-xx cables
- HN8ØØ electrical bus maximum length is 30 meters(100ft)
- S+ Controllers support up to 4 remote I/O links tested, theoretical 16
- Each remote link can support up to 64 I/O modules



SD Series I/O system overview

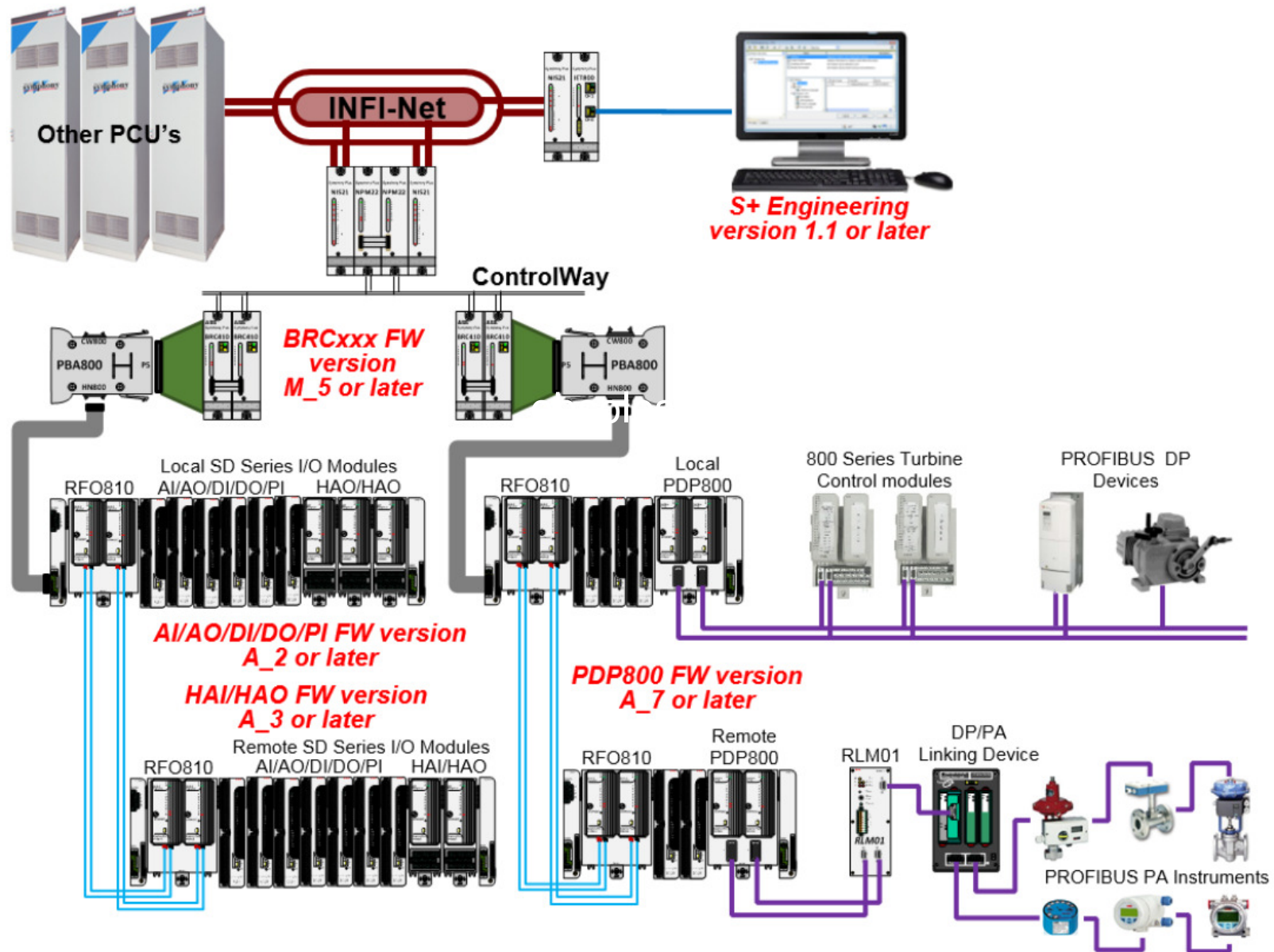
Vertical Bus

- Physically connected bus extenders & bases form HN800 electrical **Bus Segments**
- Each vertical Bus Segment can support up to 8 I/O modules (NEC limits)
- Up to 10 vertical Bus Segments can be connected using SPK800-xx cables
- HN800 electrical bus maximum length is 30 meters(100ft)



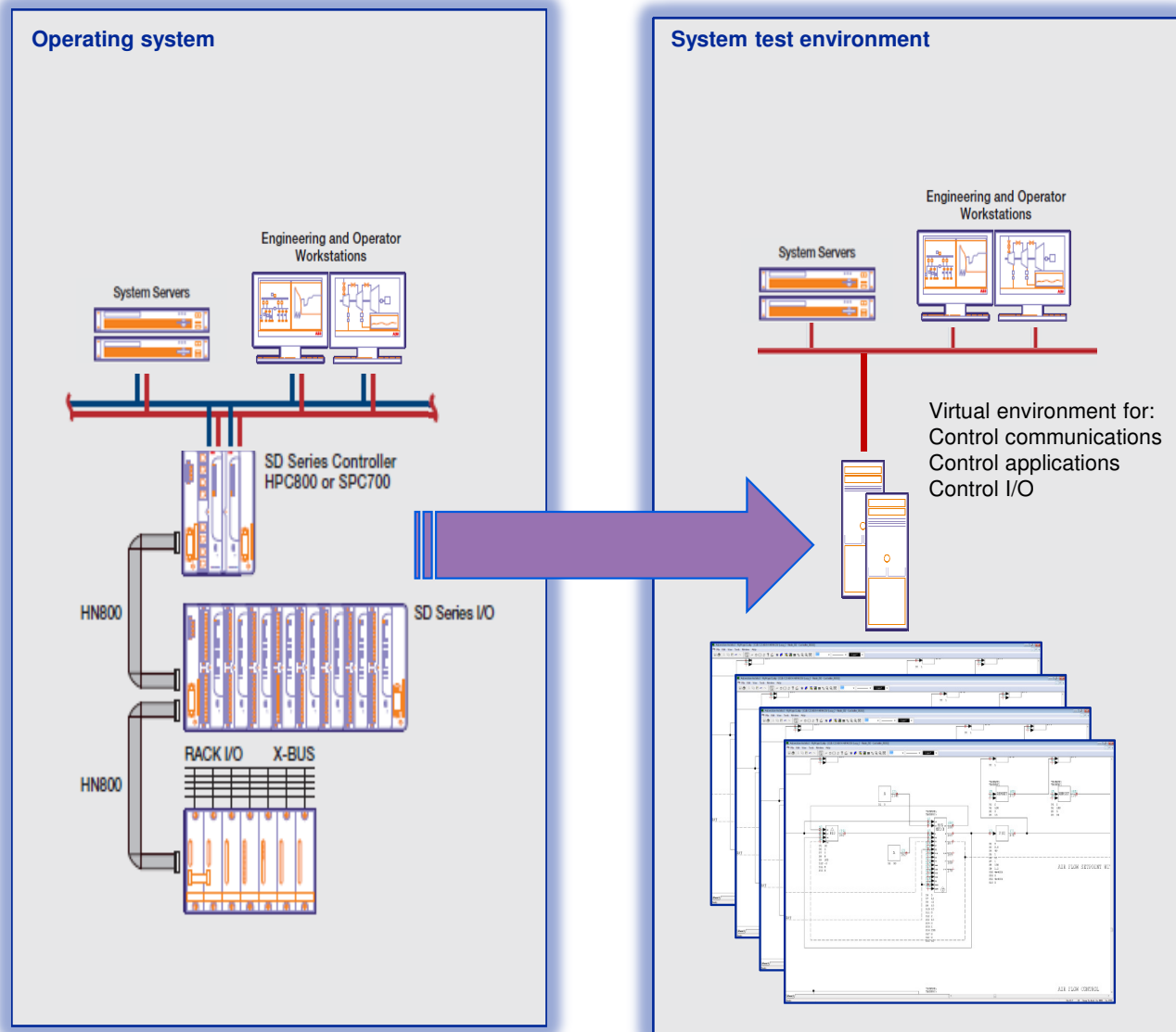
Symphony Plus

Evolution without obsolescence



Symphony Plus

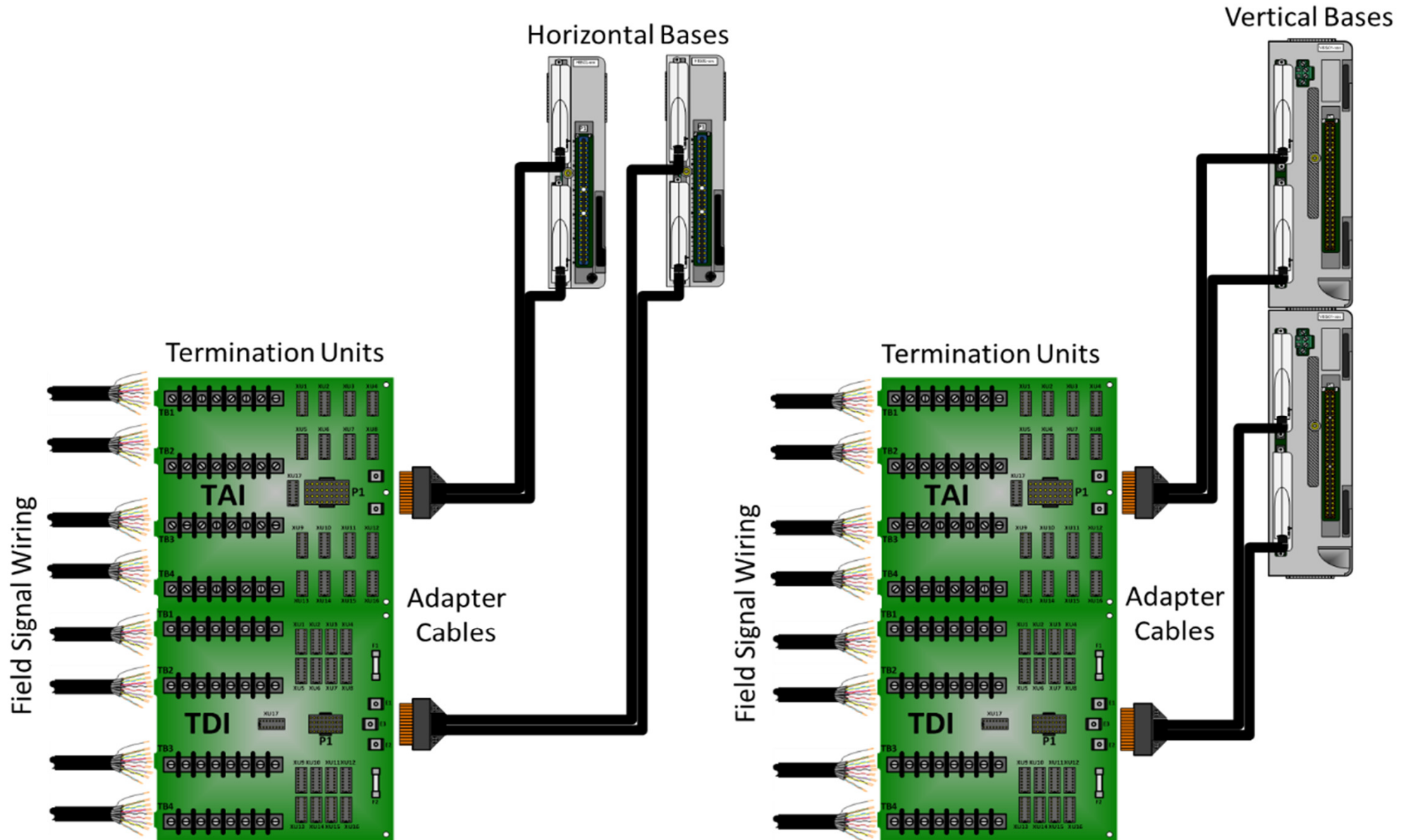
S+ Control & I/O : Soft controller



SD Series soft controller reduces testing and commissioning:

- Provides the virtual environment for developing and testing of new logic or modified logic
- Uses same control logic as physical SD Series (same cfg file)
- Virtual system communication devices allow for system level connection and testing with engineering and operations
- Results directly transferable to running system
- Supported by all Symphony Plus and 800xa with harmony connect consoles
- Supported by all legacy Bailey consoles
- Up to 100 controllers on a PC, largest delivered so far 94 controllers on 1 PC.

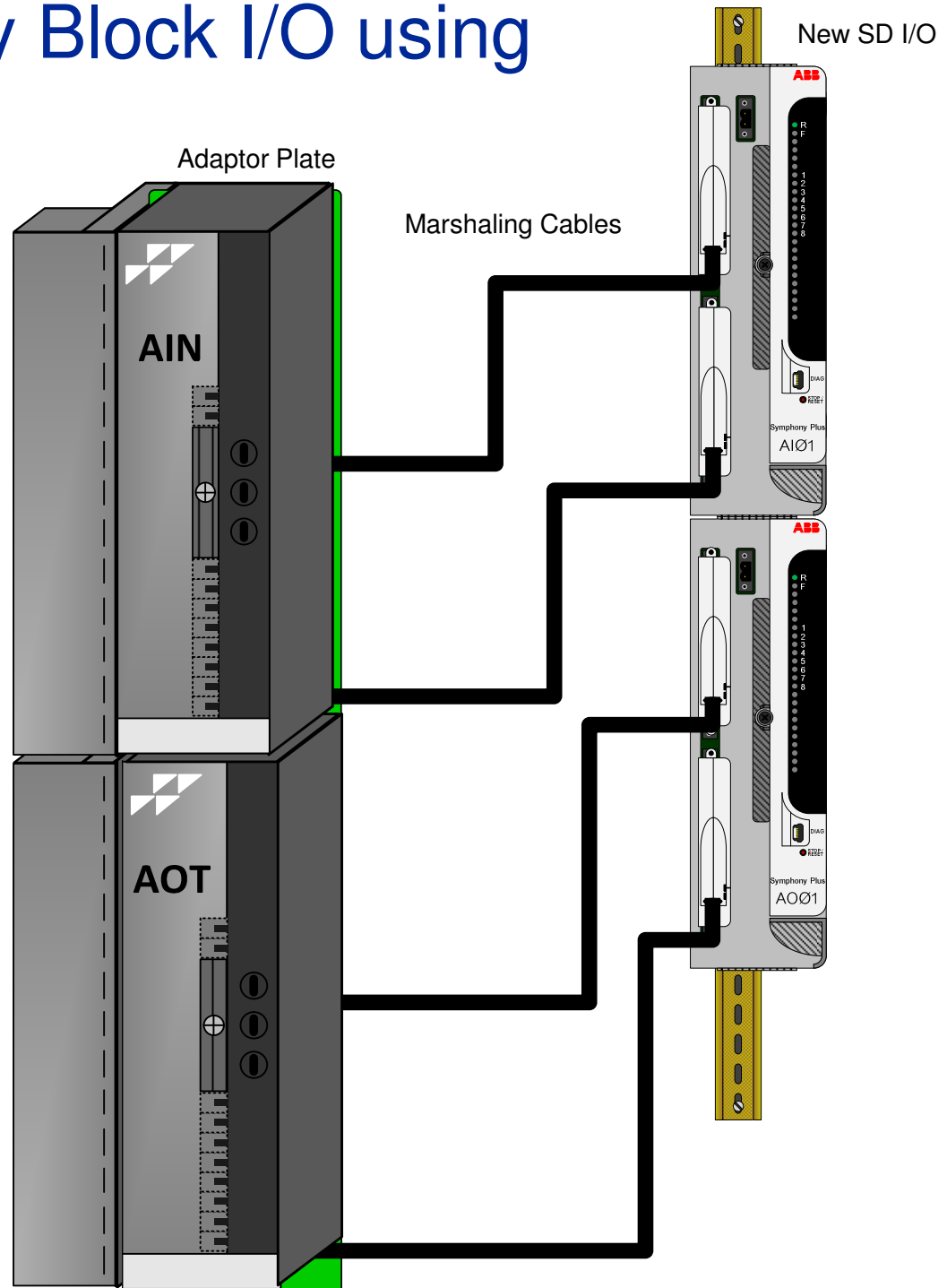
Evolution of Harmony Rack I/O using New SD Series I/O



Target 4Q-16

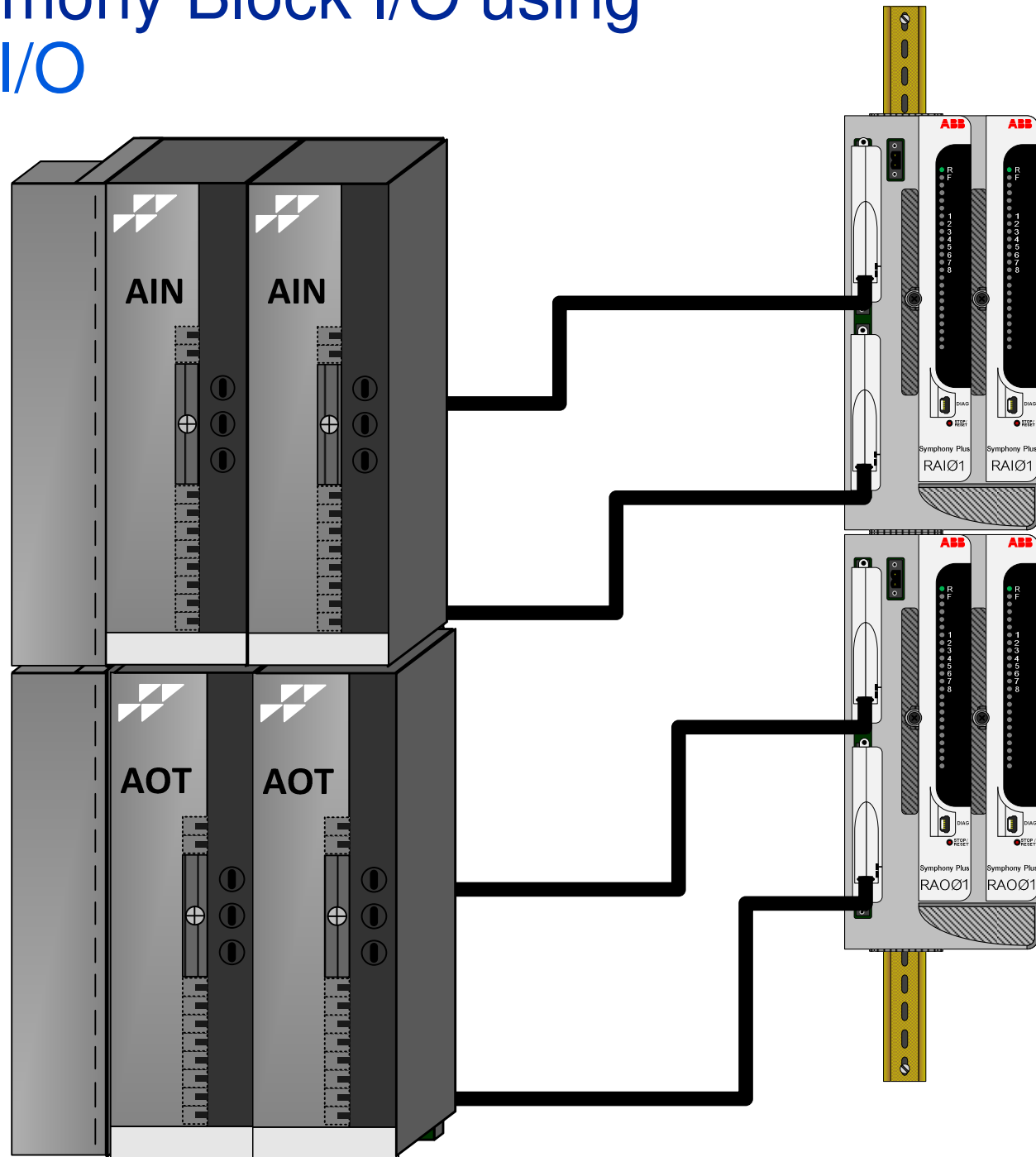
Evolution of Harmony Block I/O using New SD Series I/O

Target 4Q-16



Evolution of Harmony Block I/O using New SD Series I/O

Target 4Q-16



S+ Control and I/O, where to go from here?

Obsolete PLCs without an evolution path

Any Allen Bradley SLC



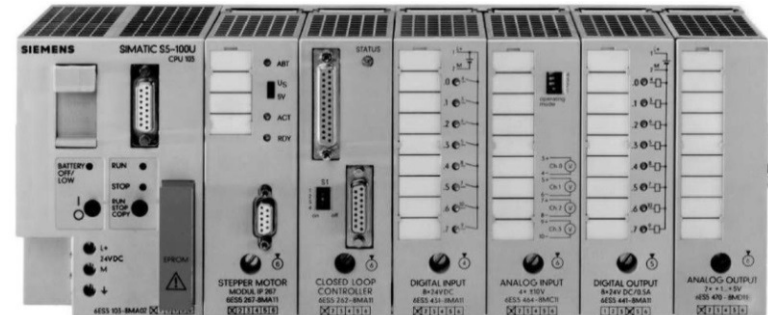
Modicon 984 / 884 / 584



Allen Bradley PLC-5 / PLC-3 / PLC-2



Siemens Simatic S5



Symphony Plus – Technology Update

Use Case PLC Replacement

PLC



Comparable Size for Retrofit



SPC700 and SD I/O

Symphony Plus – Technology Update

PLC Replacement

ABB PLC's

SPC700 and SD I/O



AC800M and S800 I/O

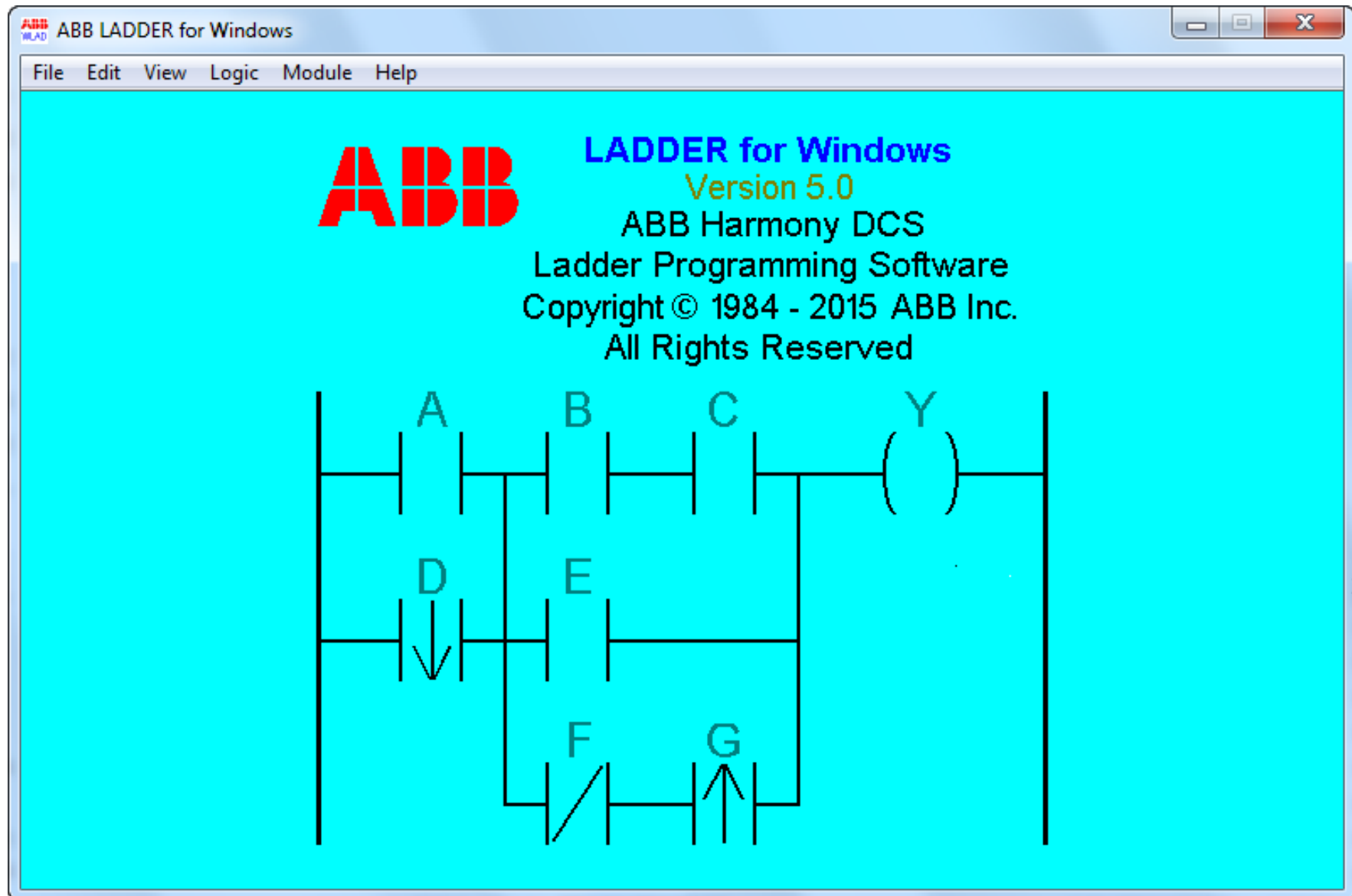


AC500 and I/O



Symphony Plus – Technology Update

PLC Replacement ABB Ladder



Symphony Plus – Technology Update

PLC Replacement ABB Ladder

Pcdem.lad - ABB LADDER for Windows

File Edit View Logic Module Help

Marked: 0 : 0 Block: 35 Rung: 9

Pre Node #1 Time Delay

PS1A

TIME DELAY OR PULSE

1B BLK ADR OF INPUT

2I 2 0=PULSE OUTPUT
1=TIMED OUT 2=TIMING

3R 3.000 TIME DELAY (IN SEC)

FC 35

0B

TOF-1

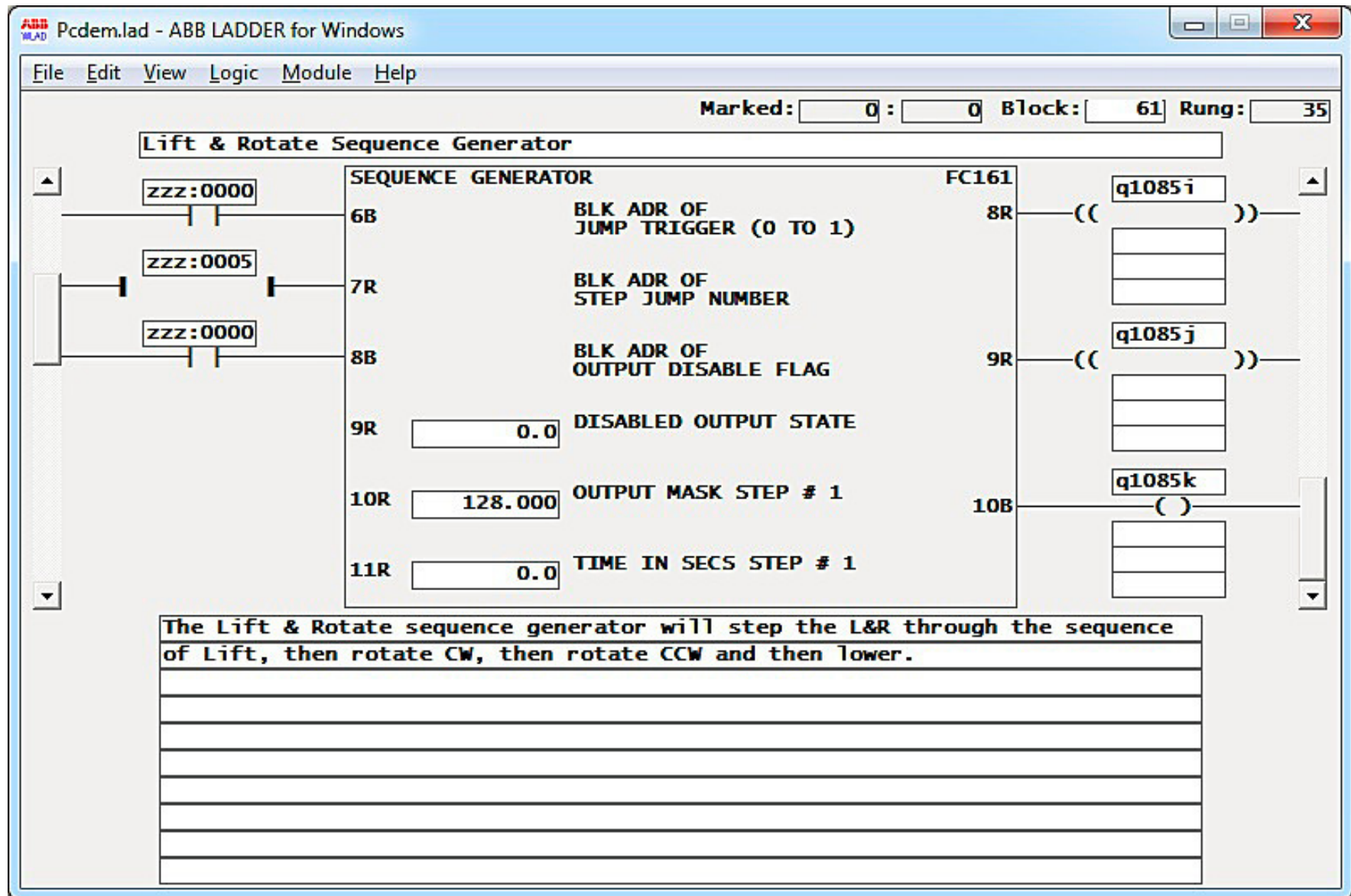
()

Pre
Node #1
Time Dly

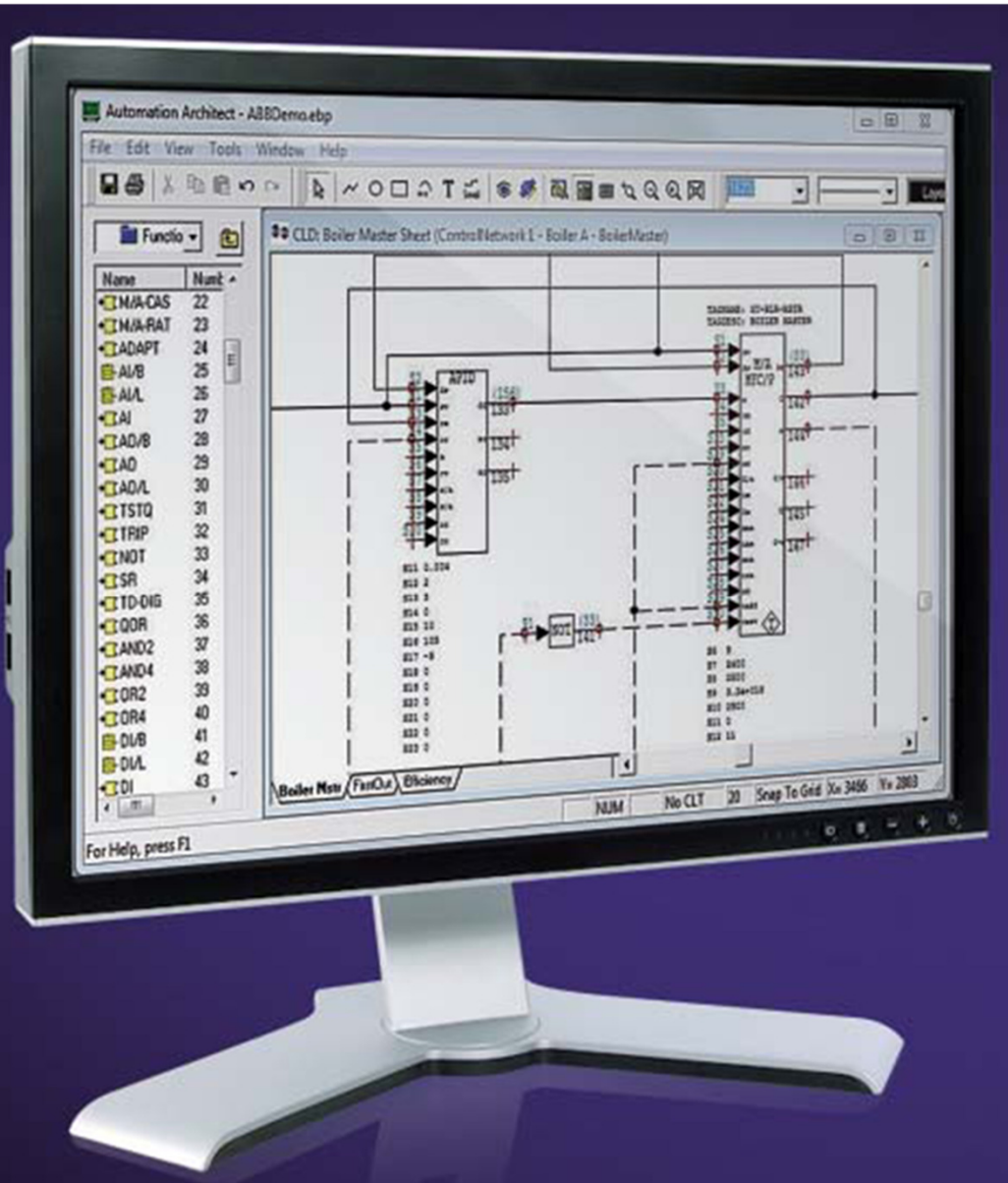
Time delays are used at each pre-node position in order to create a space between pallets by holding the indication of a pallet still being at a pre-node stop for a specified time period.

Symphony Plus – Technology Update

PLC Replacement ABB Ladder

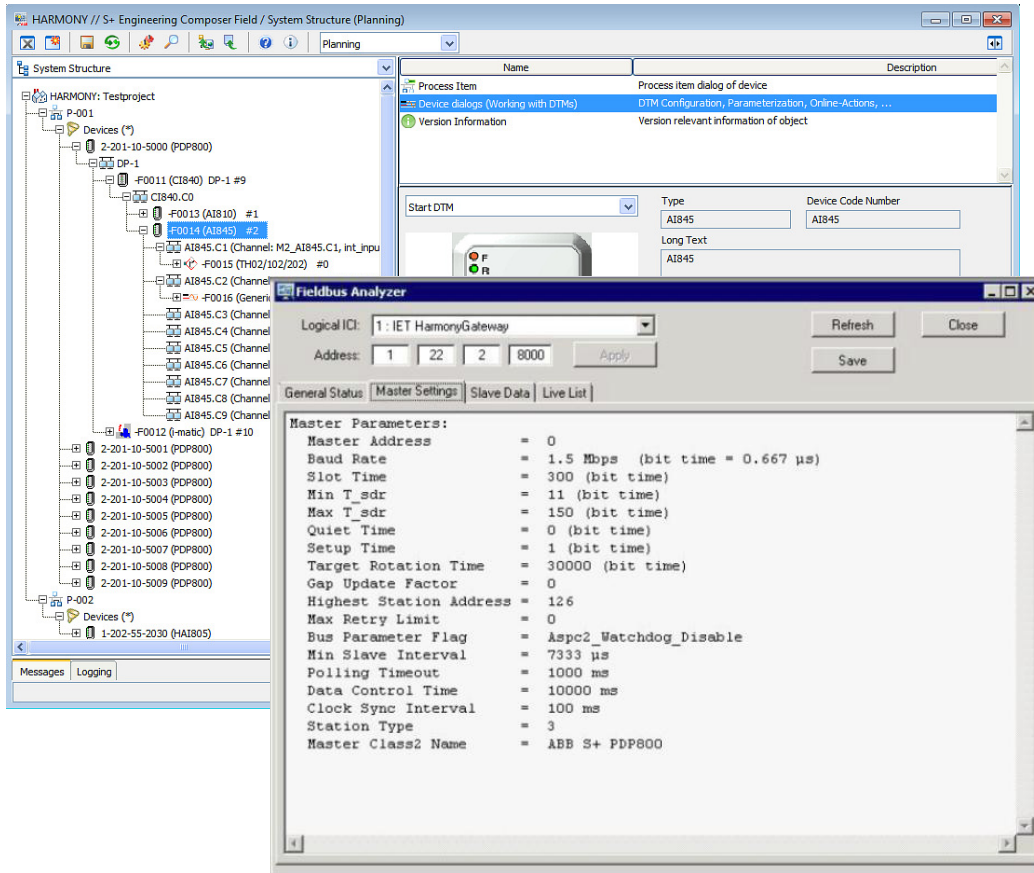


Composer – Symphony Plus Engineering

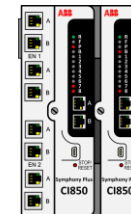


- Version 5.0 and older
 - Obsolete
- Version 5.1
 - Transitioning to Limited 12/2015
- Version 6.0
 - Transitioned to Limited 12/2016
- Version 6.1
 - Transitioning to Classic 12/2016
- All Versions replaced by Symphony Plus Engineering 1.0 (composer 6.2)

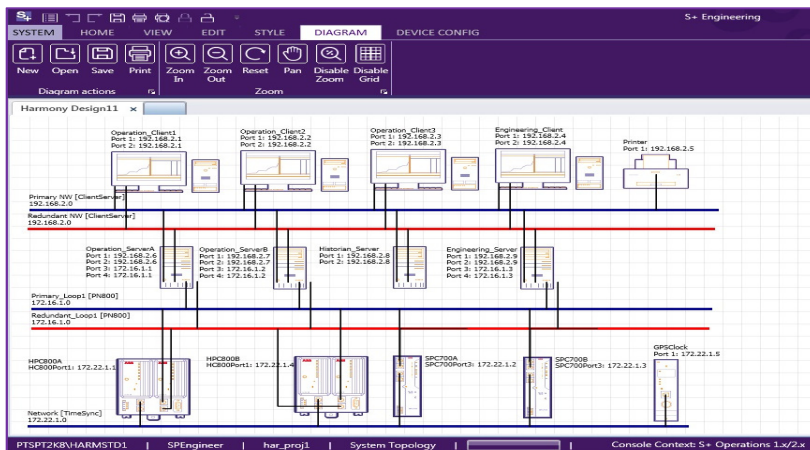
Symphony Plus Engineering(SPE)



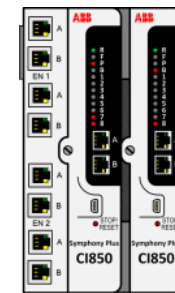
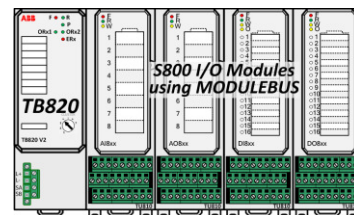
- SPE 1.0 (composer 6.2)
- New Workbench look and feel
 - User Management(workgroup and domain)
 - System Topology
 - Bulk configuration
- New CI850 Communications
 - IEC 61850 GOOSE interface
- Virtual PNI Interface(no CIU Hardware)
- Add Hart and Profibus support to BRC's (M4 firmware)
- SPC700 support
- Initial SD I/O support



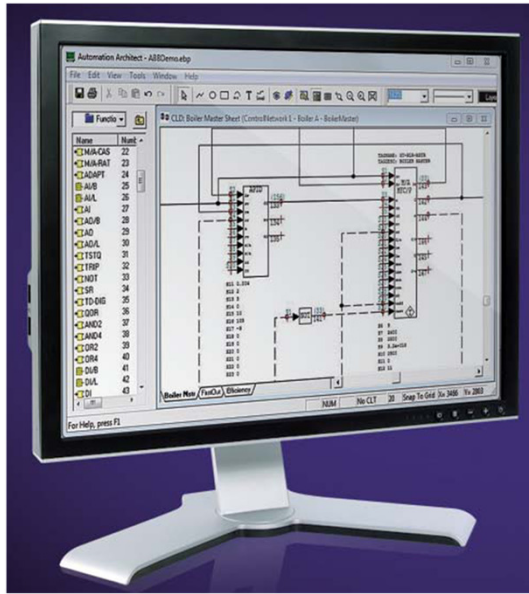
Symphony Plus Engineering(SPE)



- SPE 1.1 (composer 6.3)
- Bulk import and export of users
- Staggered import of excel I/O lists
- Automatic building of I/O CLD's from I/O lists
- Added Tag Manager tool
- Automatic cross-referencing while engineering
- Configuration of S800 Hart modules
- Support for released SD I/O modules (AI02, AO02, AI05, and AO05)
- Added support for IEC60870-5-104 interface (CI600)
- Added Office 2013 support



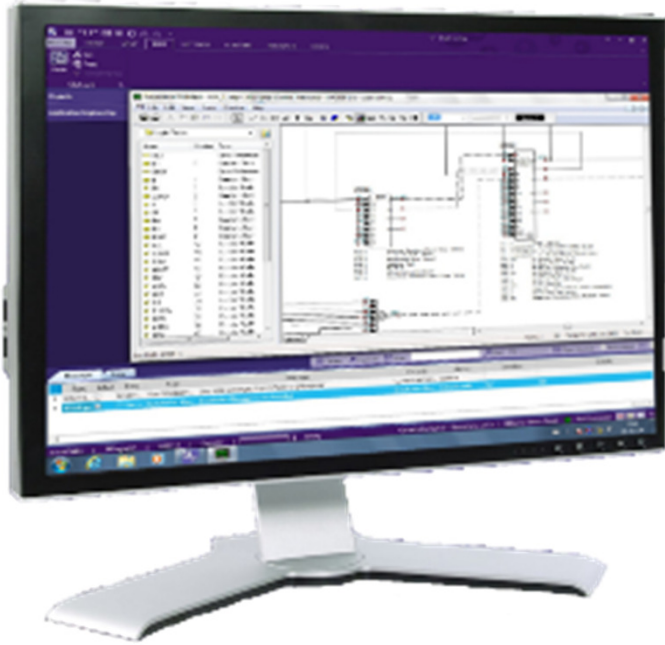
Symphony Plus Engineering(SPE)



- SPE 1.2 (composer 6.4)
- Added support for AD01 and AD02 drive SD I/O (CIS cards)
- HGS upgraded to 6.2
- Added support for Redundant SD I/O cards RAI02 and RAO02
- CI600 upgraded to SCI200(IEC 104)



S+ Engineering Software release roadmap



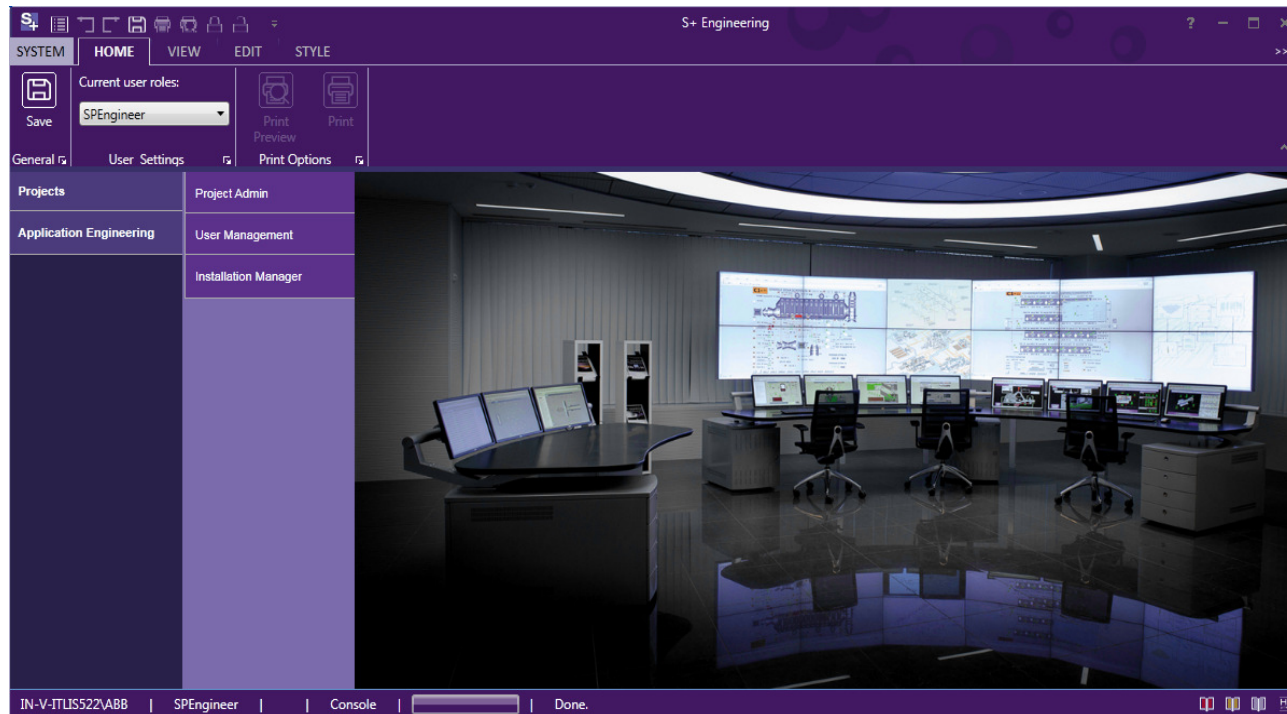
- **S+ Engineering Workbench 1.3 for DCS 2H 2016 (Target)**
 - DNP3 and ModbusTCP via block ware

S+ Engineering Workbench 2.0 for SCADA 3Q 2016 (Target)

- New Database Engine
- Composer Operations Integration

S+ Engineering 1.2 for Harmony(Composer 6.4)

Engineering Workbench: overview



Engineering Workbench features some very useful tools to make the project efficient:

- Project administration
- User management
- System Topology design
- Bulk Tag/IO management
- IEC61850 Engineering - horizontal and vertical
- Integrated central Install & Update
- Support for HMI configuration
- Integrated software PNI (no CIU)
- IEC60870-5-104 Engineering

S+ Engineering 1.2 for Harmony

Engineering Workbench: project administration

The screenshot displays the 'PROJECTS' tab in the S+ Engineering 1.2 for Harmony software. The interface features a top menu bar with 'SYSTEM', 'HOME', 'VIEW', 'EDIT', 'STYLE', and 'PROJECTS'. Below this is a toolbar with icons for 'New', 'Open', 'Close', 'Delete', 'Backup', 'Restore', 'Upgrade', 'Maintenance', and 'Settings'. A 'System Project Options' section is visible, including a 'Settings' button. The main area is divided into three sections: 'Project Details', 'Customer Details', and 'Consultant Details'. The 'Project Details' section includes fields for 'System Project Name' (Project1), 'System Project Desc' (Coal fired power plant), 'System Project Type' (DCS), 'Plant' (Plant1), 'Operations Console' (S+ Operations), and 'Console Version' (1.x/2.x). The 'Customer Details' section includes fields for 'Customer Name' (ReliancePower), 'Address' (Address1), 'Phone' (00000), 'Email' (reliance@email.com), 'Logo' (C:\Users\ABB\Desktop\reliance.png), and a 'Logo Preview' showing the 'RELIANCE' logo. The 'Consultant Details' section includes fields for 'Consultant Name' (Toyo Engineering), 'Address' (Address1), 'Phone' (00000), 'Email' (toyo@email.com), 'Logo' (C:\Users\ABB\Desktop\toyo.png), and a 'Logo Preview' showing the 'TOYO Engineering' logo. A left sidebar contains 'Back', 'Project Admin', 'User Management', and 'Installation Manager' buttons. The bottom status bar shows 'IN-V-ITLIS522\ABB', 'SPEngineerAdmin', and 'Project Admin'.

Section	Field	Value
Project Details	System Project Name *	Project1
	System Project Desc *	Coal fired power plant
	System Project Type *	DCS
	Plant *	Plant1
	Operations Console *	S+ Operations
	Console Version	1.x/2.x
Customer Details	Customer Name *	ReliancePower
	Address	Address1
	Phone	00000
	Email	reliance@email.com
	Logo	C:\Users\ABB\Desktop\reliance.png
	Logo Preview	RELIANCE
Consultant Details	Consultant Name *	Toyo Engineering
	Address	Address1
	Phone	00000
	Email	toyo@email.com
	Logo	C:\Users\ABB\Desktop\toyo.png
	Logo Preview	TOYO Engineering

A simple and intuitive way of project handling:

- System project creation with implicit creation of control project
- Clean project deletion
- Backup & restore
- Upgrade from previous versions
- Ability to store detailed customer/consultant information with logo for quick reference to documentation

S+ Engineering 1.2 for Harmony

Engineering Workbench: user management

The screenshot shows the 'PERMISSIONS' tab in the S+ Engineering 1.2 for Harmony application. The interface is divided into several sections:

- Top Bar:** Contains navigation icons and tabs for SYSTEM, HOME, VIEW, EDIT, STYLE, and PERMISSIONS.
- Left Sidebar:** Includes a 'Back' button and a list of management options: Project Admin, User Management (selected), and Installation Manager.
- User List:** A table listing users: ABB, ADMINISTRATOR, BTP-ADMIN, GUEST, and INGRES.
- Add/Modify User:** A form with fields for User ID*, Password*, Confirm Password*, First Name*, Last Name*, and Description*.
- Project Mapping:** A section for assigning roles to the user.
- S+ Roles*:** A list of roles including System Roles, Engineering Roles (SPEngineer, SPEngineerAdmin), and Operation Roles.
- Assigned Roles:** A list of roles assigned to the user, including SPEngineer, SPEngineerAdmin, SPSystemAdmin, and SPUser.
- Buttons:** 'Apply' and 'Cancel' buttons are located at the bottom right of the form.

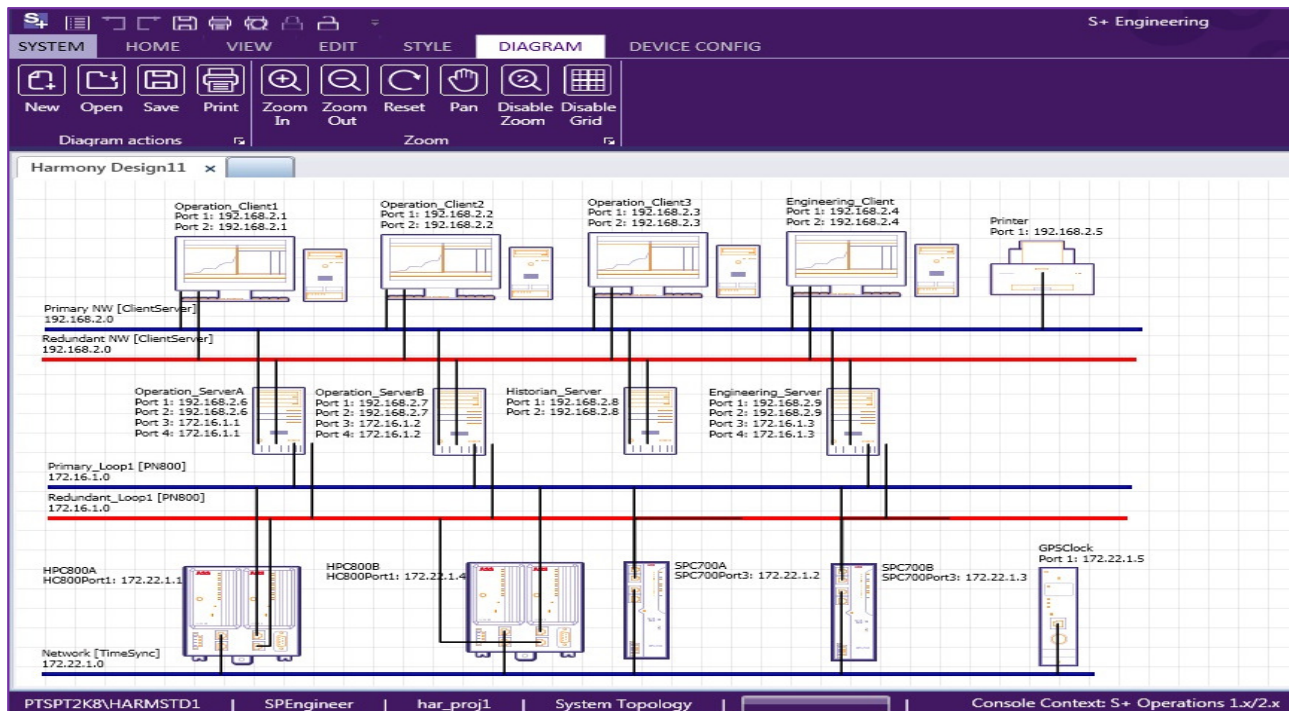
The status bar at the bottom shows the user is logged in as 'SPSystemAdmin' and is currently viewing the 'User Management' section.

A simple and intuitive way of user management for entire system:

- Create/maintain users with role assignment
- Assign users to specific projects
- Automatic configuration of Active Directory and Workgroup
- Enhanced security through Role Based Access Control (RBAC)
- Saves time during commissioning and simplifies maintenance by providing a central management tool
- Import and Export Users with Excel

S+ Engineering 1.2 for Harmony

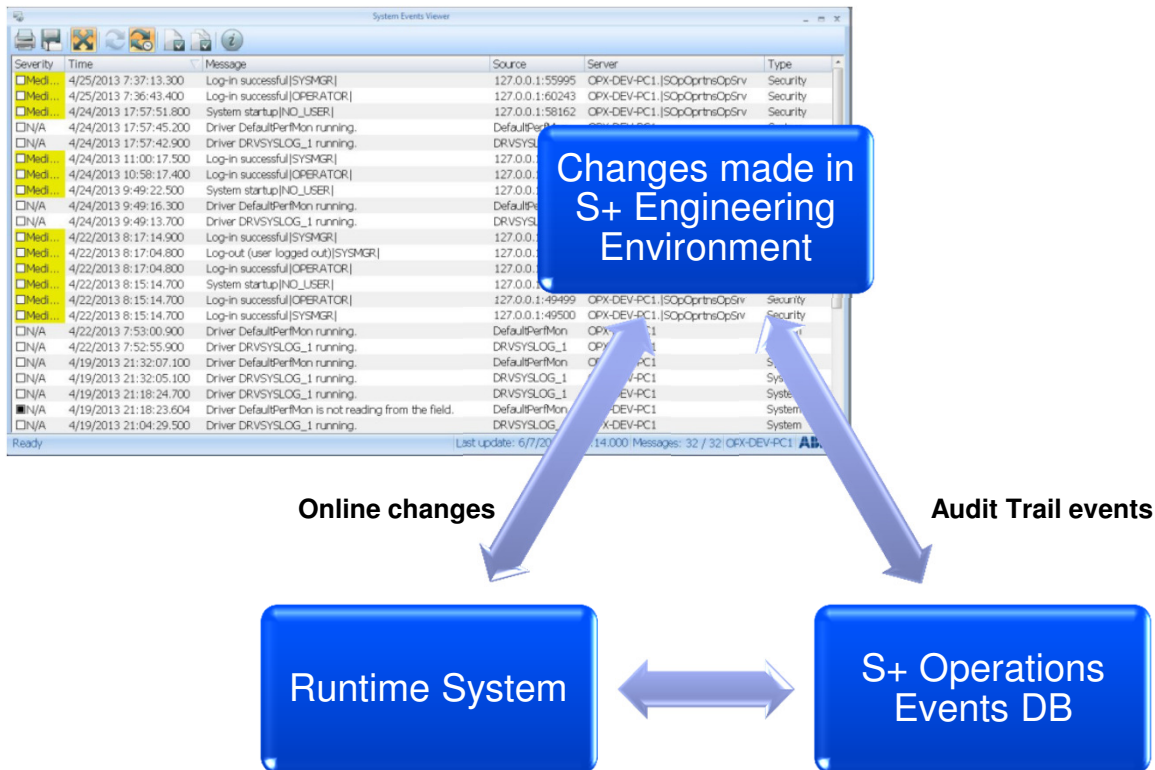
Engineering Workbench: system topology engineering



- Visual method to define topology from plant network to the S+ controller level
- Device specific property window
- Synchronizes control topology with control engineering
- Support system setup
 - **Publish IP to reachable computer nodes**
 - **Share information with Install & Update (I&U) tool and enables central I&U**
- HMI configuration support
 - **Shares HMI topology information and enables further configuration in S+ Operations**
- Effortless documentation and report generation

S+ Engineering 1.2 for Harmony

Audit trail

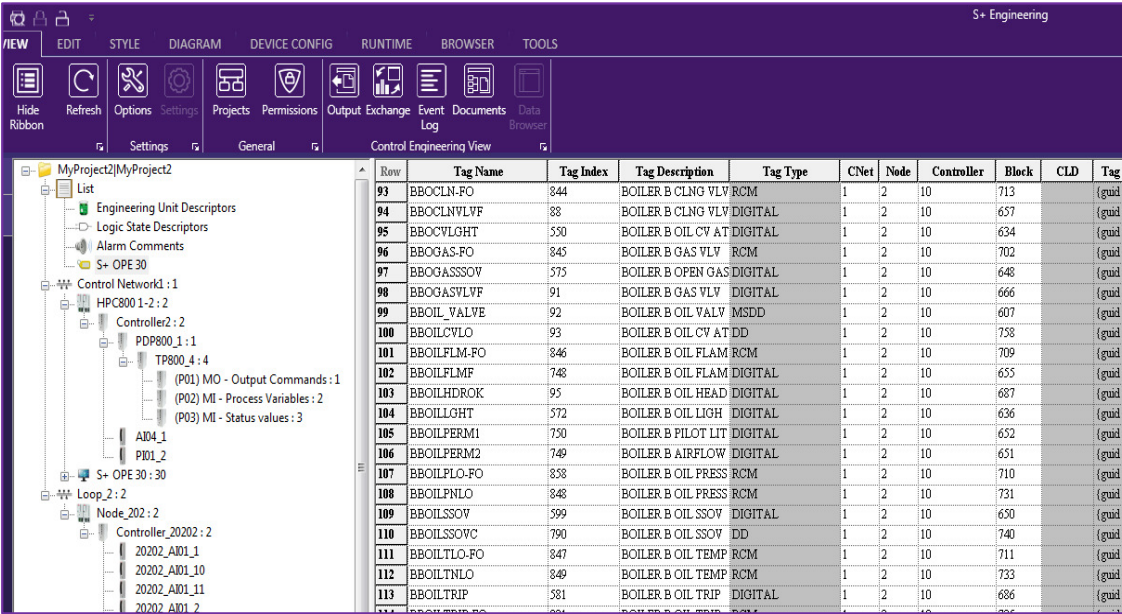


- Track and archive system changes made at any engineering station
- All event logs are traced in a central event database of S+ Operations through a configured Syslog driver*
- Long term archiving is made possible in Symphony Plus Historian
- System event viewer window in S+ Operations shows all the security events with time stamp and priority

* In systems where S+ Operations is not installed, the security event logs are stored on the local hard drive of S+ Engineering configuration server

S+ Engineering 1.2 for Harmony

Explorer: data browser view

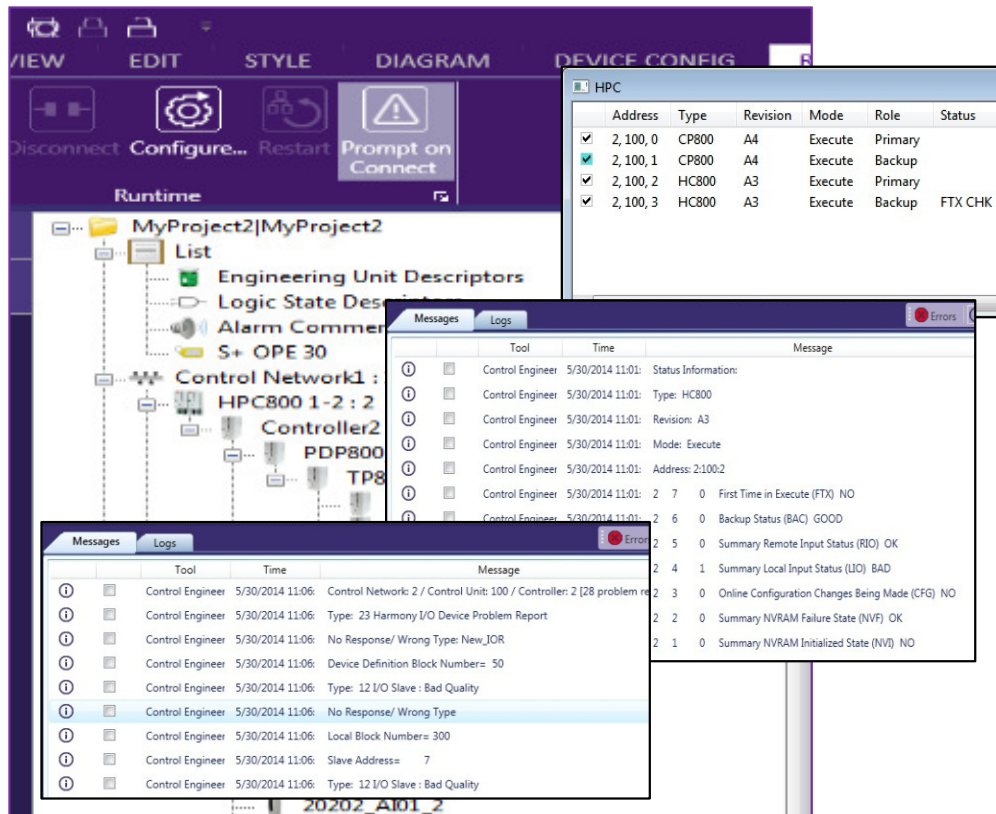


Row	Tag Name	Tag Index	Tag Description	Tag Type	CNet	Node	Controller	Block	CLD	Tag
93	BBOCLN-FO	844	BOILER B CLNG VLV RCM		1	2	10	713		(guid)
94	BBOCLNVLVF	88	BOILER B CLNG VLV DIGITAL		1	2	10	657		(guid)
95	BBOCVLGHT	550	BOILER B OIL CV AT DIGITAL		1	2	10	634		(guid)
96	BBOGAS-FO	845	BOILER B GAS VLV RCM		1	2	10	702		(guid)
97	BBOGASSOV	575	BOILER B OPEN GAS DIGITAL		1	2	10	648		(guid)
98	BBOGASVLVF	91	BOILER B GAS VLV DIGITAL		1	2	10	666		(guid)
99	BBOIL_VALVE	92	BOILER B OIL VALV MSDD		1	2	10	607		(guid)
100	BBOILCVLO	93	BOILER B OIL CV AT DD		1	2	10	758		(guid)
101	BBOILFLM-FO	846	BOILER B OIL FLAM RCM		1	2	10	709		(guid)
102	BBOILFLMF	748	BOILER B OIL FLAM DIGITAL		1	2	10	655		(guid)
103	BBOILHDROK	95	BOILER B OIL HEAD DIGITAL		1	2	10	687		(guid)
104	BBOILLGHT	572	BOILER B OIL LIGH DIGITAL		1	2	10	636		(guid)
105	BBOILPERM1	750	BOILER B PILOT LIT DIGITAL		1	2	10	652		(guid)
106	BBOILPERM2	749	BOILER B AIRFLOW DIGITAL		1	2	10	651		(guid)
107	BBOILPLO-FO	838	BOILER B OIL PRESS RCM		1	2	10	710		(guid)
108	BBOILPNLO	848	BOILER B OIL PRESS RCM		1	2	10	731		(guid)
109	BBOILSSOV	599	BOILER B OIL SSOV DIGITAL		1	2	10	650		(guid)
110	BBOILSSOVC	790	BOILER B OIL SSOV DD		1	2	10	740		(guid)
111	BBOILTLO-FO	847	BOILER B OIL TEMP RCM		1	2	10	711		(guid)
112	BBOILTNO	849	BOILER B OIL TEMP RCM		1	2	10	733		(guid)
113	BBOILTRIP	581	BOILER B OIL TRIP DIGITAL		1	2	10	686		(guid)

- Data browser view will show all the tag data associated with selected object
- View, define and modify the tag data for the entire system from this view. Changes are saved in S+ configuration server; so multiple entries not required
- Database filtering makes configuration faster by eliminating unnecessary information from view
- Call upon tag properties dialog window for easy editing of individual tag, or
- Import/export tag data, perform search-and-replace operations
- Easy navigation to open relevant control logic document

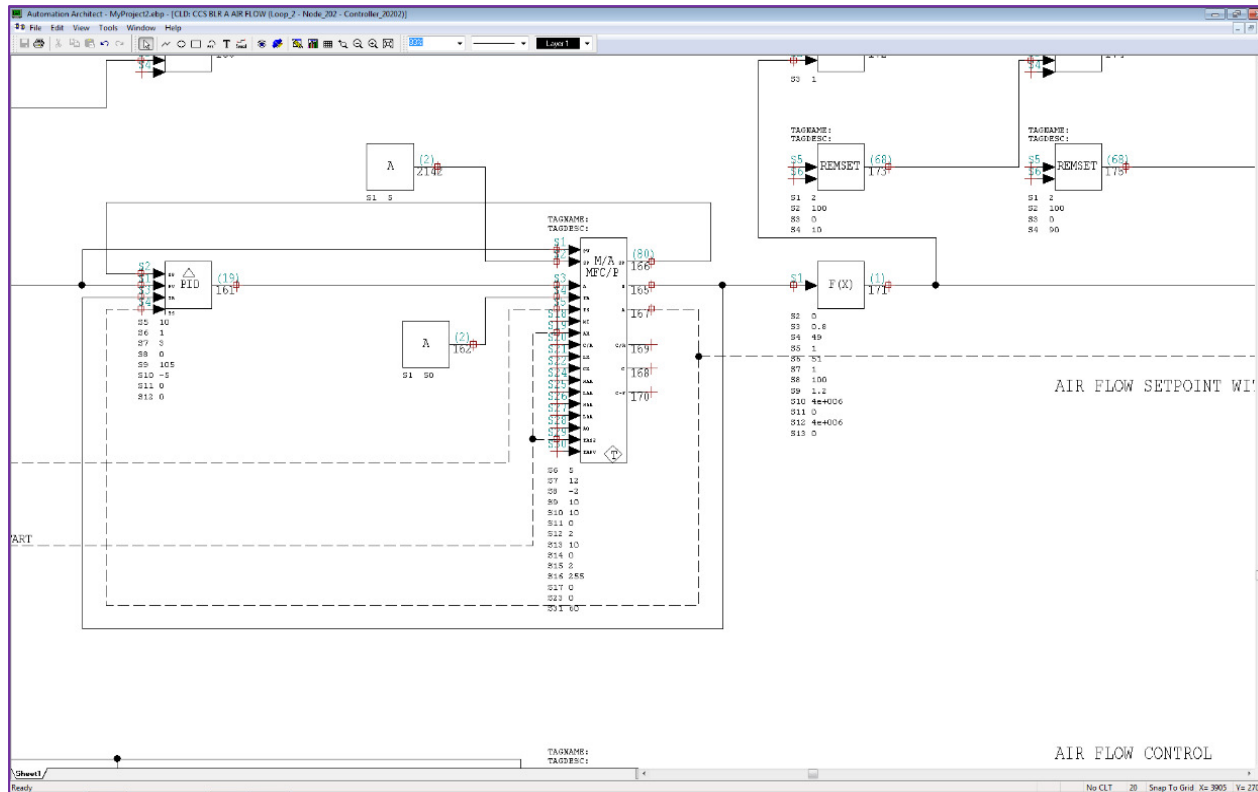
S+ Engineering 1.2 for Harmony

Explorer: run-time operations



- Retrieve run-time status and diagnostic information from system hardware
 - Online/offline, redundancy, module type, firmware revision, etc.
 - Controller status report for summary status and errors information
 - Controller problem-report to reveal individual error condition detail
- Wizard style guided online configuration
 - Modify control logic in the running redundant controller without interruption of the process
 - Step by step guidance to reduce chance of mistake
 - Can discard changes and roll back to original configuration
- Support I/O channel forcing and simulation for easy in-house check-out and site commissioning
 - Applicable to SD I/O and S800 I/O

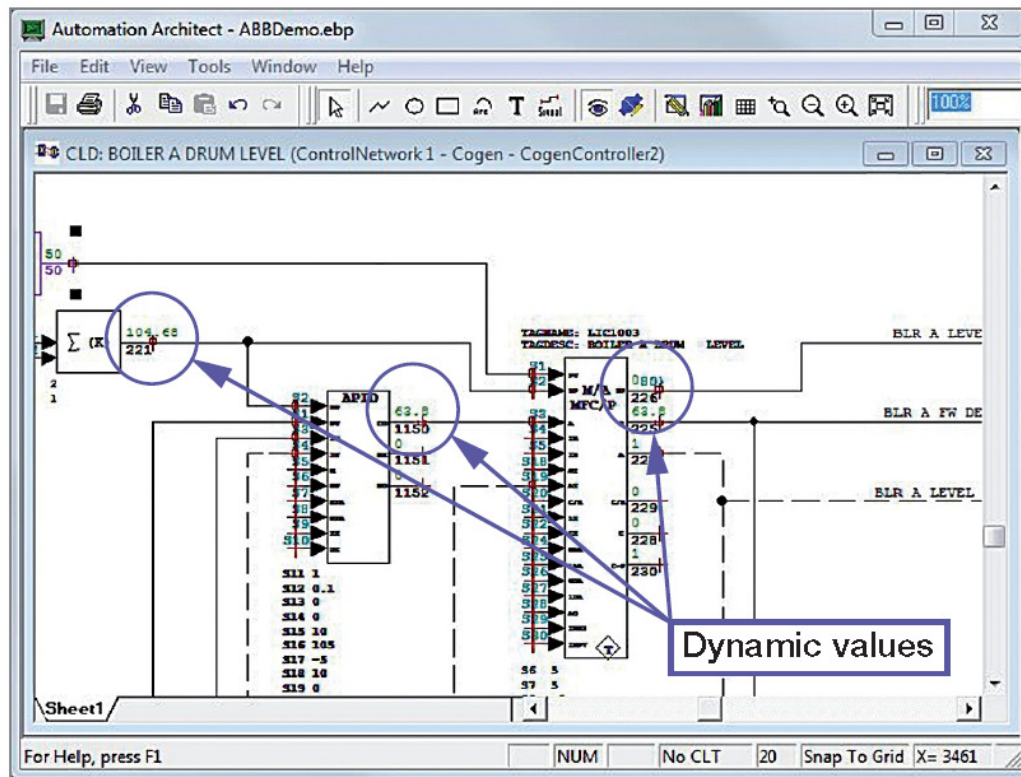
Automation Architect



- Visual creation, editing, monitoring and tuning of control logic
- Drag and drop function codes directly into the CLD
- Easy navigation between sheets or documents connected by cross-references
- Can add or assign tags directly on the drawing
- Save control strategy as a macro that can be re-used
- Makes for more intuitive engineering, saves time and reduces errors
 - Users can view and create signal flow and control strategy in visual form instead of lines of code

S+ Engineering 1.2 for Harmony

Monitoring and Tuning



- Online mode of Automation Architect permits monitoring and tuning of dynamic values on a CLD
- In this mode, the function code block output values are updated with live values from the controller
- All the tunable parameters can be tuned in this mode
- If tunable parameters are modified and the changes are accepted, the changes are stored within the CLD and are transmitted to the affected function blocks within the controller

S+ Engineering 1.2 for Harmony

Bulk engineering

The screenshot displays the S+ Engineering for Harmony software interface. The top menu bar includes SYSTEM, HOME, EDIT, VIEW, SETTINGS, GENERAL, and TOOLS. Below the menu is a toolbar with icons for UnMap, Sort, Insert, Delete, Set header, and Set data. The main workspace is divided into several sections:

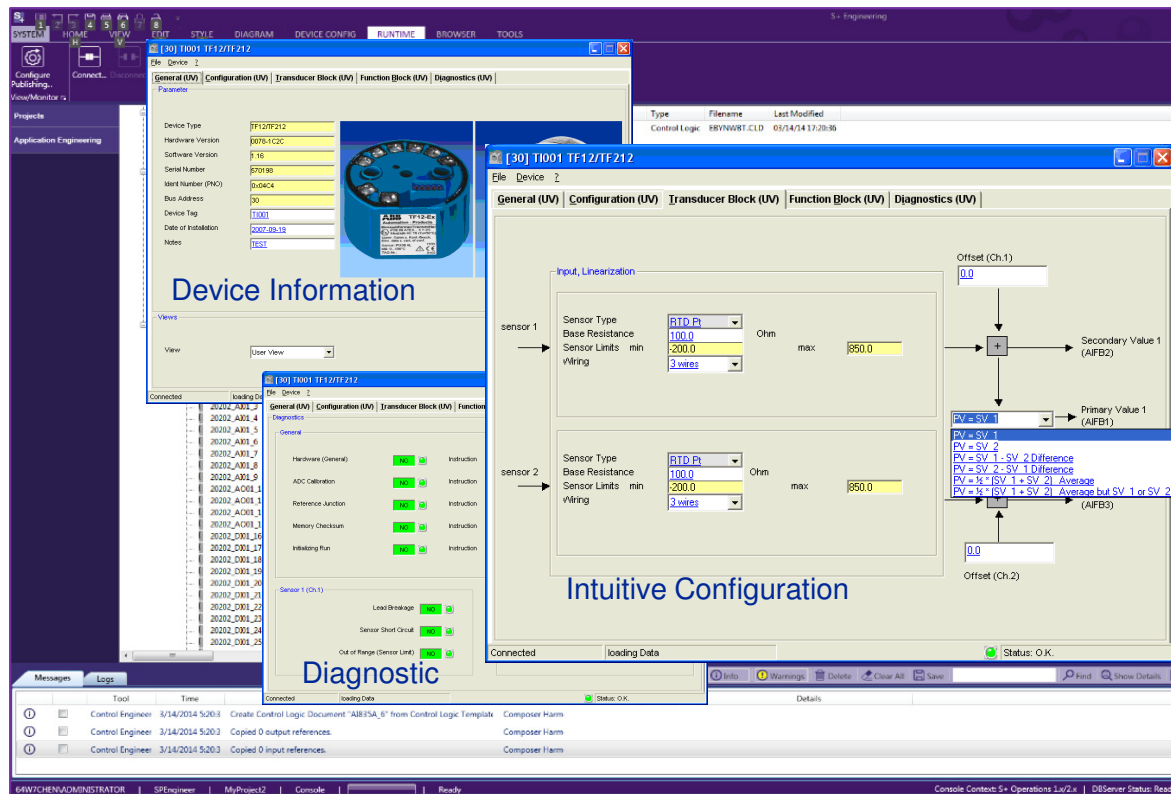
- Tag List:** A table with columns for Column, Tag attribute, and Tag attribute. It contains rows for TAGNAME*, TAG Alas name, TAG DESCRIPTION, TAGDESC, TAGTYPE*, Instrument tag, Instrument type, Instrument supplier, Location MCC, and Originator.
- IO list:** A table with columns A through Q. It contains rows for TAG_NAME*, TAG_DESC, TAG_TYPE*, and various signal and device information.
- Buttons:** Validate, Preview, Validate with Composer, Import IO, Export excel, and Tag manager.

The bottom status bar shows the project name INNAM2, the user SP Engineer, and the test name TestWithNewTM1.

- Simple and intuitive way of handling bulk data
- Seamless import of tag list for configuration
 - **Manage the bulk data in the familiar MS Excel environment and then import into Symphony Plus Engineering Server**
- Import history maintained with tag list and logs for ready reference
- Reduces the burden on your engineers by easing the handling of large amounts of data
- Saves valuable time during startup and commissioning

S+ Engineering 1.2 for Harmony

Device integration / field engineering



- Complete support for configuration, commissioning, maintenance and management of intelligent field and electrical devices using PROFIBUS and HART
- Unlimited access to HART device parameters (including primary and secondary variables) in control application via function blocks
- Full support for PROFIBUS-DP V0, V1, V2 (device management, configuration, diagnostic and maintenance) as well as PROFIBUS-PA
- Use of standard HART and PROFIBUS DTMs – intuitive graphical interface for configuration
- Shortens commissioning time by allowing single platform (without additional tools/software) for smart device configuration

S+ Engineering 1.2 for Harmony

Modbus TCP communication interface HGS 6.1

The screenshot displays the 'HGS Modbus TCP Interface' configuration window within the S+ Engineering 1.2 for Harmony software. The interface is divided into several sections:

- Module Fixed Blocks:** A list of modules and their associated Modbus points, including 'Startup in Progress Flag', 'Memory Display Value', 'System Free Time', 'Revision Level', 'Reserved', 'Elapsed Time Previous Cycle', 'Elapsed Time Current Cycle', 'Process Utilization', 'Check Point Overrun Count', 'Cycle Time Overrun', 'Hours', 'Minutes', 'Seconds', 'Time Sync Flag', 'Year', 'Month', 'Day', 'Calendar Day Of Week', 'Reserved', and 'Reserved'.
- HGS Ethernet Segment:** A diagram showing the network topology, including a 'Server, Maximum client connections (1)' and a 'Heartbeat 0-disabled, 1,2-Global, 3,4'.
- Modbus TCP Mapping Table:** A table listing the mapping of Modbus points to function blocks. The table has columns for Index, Block Number, Atom Type, Data Direct, Boolean Loc, Digital Alarm, Analog Type, Offset, Multiplier, Auto Refresh, Auto Load, Heartbeat, Mapped, and Tail. The table lists 32 entries, each corresponding to a specific Modbus point and its configuration.

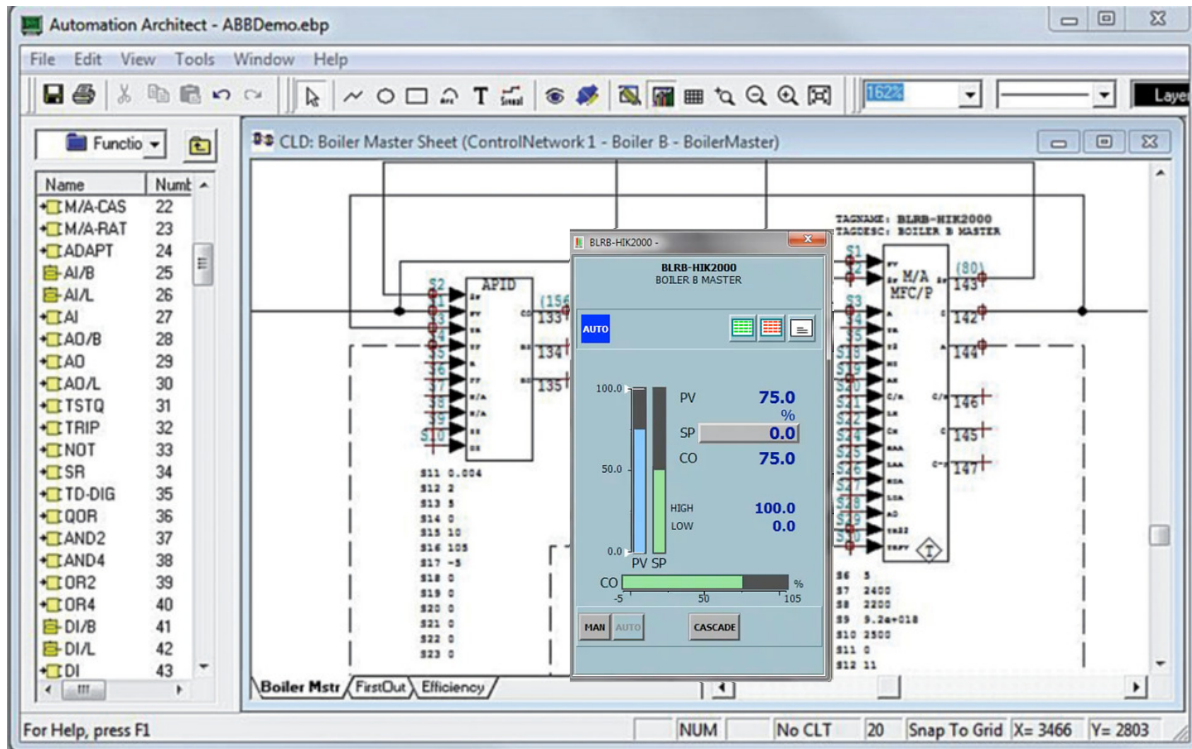
The table data is as follows:

Index	Block Number	Atom Type	Data Direct	Boolean Loc	Digital Alarm	Analog Type	Offset	Multiplier	Auto Refresh	Auto Load	Heartbeat	Mapped	Tail
1	2000	VB	R	0	2	1655	0	1	0	0	1	DI	0
2	2001	VB	R	0	2	1655	0	1	0	0	1	DI	1
3	2002	VB	R	0	2	1655	0	1	0	0	1	DI	2
4	2003	VB	R	0	2	1655	0	1	0	0	1	DI	3
5	2004	VB	R	0	2	1655	0	1	0	0	1	DI	4
6	2005	VB	R	0	2	1655	0	1	0	0	1	DI	5
7	2006	VB	R	0	2	1655	0	1	0	0	1	DI	6
8	2007	VB	R	0	2	1655	0	1	0	0	1	DI	7
9	2008	VB	R	0	2	1655	0	1	0	0	1	DI	8
10	2009	VB	R	0	2	1655	0	1	0	0	1	DI	9
11	2010	VB	R	0	2	1655	0	1	0	0	1	DI	10
12	2011	VB	R	0	2	1655	0	1	0	0	1	DI	11
13	2012	VB	R	0	2	1655	0	1	0	0	1	DI	12
14	2013	VB	R	0	2	1655	0	1	0	0	1	DI	13
15	2014	VB	R	0	2	1655	0	1	0	0	1	DI	14
16	2015	VB	R	0	2	1655	0	1	0	0	1	DI	15
17	2016	VB	R	0	2	1655	0	1	0	0	1	DI	16
18	2017	VB	R	0	2	1655	0	1	0	0	1	DI	17
19	2018	VB	R	0	2	1655	0	1	0	0	1	DI	18
20	2019	VB	R	0	2	1655	0	1	0	0	1	DI	19
21	2020	VB	R	0	2	1655	0	1	0	0	1	DI	20
22	2021	VB	R	0	2	1655	0	1	0	0	1	DI	21
23	2022	VB	R	0	2	1655	0	1	0	0	1	DI	22
24	2023	VB	R	0	2	1655	0	1	0	0	1	DI	23
25	2024	VB	R	0	2	1655	0	1	0	0	1	DI	24
26	2025	VB	R	0	2	1655	0	1	0	0	1	DI	25
27	2026	VB	R	0	2	1655	0	1	0	0	1	DI	26
28	2027	VB	R	0	2	1655	0	1	0	0	1	DI	27
29	2028	VB	R	0	2	1655	0	1	0	0	1	DI	28
30	2029	VB	R	0	2	1655	0	1	0	0	1	DI	29
31	2030	VB	R	0	2	1655	0	1	0	0	1	DI	30
32	2031	VB	R	0	2	1655	0	1	0	0	1	DI	31
33	2032	VB	R	0	2	1655	0	1	0	0	1	DI	32
34	2033	VB	R	0	2	1655	0	1	0	0	1	DI	33

- Built-in functionality of Harmony Gateway Software (HGS)
- Complete integration of Modbus TCP data within the control application by mapping Modbus points to function blocks in the controller
- Ultimate design flexibility - HGS can configure S+ controller as a Modbus TCP client, server or client/server concurrently
- Data can be read from, or write to, or bi-directional with 3rd party PLCs or devices
- Up to 10,000 Modbus TCP points, 128 clients, 8 servers per controller (capacity may vary by controller type)

S+ Engineering 1.2 for Harmony

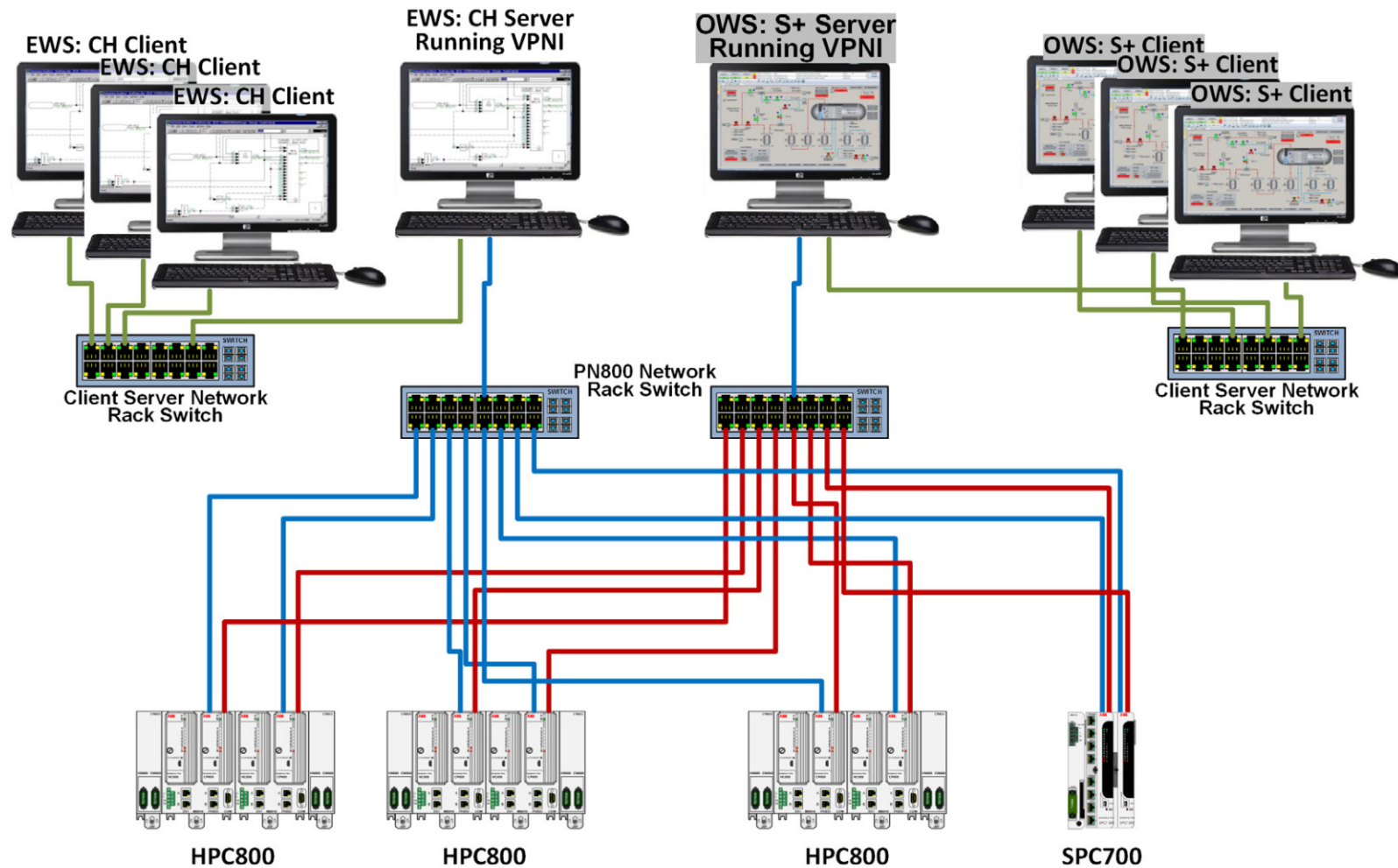
Integration with S+ Operations



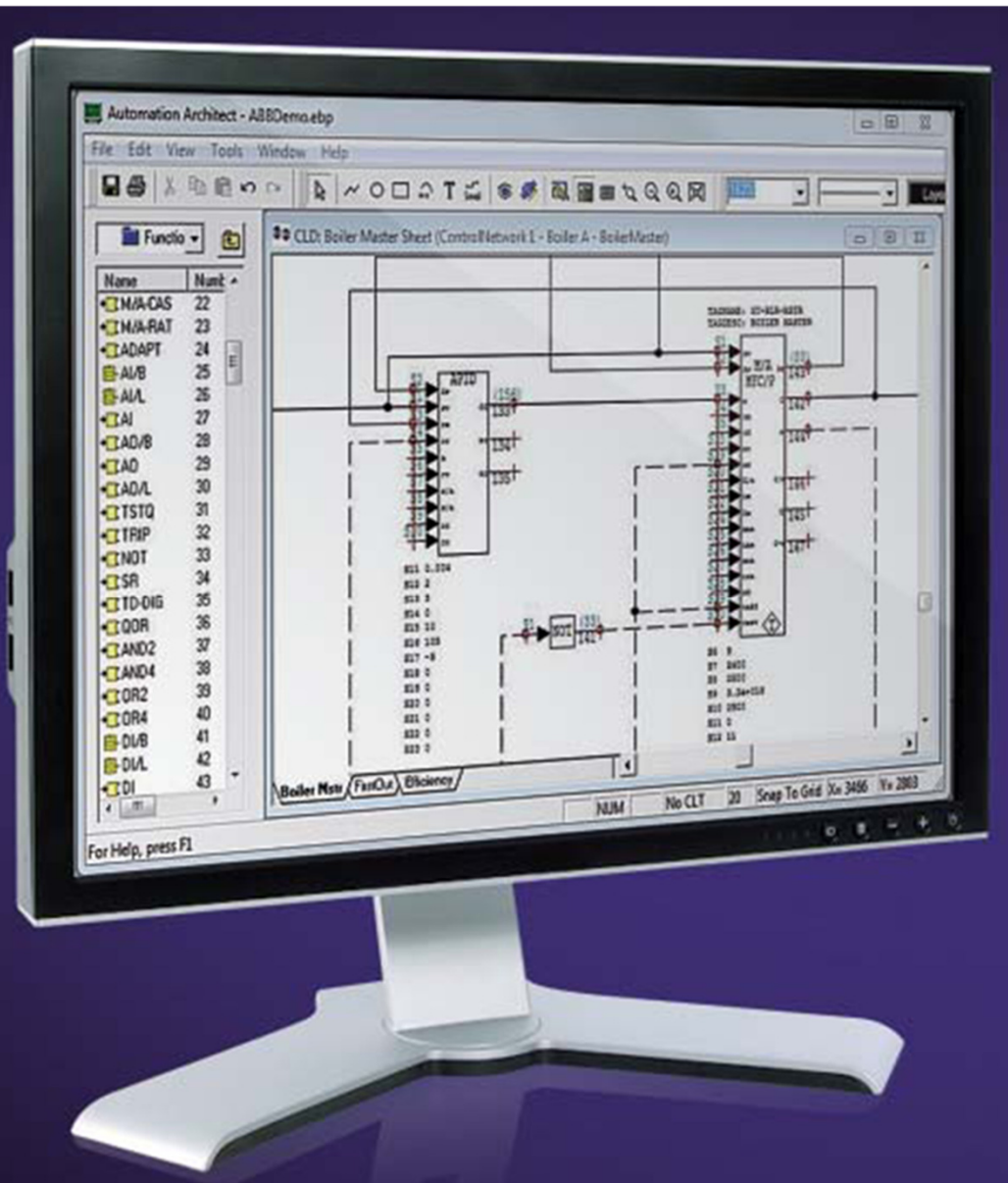
- Complete integration between S+ Engineering and S+ Operations (HMI)
- Direct and seamless cross-navigation between two systems
- View relevant alarms & events, graphics, faceplates and trends in the HMI without leaving the engineering interface
 - Launch a faceplate from control logic diagram (CLD)
 - Open a CLD directly from a process graphic/faceplate

S+Engineering 1.2

VPNI – Software CIU -



Harmony Gateway Software (HGS 6.2)



- Integrated into Symphony Plus Engineering 1.2
- 10,000 modbus points
- Support for HPC800
 - Modbus connect for process panel added supports 100 tags, one server and one client. For HPC only
 - 8 servers and 128 clients
- Support for SPC700
 - SPC not enabled for HGS at this time
 - 2 servers and 32 clients (when enabled)
- HGS 5 is now obsolete
- HGS 5.1 enters Limited 1/2017

Harmony OPC Server version 6 service pack 1



- Windows 7 and Server 2008, 32 and 64 bit
- Support for the Remote Motor Control Block (FC 136).
- Ability to set write security on a per tag basis to prevent clients from writing to a tag.
- Full Tag licensing enhancement – each tag license supports subscriptions to any applicable tag.atom.
- Support for the PNI800 module.
- Tested with DBDOC to replace Rovisys OPC server
- USB dongle or ethernet licensing
- 4 OPC applications per computer
- OPC server 4 is now obsolete

Symphony Plus 800XA SV.6.0 for Symphony Plus



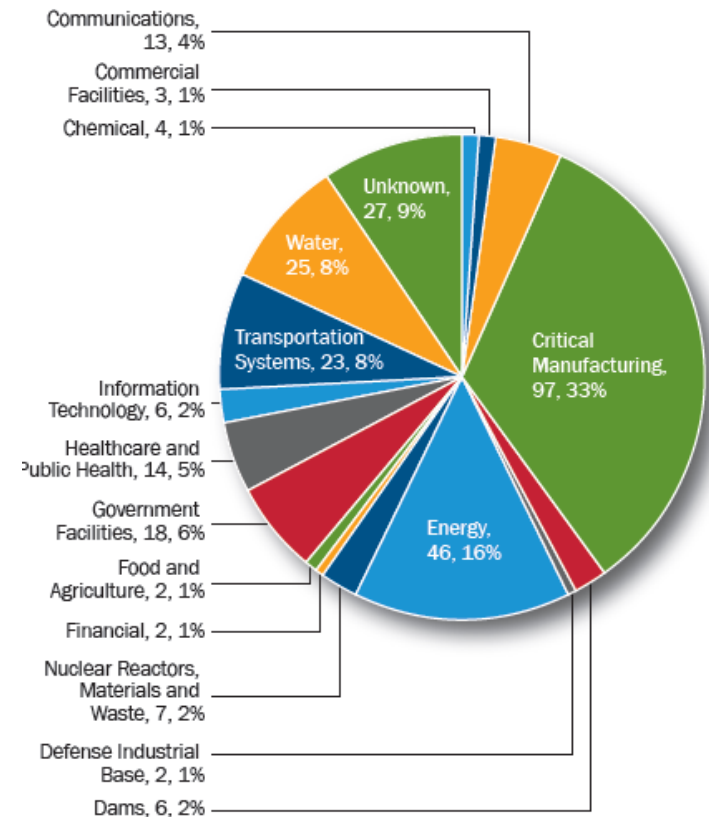
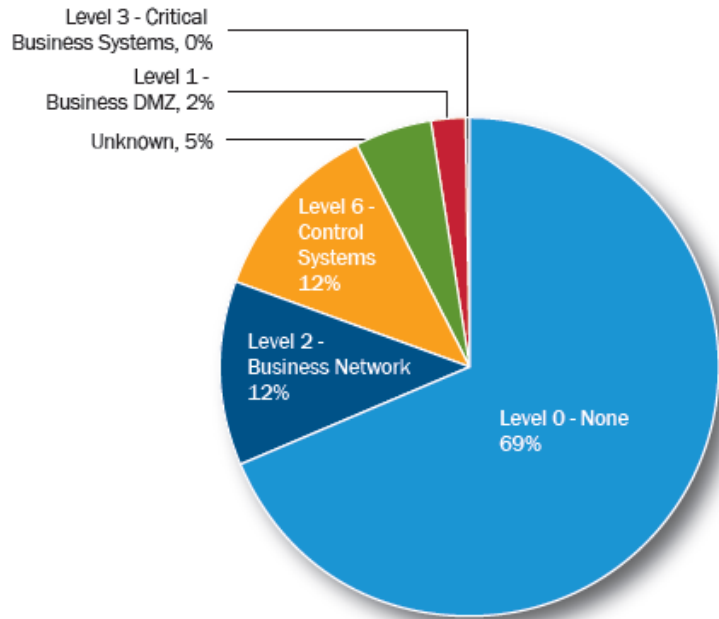
Windows 8.1 and Server 2012 R2

- The SQL Server based ConfigServer Database that contained 800xA for Harmony Configuration data has been eliminated in the 6.0 release. The tag configuration data is now stored in the Aspect Directory.
- The Harmony Synchronizer Aspect, Tag Importer Exporter, and Import Export Configuration utility have been eliminated. A new Harmony Uploader Aspect has been added to allow Harmony tag configuration data to be imported to and exported from the Aspect Directory.
- The System Definition object type located under the Harmony OPC Server Network object has been eliminated. It has been replaced with a new INFI 90 System Definition object in the Library Structure and a new ServerConfig aspect on the Harmony OPC Server Network object.
- The Harmony Bulk Configuration Manager has been eliminated. The 800xA Bulk Data Manager can now be used to make bulk changes to 800xA for Symphony Plus Harmony TagConfig Aspects.
- The 800xA for Harmony Backup/Restore utility has been eliminated. 800xA for Symphony Plus Harmony tag configuration data can now be backed up and restored through the standard 800xA Aspect Directory backup/restore.
- The Harmony Server Monitor object and TagMonitor Aspects are no longer needed and have been eliminated.
- A new TagConfig Aspect that supports Aspect Directory based tag configuration has been added. The new TagConfig Aspect also provides support for 800xA Engineering Environments and Versioning.
- No longer supports SCSI CIU's

ICS-Cert reported attacks

(245) 2014 attacks
(295) 2015 attacks

12% against control systems(2015)



ICS-CERT 1/2016

Security Workplace Background

- Designed to ensure the safety and availability of power plants & other critical infrastructure sites
- Automates what are currently manual and tedious tasks
- Enables the ability to comply with NERC CIP and other external as well as internal regulations
- Designed specifically for automation systems
- Tightly integrated into ABB systems
- Integrates with Industrial Defender security devices



Patch Update | Anti Virus Manager | Security Event Manager | Compliance Reporting | Server BackUp Manager

Repository Options Action

Computer

- SPLUSCL2
- SPLUSCL1
- SPLUSSRV

Patch Update Summary Report

Microsoft Hotfixes

Computer	Unapproved updates (Installed)	Approved updates (Not installed)	N/A updates (Installed)	Approved updates (Installed)
SPLUSCL2	0	7	0	45
SPLUSCL1	0	7	0	45
SPLUSSRV	1	8	0	58

Detail

Updates that are installed but unapproved.

MS-ID	KB Article	Affected Computers	Title
MS11-025	2467173	SPLUSSRV,	Security Update for Microsoft Visual C++ 2010 Redistributable Package (KB2467173)

Patch Update | Anti Virus Manager | Security Event Manager | Compliance Reporting | Server BackUp Manager

Repository Options Action

Computer

- SPLUSCL2
- SPLUSCL1
- SPLUSSRV

SPLUSSRV

Operating System: Server 2008 R2 SP1 64-bit

Status: Idle

Collection Time: 3/12/2013 5:27:39 AM

Quality: Good

Detected Software: InternetExplorer9 x64, Office2010 No ServicePack x64

Profile: Symphony Plus 1.0 SP2 and 1.1, Composer Melody 5.3 and 6.0, Composer Harmony 5.1 and 6.0, Composer System 1.0

Profile Version: 2/25/2013 12:00:00 PM

CAB Date: 2/12/2013 3:06:15 AM

Log

Repository

✓ All repository files are present, ready to copy.

Copy Updates to This Node

Launch Remote Installation

File Copy Status

Microsoft Hotfixes

1 Unapproved updates are installed.

8 Approved updates are not installed.

In Repository	MS-ID	KB Article	Status	Title	Notes
✓	MS13-019	2790113	Qualified	Security Update for Windows Server 2008 R2 x64	E-Release (x627001113)

Security Workplace

Reliability – Security – Compliance



MAINTAIN

Security Workplace

- System Hardening
- User Access Control
- MS Patches, Anti Virus, Patch Disk
- **Centralized Microsoft Patching***
- Centralized Anti-Virus Management
- Automated Backup and Recovery
- **Removable Media Protection (ODI-X)***

DEFEND

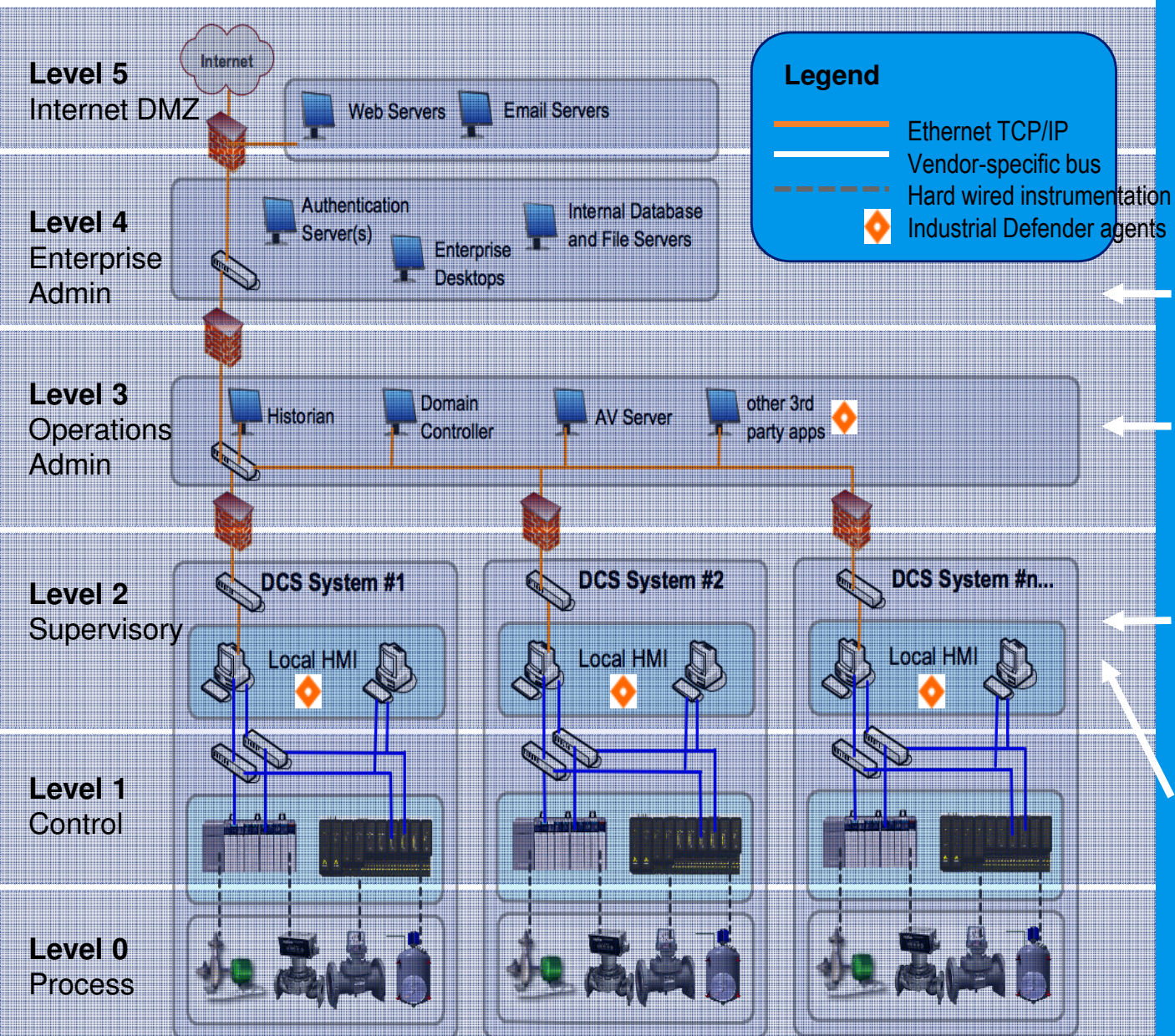
- **Detect-in-Depth (HPSS + SOPHIA)***
- NIDS (Network Intrusion Detection)
- Security Event Monitoring
- **Application Whitelisting ***
- Configuration Change Management
- IT Asset Management

COMPLY

- Automated Data Collection
- Automated Compliance Reporting
- Policy Management
- Workflow Automation Suite

Control Systems Best Practices

ISA/IEC-62443 Standards (formerly ISA-99)



Purpose Built **Solution Stack**



FleetView™



Automated Systems Manager (ASM)



Advanced Service Appliance (ASA)



Network Intrusion Detection Systems (NIDS)



HIDS and State Data Collectors

Training Special - ABB Training Passport program

- Twelve months of unlimited in-center training courses for one low price.
 - \$8,400 per employee per 12-month period

Watch the savings add up

Weeks of Training	List Price (USD)	Training Passport Program (USD)	Savings
1	\$3,300	\$8,400	
2	\$6,600	\$8,400	
3	\$9,900	\$8,400	15%
4	\$13,200	\$8,400	36%
5	\$16,500	\$8,400	49%

Symphony Plus

Stay Tuned for New things this year



Power and productivity
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