



FEBRUARY 2017

Symphony Plus Control & I/O

General Product Update & Roadmap

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HR Series Control and I/O

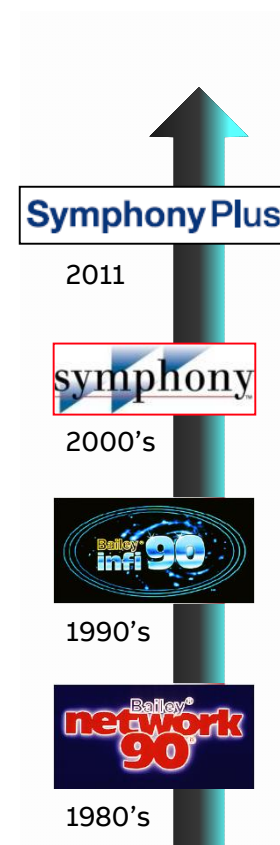
Background: Rich history

Introduced in 1980, Network 90 was one of the leading DCS offerings on the market
INFI 90, INFI 90 OPEN, and Symphony Harmony are compatible technology upgrades from Network 90

Continued development and support on 30+ year commitment to our Customers

Now on the next step in its evolutionary path...**Symphony Plus** – Total plant automation

Evolution without obsolescence



HR Series Control and I/O

Background: Contiguous life cycle management

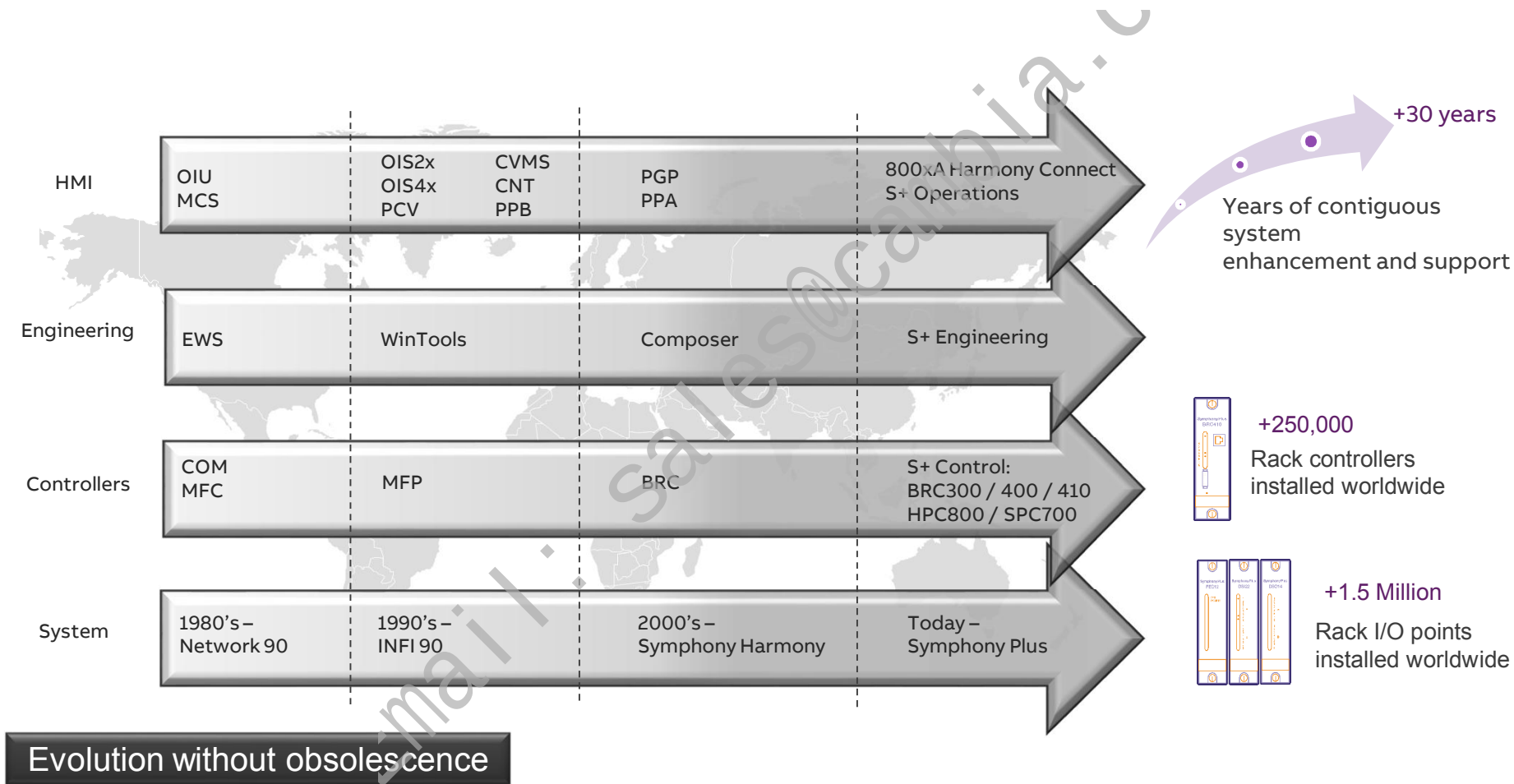


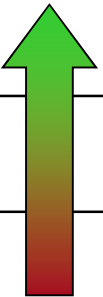
ABB Solution: system lifecycle management

Formal system lifecycle policy

Active	Product Marketed/Sold/Supported
Classic	Functional Replacement Available/Still Sold/Supported
Limited	Product No Longer Sold; Repair/Refurbishment/Support Available
Obsolete	Repair/Refurbishment not Available; Best Effort Support

- Your ABB automation system is designed for continuous evolution
- Always a path forward
- Protection of intellectual assets
- Underlying products are sustained by defined and documented lifecycle phases
- Active until functional equivalent available
- Defines minimum 10 years of support after removal from “Active” sales
- Lifecycle changes documented 12 – 18 months in advance
- Network 90/Infi-90/Symphony has been in service since 1980, 35 yrs with indefinite evolution
- No other automation supplier has made as bold a commitment for ***all system products***, to ***all system customers!***

Product life cycle status Power supplies

Active Classic Limited Obsolete	Class: Power supplies	Product Family	Remarks
		 MPS III	MPSIII is in the “ Active ” phase of its product lifecycle and is the power supply solution for Harmony Rack systems.
		MPS II	Recommend evolution to MPSIII.
		MPS I	Recommend evolution to MPSIII.
		Network 90 Power System	Based on vendor component availability, some Network 90 power components are “ Obsolete. ” Recommend evolution to MPSIII.

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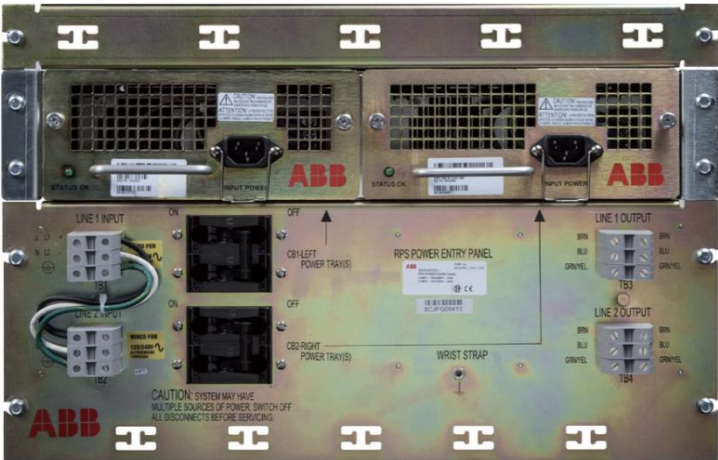
Symphony Plus-Power Supplies MPSIII



- Multi-Voltage DC Power System
 - System and Field Power
- 2N and N+1 Configuration
- System Monitoring
- “Slide-in” Design
- Evolution for Network 90, MPS I (PMU), and MPS II Supplies



HR Series: MPS 3 Modular Power System Status



3 Power Supplies:

PHARPS02010000, PHARPS11000000, PHARPS21000000 and

6 Power Entry Panels:

PHARPSPEP11012, PHARPSPEP11022, PHARPSPEP12002, PHARPSPEP21012,

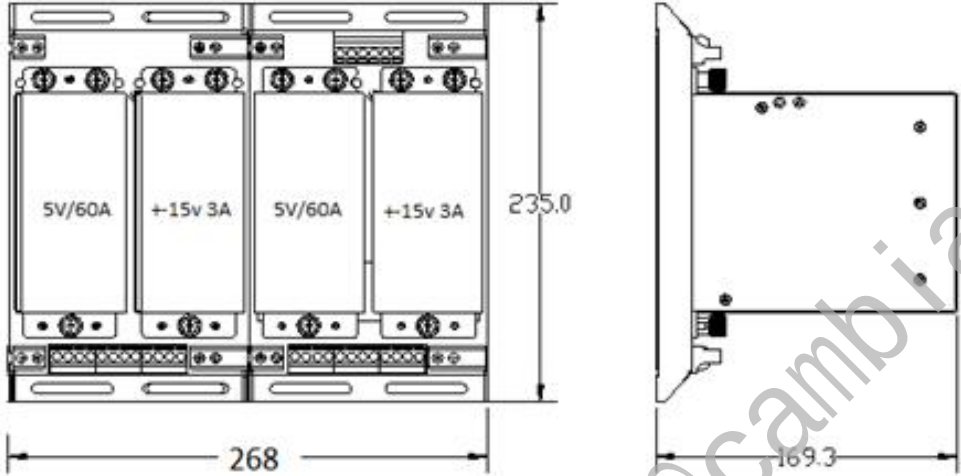
PHARPSPEP21022, PHARPSPEP22002

Moved to Limited Life Cycle in Dec 2015

Active Power System Components

Article No		Description
PHARPSCH100000	Accessories	Power Supply Chassis
PHARPSFAN03000		System Monitoring & Cooling Fan
1949790A1		Fan Filter Assembly
PHARPS03000000		24V @ 17A, 24V @ 17A
PHARPS32000000	Power Supplies	5V @ 60A, +15V @ 3A, -15V @ 3A, 24V @ 17A
PHARPS32010000		5V @ 60A, +15V @ 3A, -15V @ 3A, 24V @ 17A, 125V @ 2 A
PHARPS32200000		5V @ 60A, +15V @ 3A, -15V @ 3A, 24V @ 17A, 48V @ 8.5A
PHARPS40000000		5V @ 100A, +15V @ 8A, -15V @ 8A
PHARPSPEP11013	SINGLE CHASSIS	120/240VAC MAIN, 120/240VAC AUX, CATEGORY III
PHARPSPEP11023		120/240 VAC MAIN, 125 VDC AUX, CATEGORY III
PHARPSPEP12003		125 VDC MAIN, 125 VDC AUX, CATEGORY III
PHARPSPEP21013	DUAL CHASSIS	120/240 VAC MAIN, 120/240 VAC AUX, CATEGORY III
PHARPSPEP21023		120/240 VAC MAIN, 125 VDC AUX, CATEGORY III
PHARPSPEP22003		125 VDC MAIN, 125 VDC AUX, CATEGORY III

HR Series: MPS 4 Modular Power System in Progress



Target Release Date: 4Q-2017



Part No.	Description
SPS03-5V	Power module, output +5VDC@60A
SPS03-15V	Power module, output +-15VDC@3A
BP03	Base plate for above power modules, with integrated DC bus monitoring PFI assembly

Product life cycle status

Communications

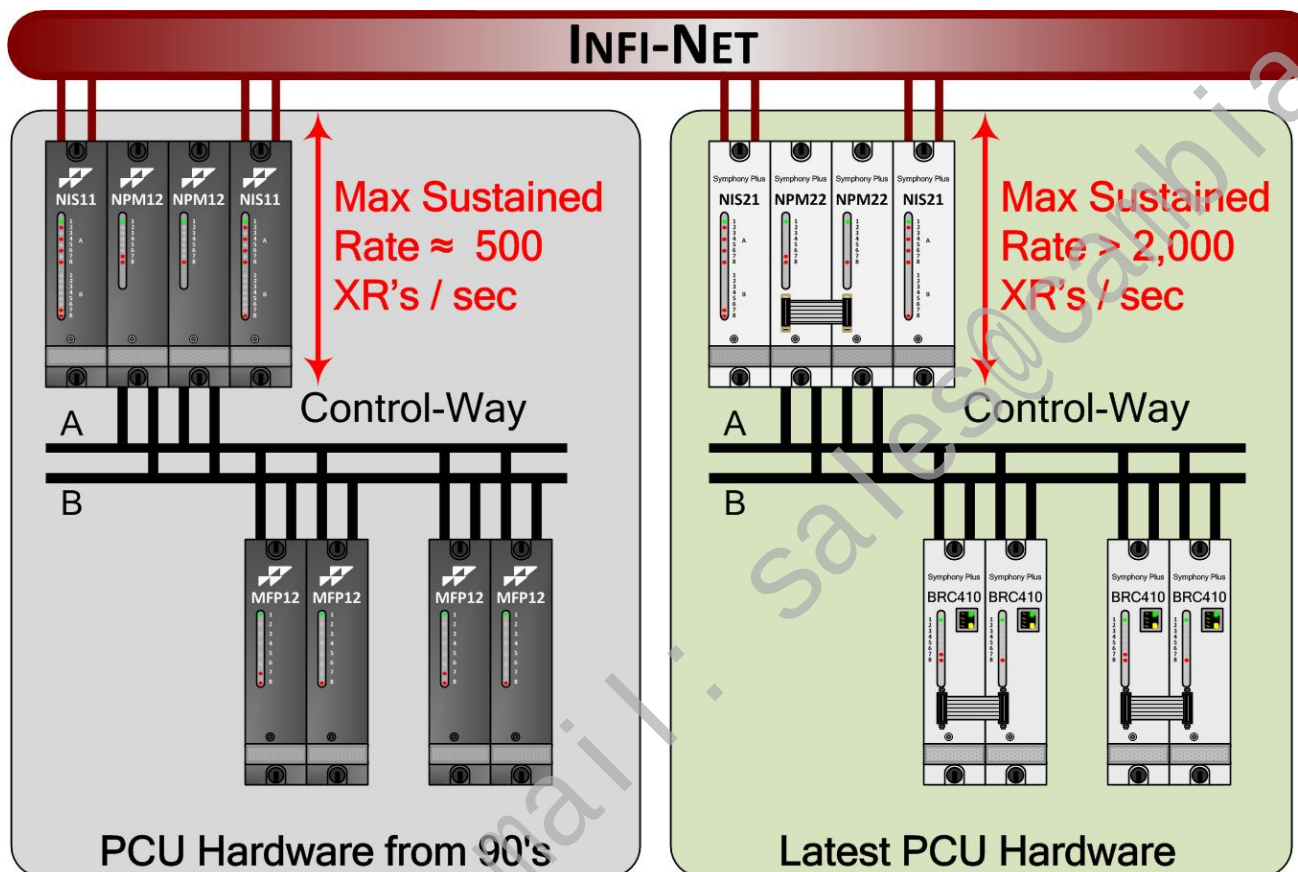
Active
Classic
Limited
Obsolete

Class: Communications	Product Family	Remarks
	INFINET HR Series	Current active family components include: SPNPM22, SPNIS21, SPIET800, SPIIT13, SPIIT12, SPIPT800, SPCPM02, SPSEM11, and SPTKM01. *Harmony Rack (Grey) alternatives of these modules (INxxxxx) moved to “Limited” in Jan 2015 per the life cycle policy (form / fit / function replacement). SPICT13A moved to “Classic” in 2013 and should be evolved to SPIET800 (Ethernet CIU).
	Plant Loop (Nxxxxx)	Recommend evolution of system network to INFINET communications (HR Series). If Plant Loop / Super Loop installed, PCU communications (controller to controller communications) should be inspected as well. Where Module Bus is used, Controlway communication evolution is recommended.

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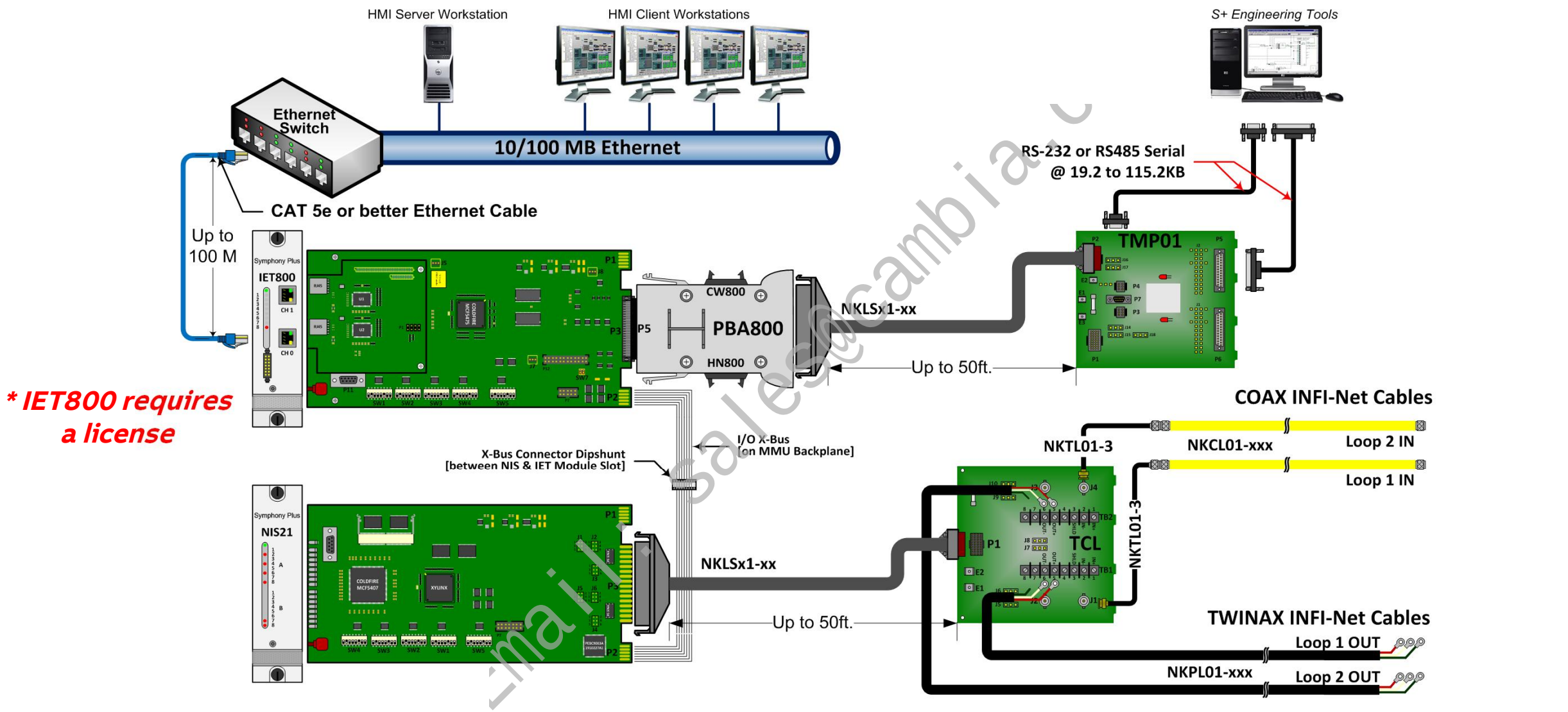
Symphony Plus

Upgrading PCU Communications to NIS21 & NPM22



- Replacement NIS01/11 & NPM02/12
- Form / Fit / Function replacement *
- Increased Capacity (8x)
- Increased Performance ($> 4x$)
- **No longer supports Plantloop**

HR Series: ICI800 Ethernet CIU



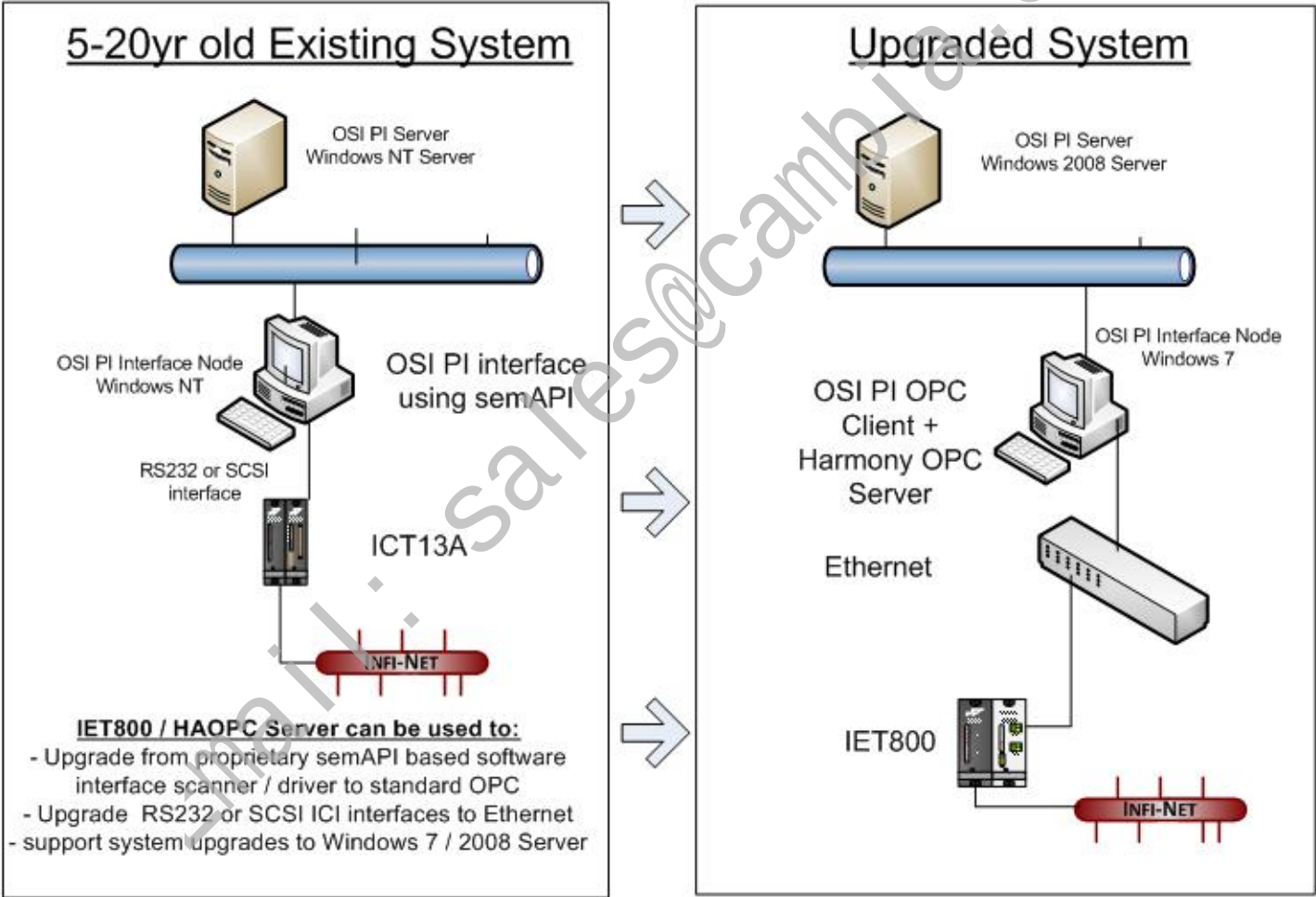
Harmony OPC Server version 6



- Windows 7 and Server 2008, 32 and 64 bit
- Support for the PNI800 module.
- 4 OPC applications per computer
- Use with Ethernet CIU to connect to OSI PI and IP.21.
- Harmony OPC Server is in the **ACTIVE** lifecycle phase and is included in the ABB's Automation Sentinel Program.

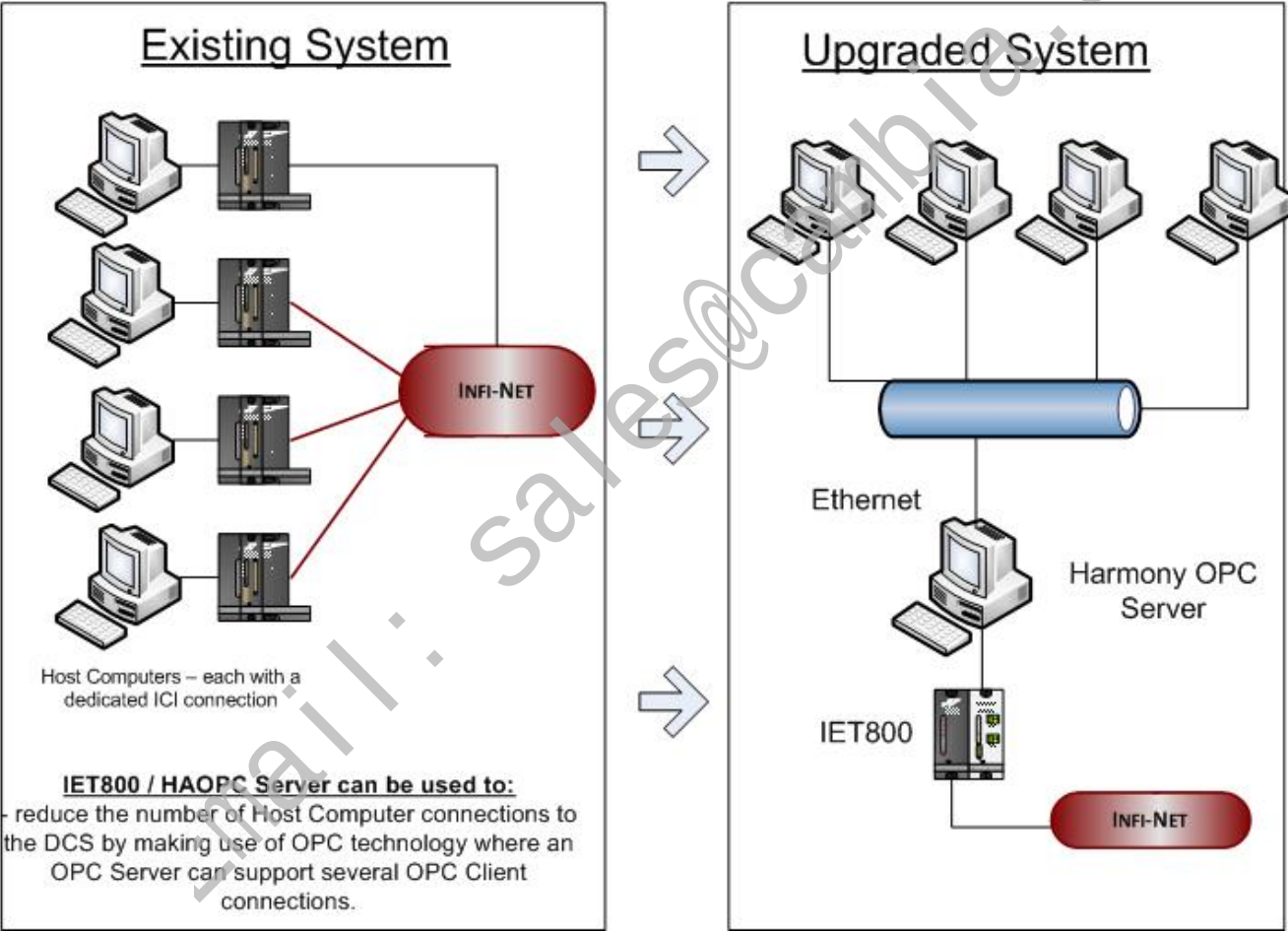
Harmony OPC Server

3rd Party: process historian evolution example



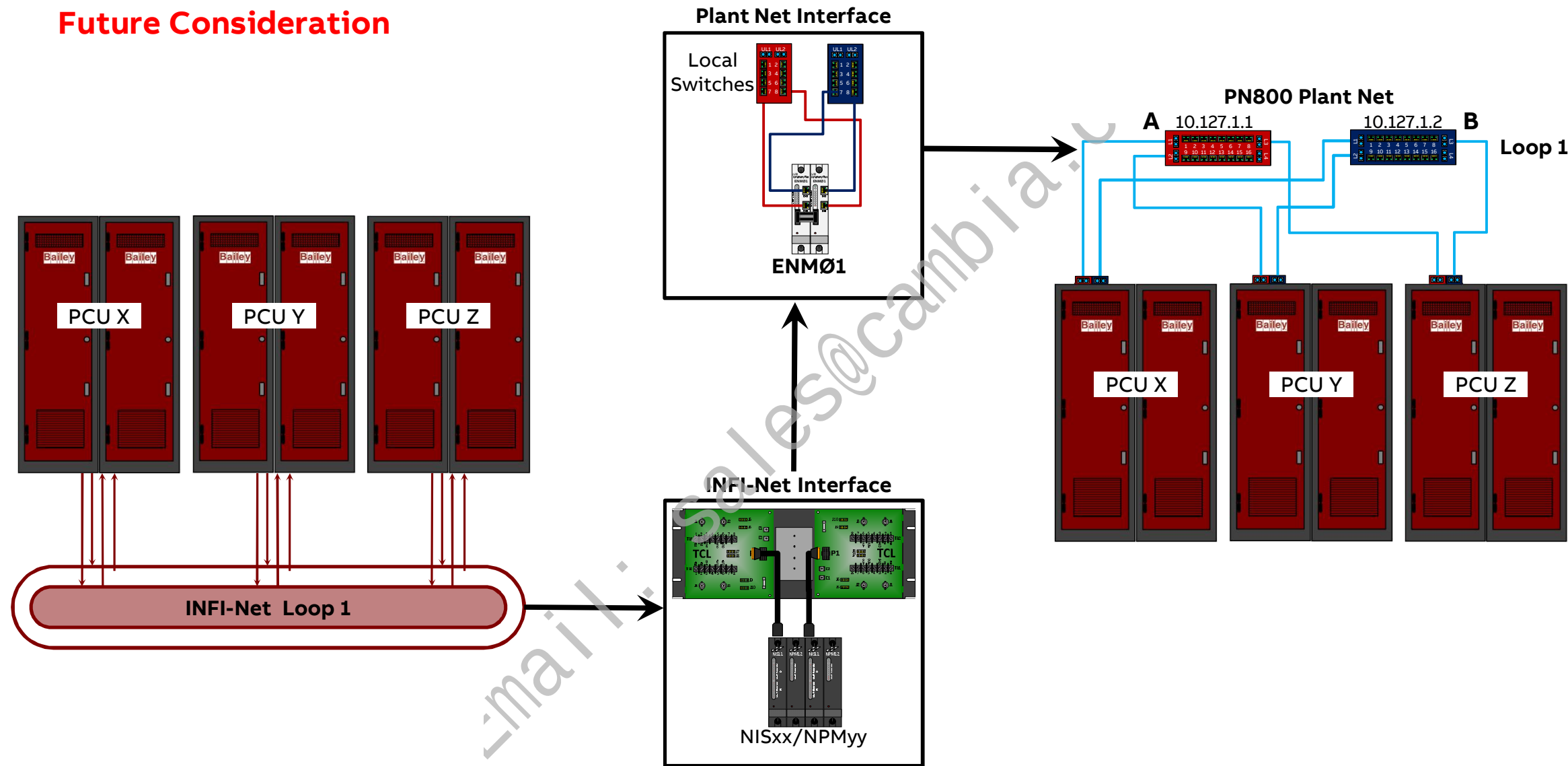
Harmony OPC Server

3rd Party multiple Host Computer example



S+ Evolution Use Case: Upgrade INFI-Net to PN800 using ENM01

Future Consideration



Product life cycle status

Controllers

Active
Classic
Limited
Obsolete

Class: Controller	Product Family	Remarks
	HR Series (Harmony Rack) BRC	Represents the latest version of Harmony Rack controllers and includes: SPBRC300, SPBRC400, and SPBRC410. These controllers provide simultaneous support for HR Series I/O (and previous rack generations), SD Series I/O (including support of PROFIBUS, HART I/O), block, and S800 I/O. MODBUS TCP devices are supported via the BRC410 only. *Harmony Rack (Grey) alternatives of the BRC300 and BRC400 (P-HC-BRCxxx) moved to "Limited" in Jan 2015 per the life cycle policy (form / fit / function replacement). Additionally, the HPG800 is replaced by the BRC410 and moved to "Limited" in 2014 (form / fit / function replacement).
	HAC	Recommend evolution to SD Series controller HPC800. HPC800 has 30,000 Function Block capacity and preserves existing HAC control logic configurations including support for all existing function code executions, custom user programs, and foreign device interfaces.
	MFP, MFC, AMM, LMM & COM	Recommend evolution to HR Series controllers (BRC300 / 400 / 410). For AMM, AOM, COM, and LMM, controllers can be replaced by BRC controllers with appropriate I/O processing modules and consolidation of logic into the BRC. *MFP12 moved to "Limited" in 2011.

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Symphony Plus Control & I/O

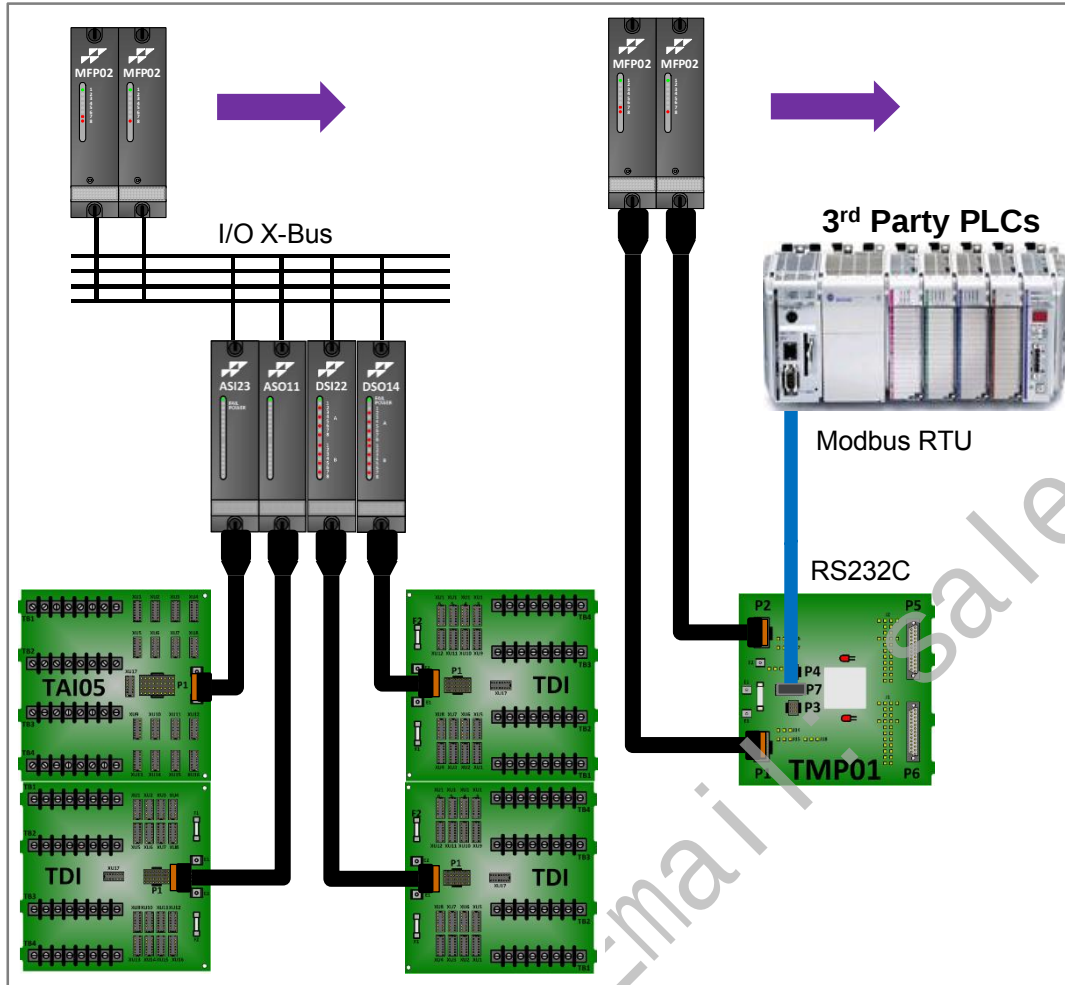
BRC410



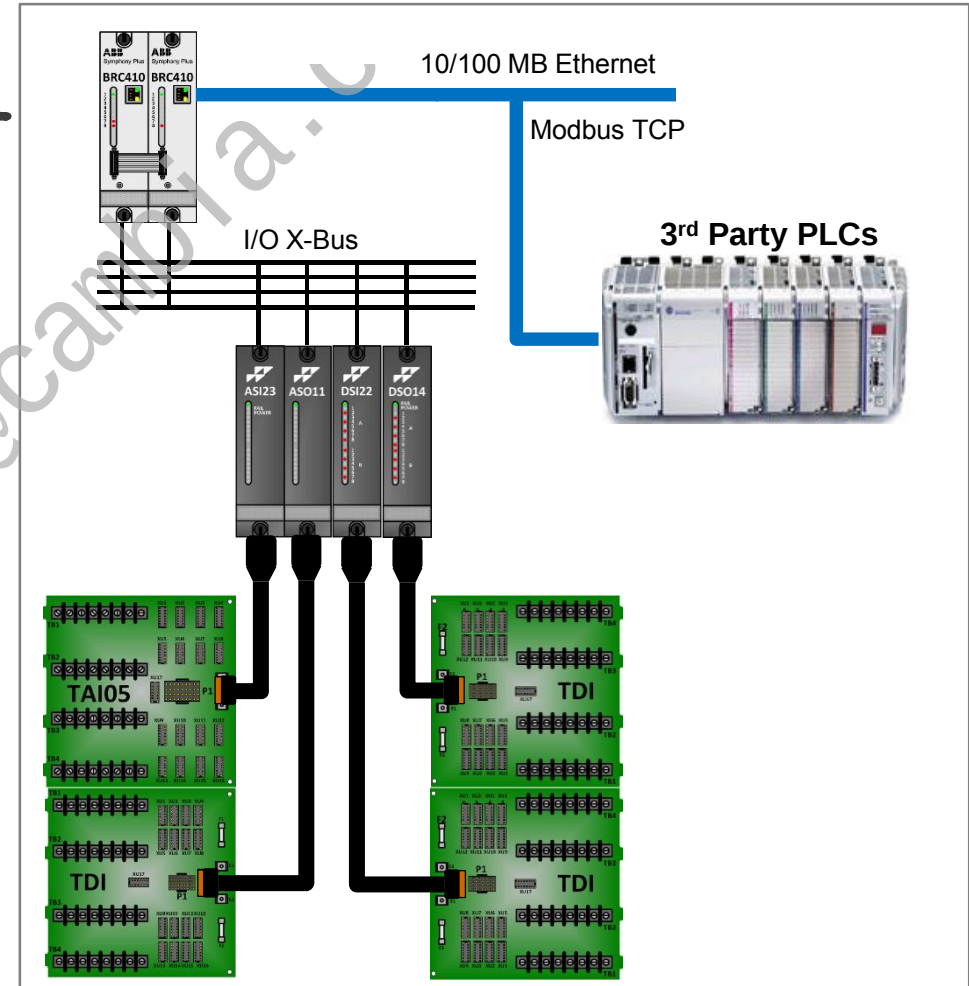
- Performance increase depends on specific function blocks used, but in general performance of latest module (BRC410) compared with older modules:
- ~ 10x vs. MFP01/02/11/12
- ~ 4x vs. BRC100/200
- Enhanced On-Line Configuration provided by BRC410
- BRC410 also provides ModBus TCP
- BRC410 support 30,000 block addresses and 4,000 Modbus TCP/IP points
- Infi90 Modulebus support*
- Downloadable firmware

HR Series: Merge multiple MFP's BRC410 Bridge Controller

Existing System ~ 20+ years old

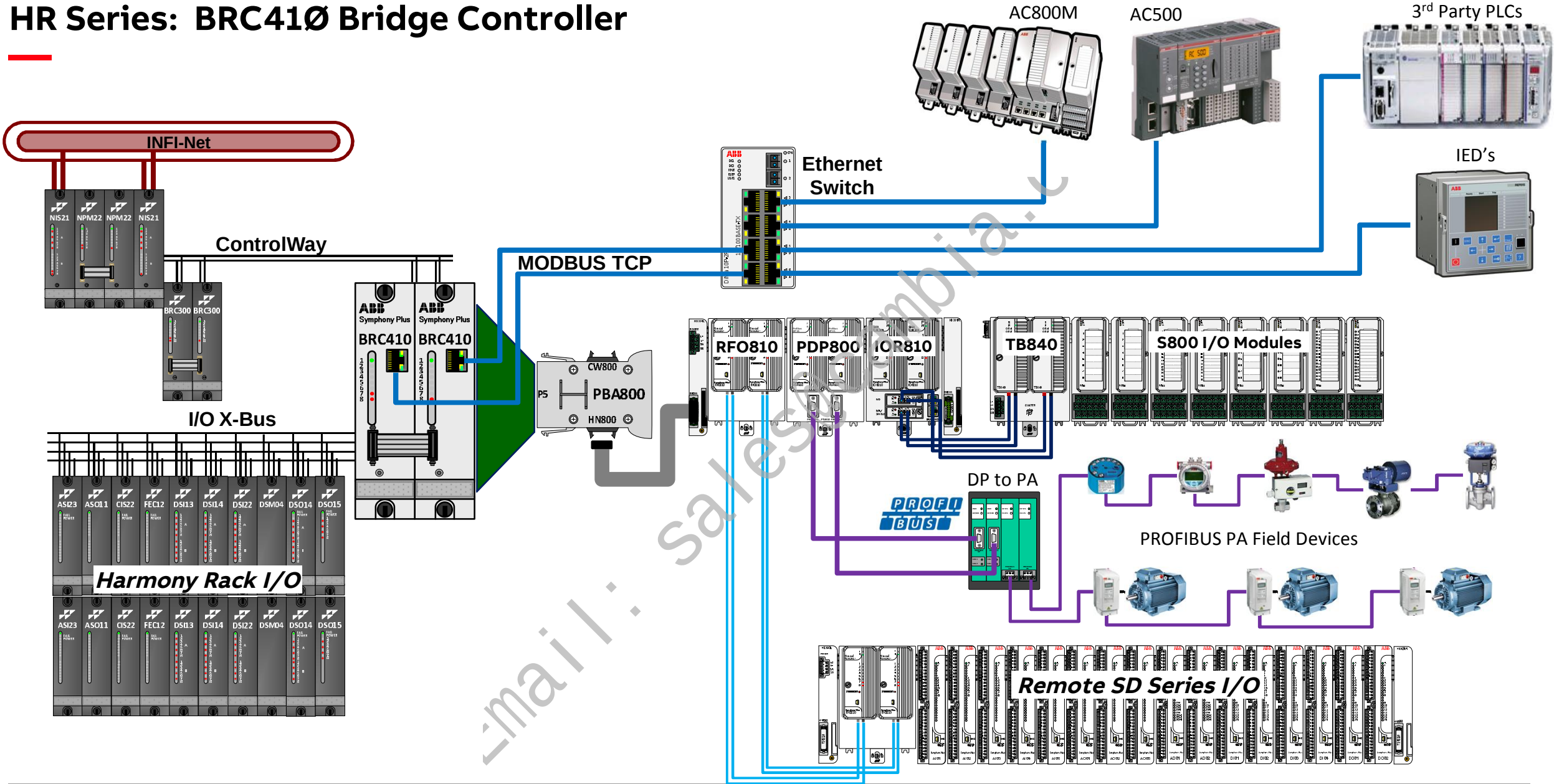


Upgraded System



*** BRC410 ≈ 10x performance of MFPxx**

HR Series: BRC410 Bridge Controller



Symphony Plus

S+ Control & I/O Rack: New Faceplates



- **S+ Rack Modules**
 - White Front Plates
 - Module Nomenclatures: SPxxxx



S+ Control & I/O Update

Upgrading to Latest Rack Hardware



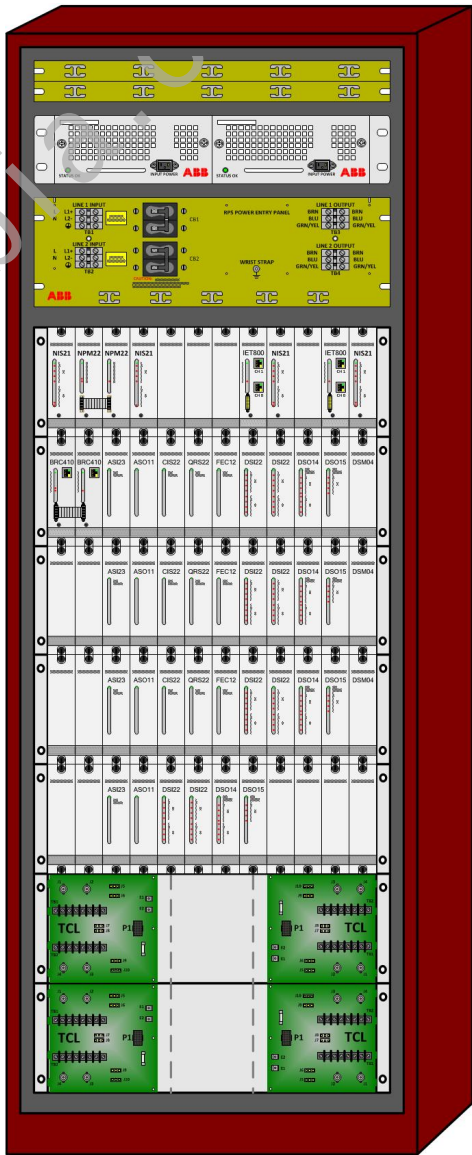
Upgrade Power System to MPS3

Upgrade PCU Communications modules to NIS21 / NPM22

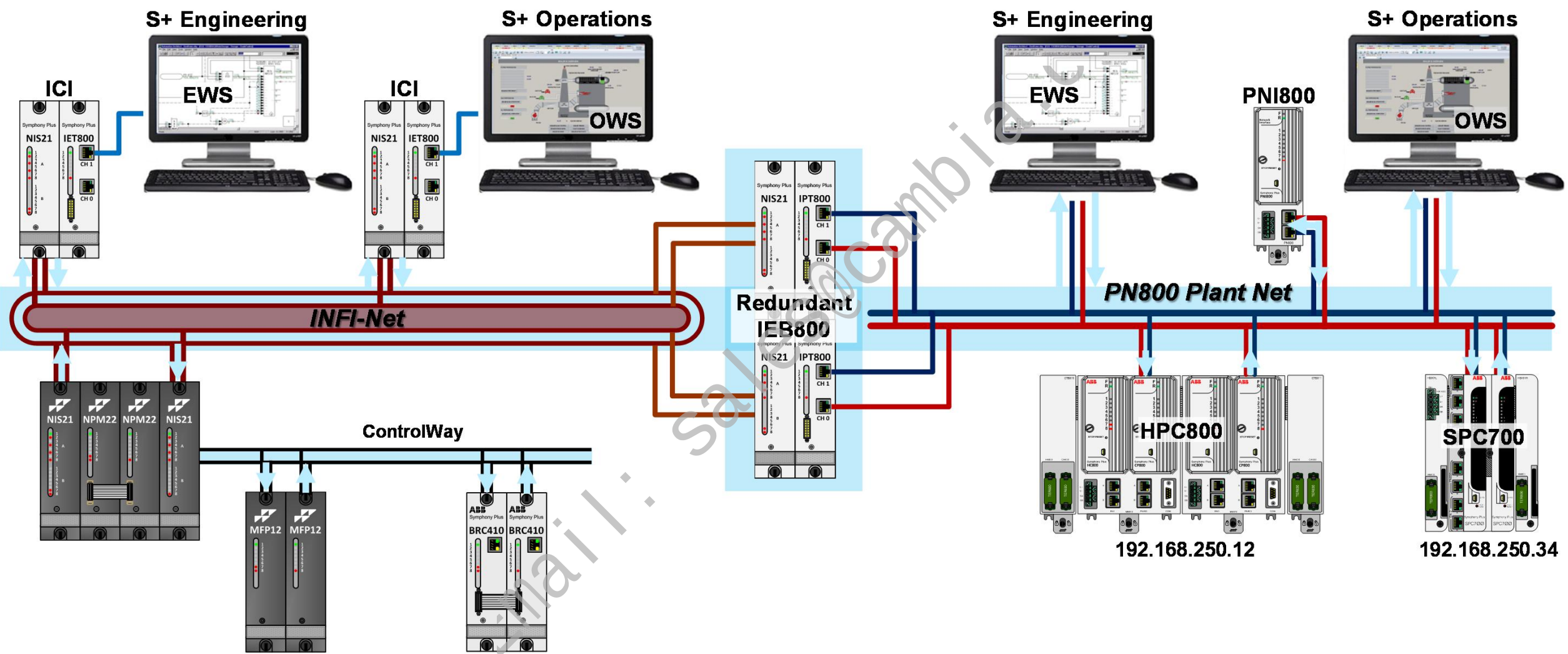
Upgrade Serial or SCSI CIU's to ICI800 Ethernet CIU's

Merge & upgrade multiple MFP's into 1 (pair) of BRC410's

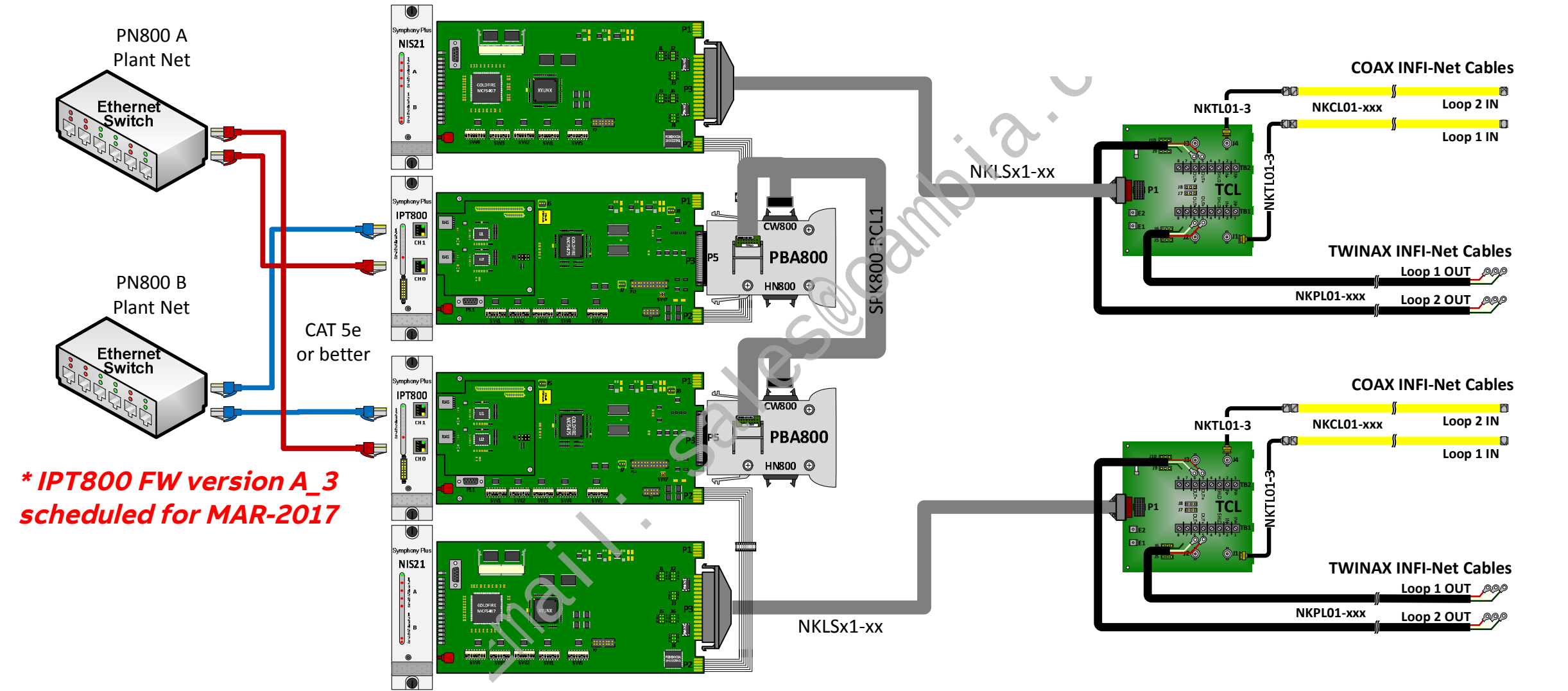
Replace outdated I/O Modules



HR Series: IEB800 INFI-Net to Ethernet Bridge Functional Overview

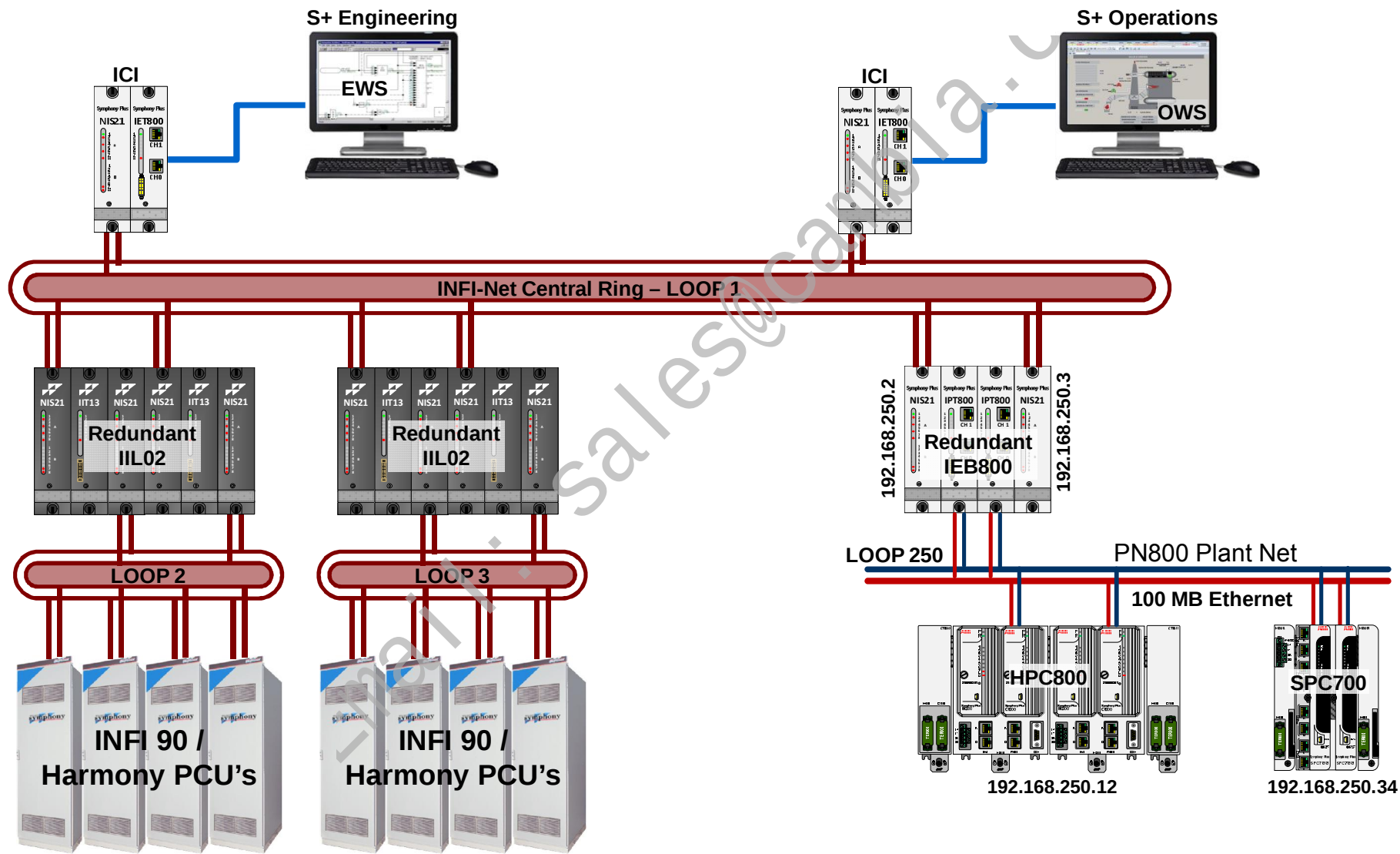


HR Series: IEB800 INFI-Net to Ethernet Bridge Connection Details

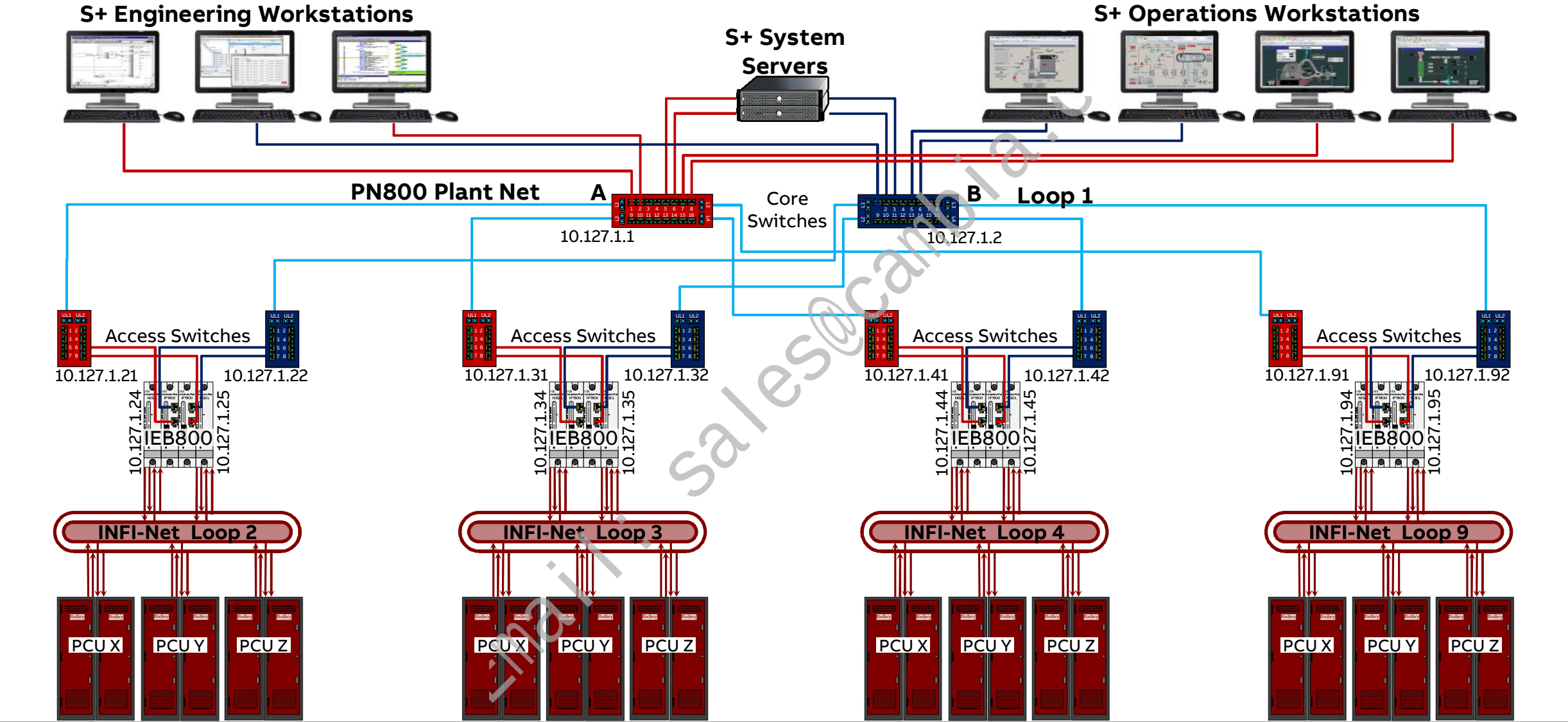


HR Series New Product: IEB800

Use case #1: Adding PN800 as Satellite Ring



S+ Evolution Use Case: Upgrade Central Ring using IEB800



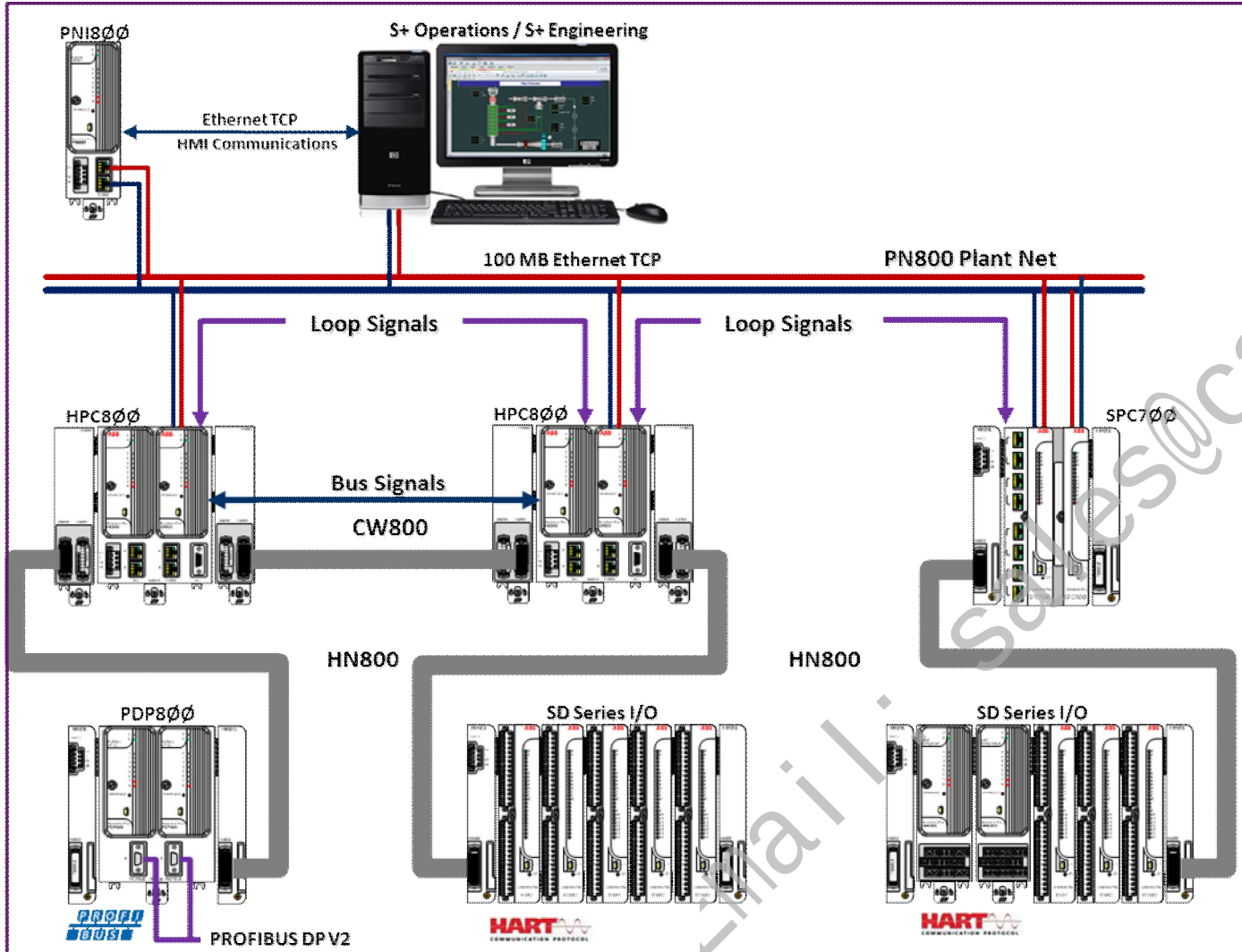
SD Series Overview

Key product features



- ❑ New ergonomic enclosure design
 - ❑ Standard DIN-Rail mounting
 - ❑ Only requires 24 VDC power
 - ❑ More than three times as dense as rack I/O
- ❑ HN800 I/O bus:
 - ❑ Redundant RS-485 differential, @4.0 MBps
- ❑ Extreme operating conditions:
 - ❑ Operating temperature range: **-20 to +70 Deg C**
 - ❑ Corrosion protection: optional **G3 conformal coating**
- ❑ Reduce overall system cost
 - ❑ Ideal for remote I/O applications

SD Series: Control & I/O System Architecture Overview



PN800 Plant Net

- ❑ Flexible bi-directional, high-speed, high-throughput, and secure; redundant 100 Mbps Fast Ethernet communications
- ❑ Connects operator consoles, engineering tools and 3rd party applications to SD Series controllers
- ❑ Protocol is “INFI-Net over Ethernet” XR (exception report) based where data is only sent on change in value or status

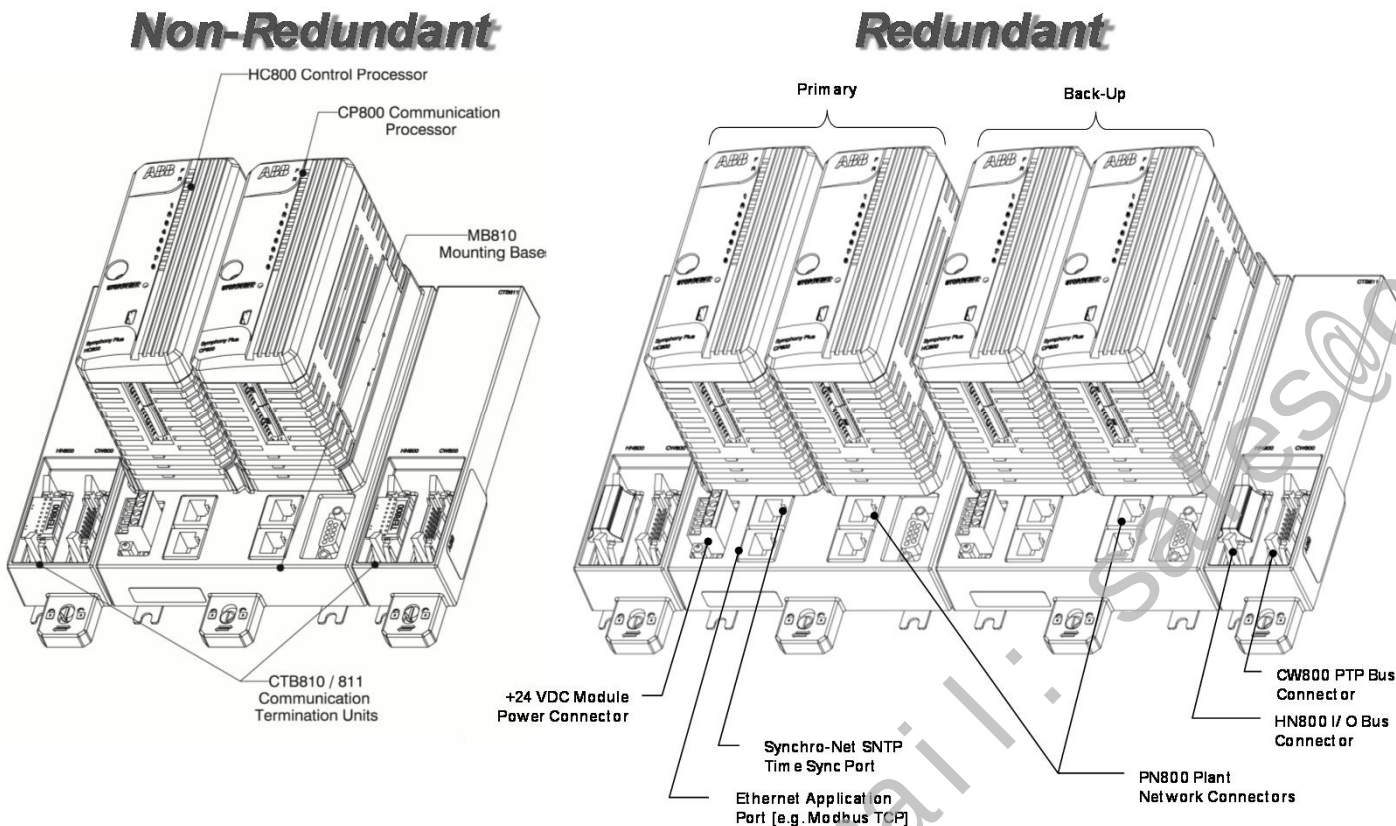
HN800 I/O bus

- ❑ SD Series I/O connect directly to controllers via redundant, high performance HN800 I/O bus
- ❑ Redundant RS-485 differential, @ 4.0 MBps
- ❑ Flexible: Local electrical bus (64 I/O modules up to 30 meters) and FO remote links (4 remote star links up to 3 km each)

CW800 PTP bus

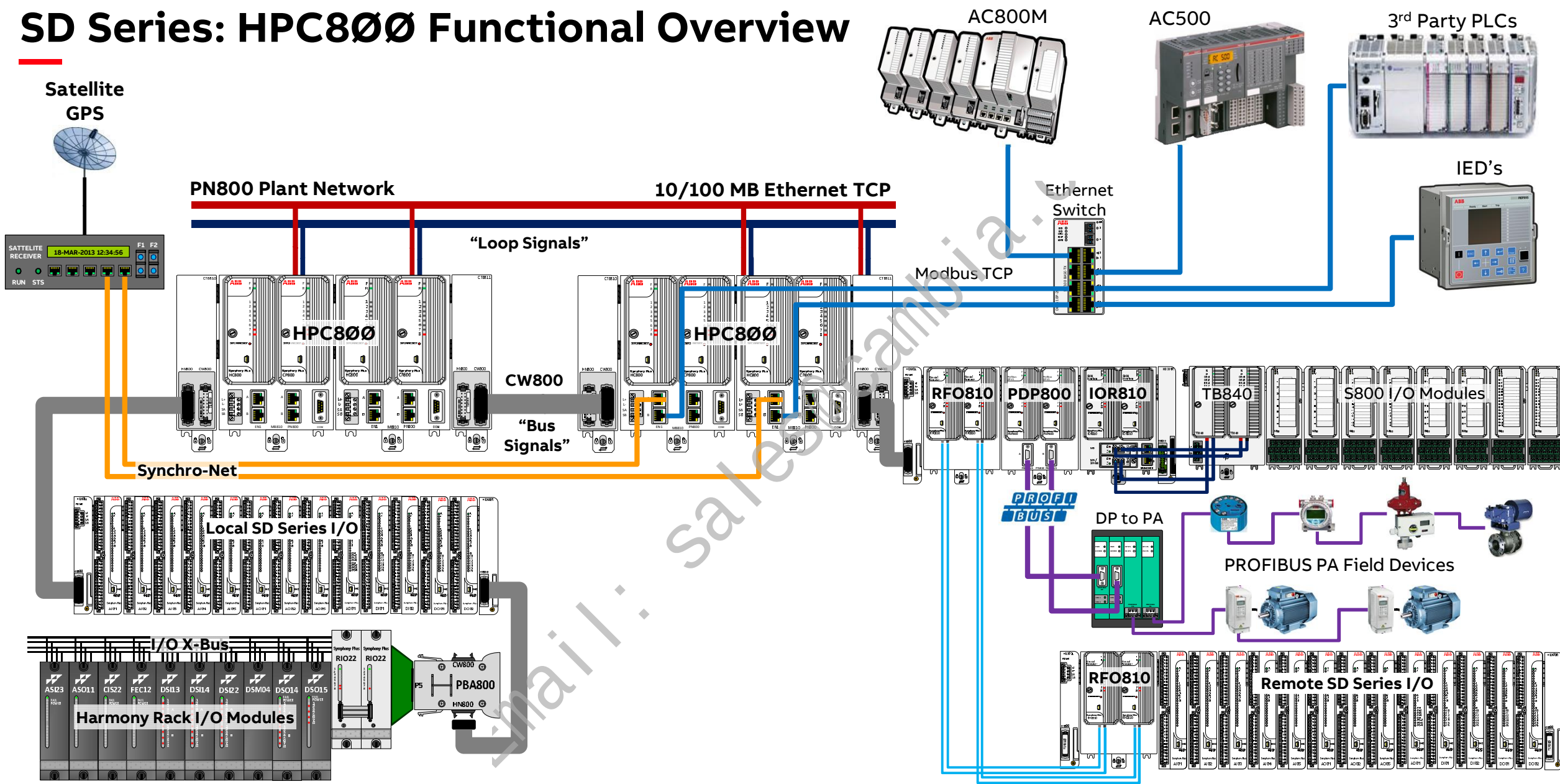
- ❑ Dedicated redundant peer-to-peer controller communication bus support update rates less than 100 msec (HPC800 only)

SD Series: HPC800 Harmony Process Controller

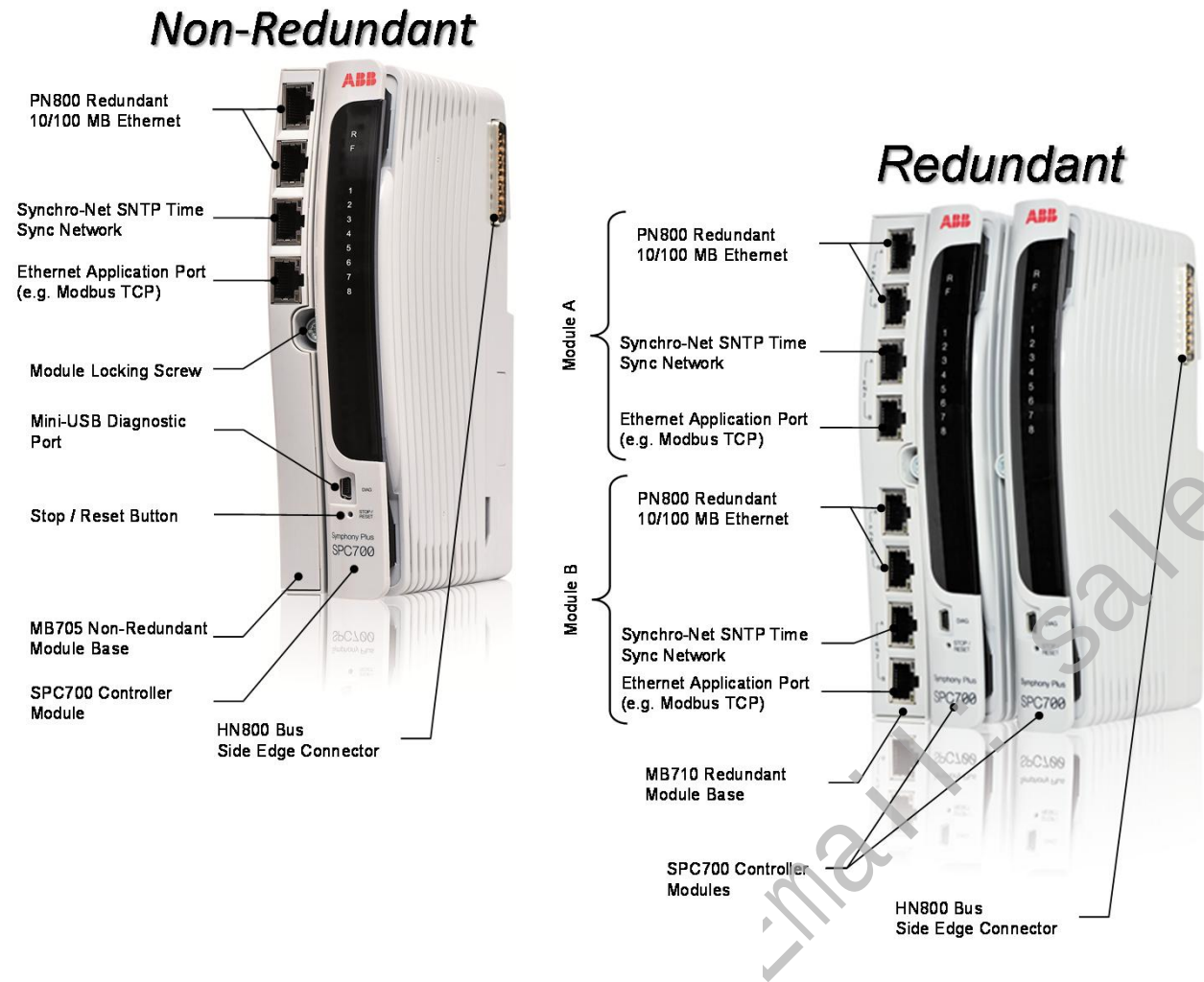


Property	Characteristic / Value	
Microprocessor / MIPS	MCF5475 @ 256 MHz = 410 MIPS (1 CPU per module)	
Memory	CP800: 64 MB DRAM, 4 MB ROM HC800: 64 MB DRAM, 4 MB ROM, 2MB NVRAM	
Power Requirements	200 mA @ 24 VDC +/- 10%, 5 W (per module)	
Dimensions	HPC800 CTB810 or CTB811	W = 124 mm, H = 186 mm, D = 127 mm W = 43 mm, H = 186 mm, D = 31 mm
Temperature Range	Operating: Storage:	0 to +55 deg C -40 to +85 deg C
Relative Humidity (Non-Condensing)	20% to 95% from 0 deg C to 55 deg C	
Air Quality	Standard: Optional:	ISA S71.04 G1 ISA S71.04 G3
Control Programming	30,000 INFI 90 Function Blocks, up to 8 segments (tasks) Batch 90, UDF and 'C' programs	
Closed Loop Control Performance	Up to 5000 I/O ≤ 250 msec	
Ethernet Ports (EN 2A & 2B)	PN800 2x 10/100MB TCP [PRP redundancy] EN2 A SNTP Time Sync, EN2 B Aux. Network ModBus/TCP	
ModBus TCP Interface *	Up to 8 Servers & 128 Clients, 500 to 10,000 ModBus Points	

SD Series: HPC800 Functional Overview



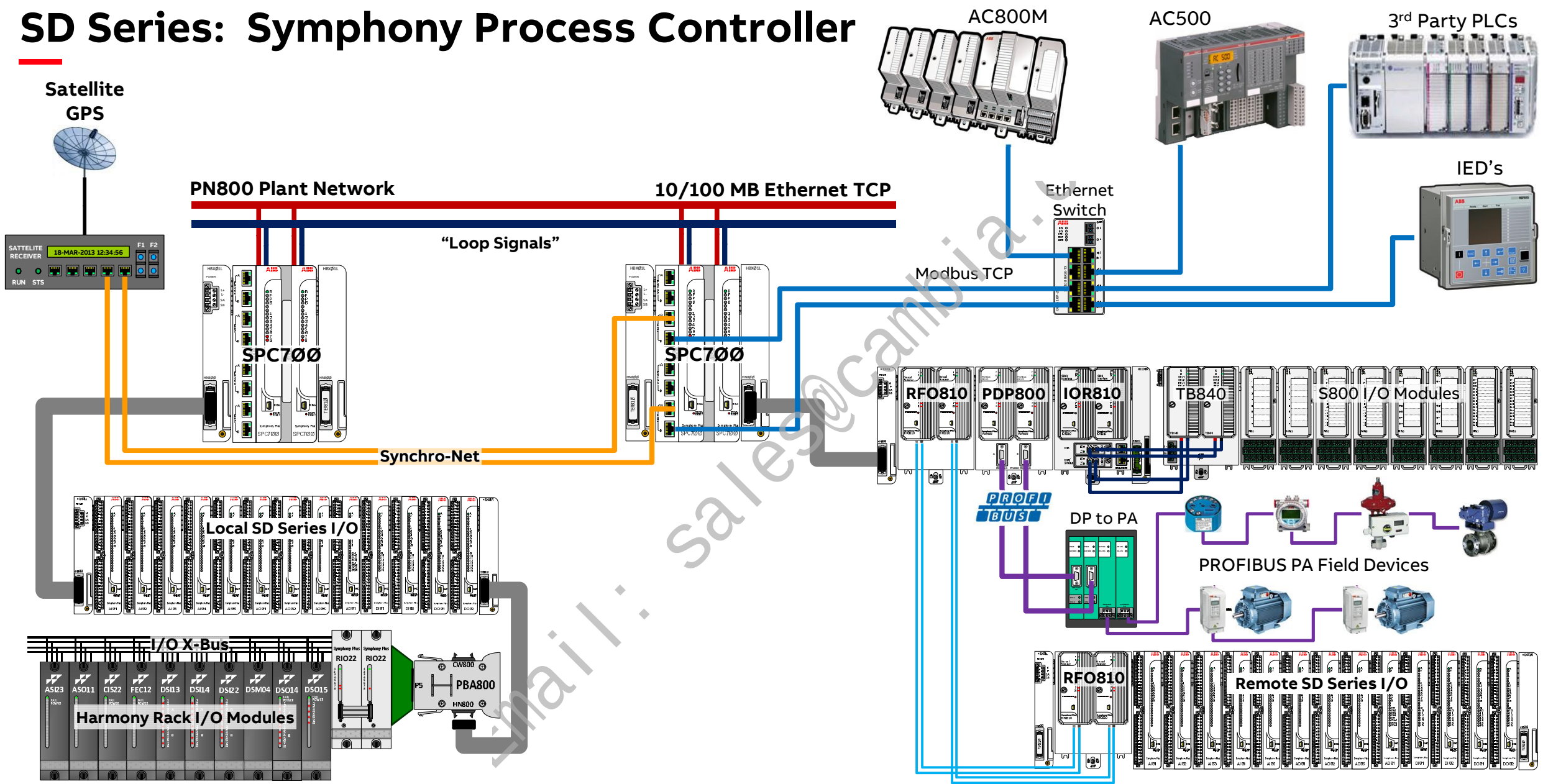
SD Series: SPC700 Symphony Process Controller



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]		MB705 Single:	W = 51 mm, H = 190 mm, D = 127 mm
		MB710 Redundant:	W = 96 mm, H = 190 mm, D = 127 mm
Temperature Range		Operating:	-20 to +70 deg C
		Storage:	-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
		Optional:	ISA S71.04 G3
Control Programming		10,000 INFI 90 Function Blocks, [1Q-2016] Batch 90, UDF and 'C' programs)	
Closed Loop Control Performance		Up to 1000 I/O ≤ 250 msec	
Ethernet Ports (EN 2A & 2B enabled in B_0 FW)		PN800 2x 10/100MB TCP [PRP redundancy] EN2 A SNTP Time Sync, EN2 B Aux. Network ModBus/TCP	
ModBus TCP Interface [Target Release 1Q-2017]		Up to 2 Servers & 32 Clients, 500 to 1,500 ModBus Points	

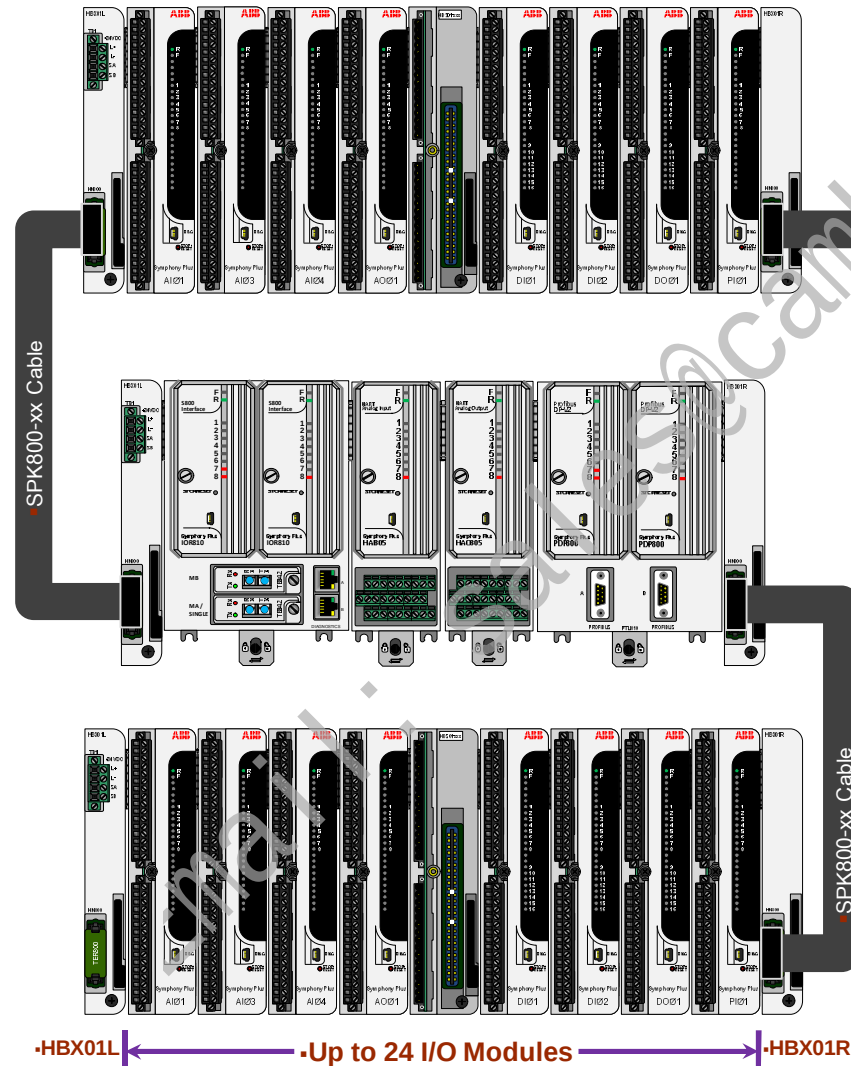


SD Series: Symphony Process Controller



SD Series Control & I/O Overview

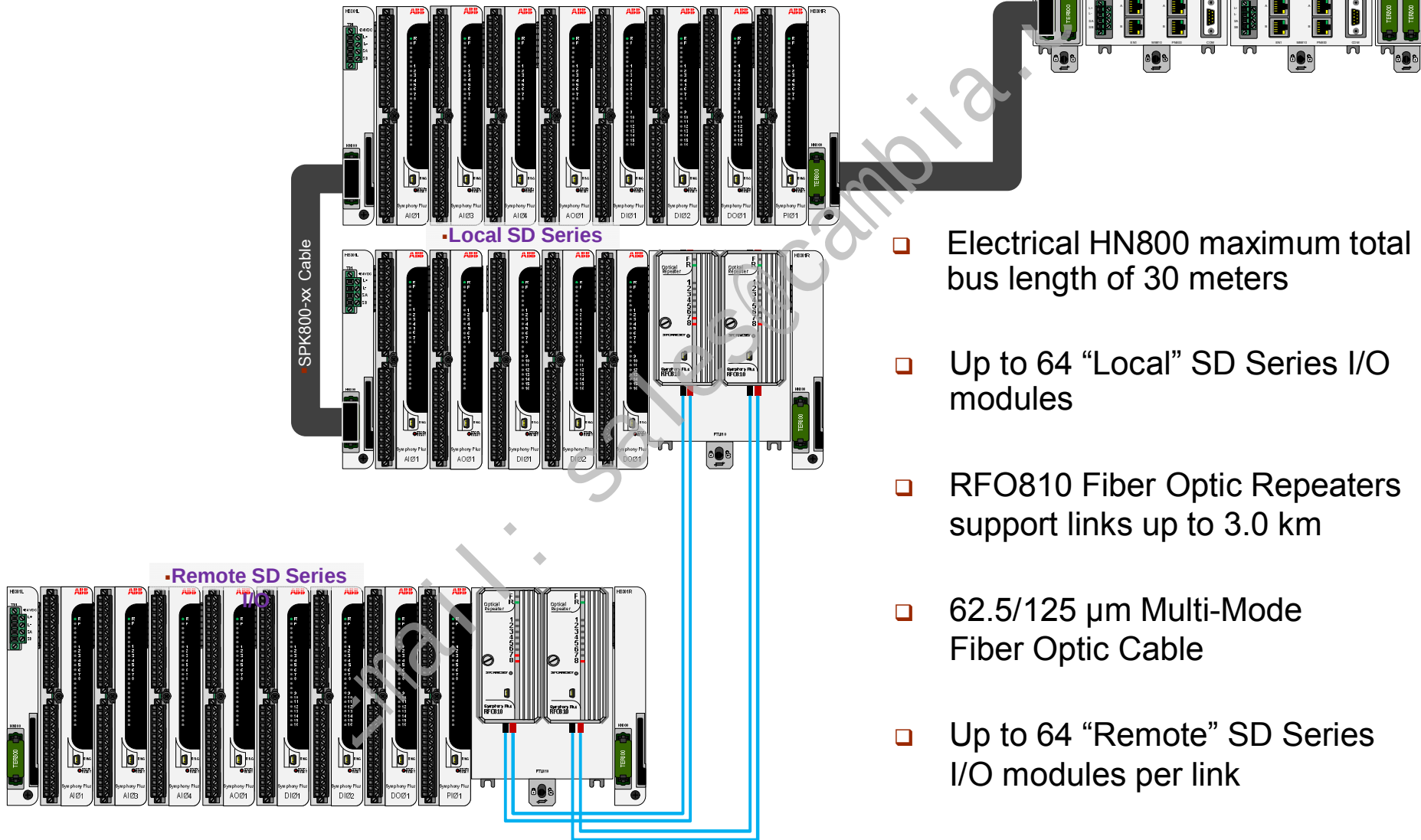
HN800 I/O & Communications Bus



- S+ Controller
- S+ Controllers: HPC800, BRC300/400/410, & SPC700
- SPK800-xx cables connect electrical HN800 I/O bus
- SD Series I/O compatible with IOR810, PDP800, etc.
- Maximum 64 “Nodes” per HN800 electrical bus
- HBX01L Bus Extender
Maximum 3.0 A, @ 24VDC

SD Series Control & I/O Overview

HN800 I/O & Communications Bus



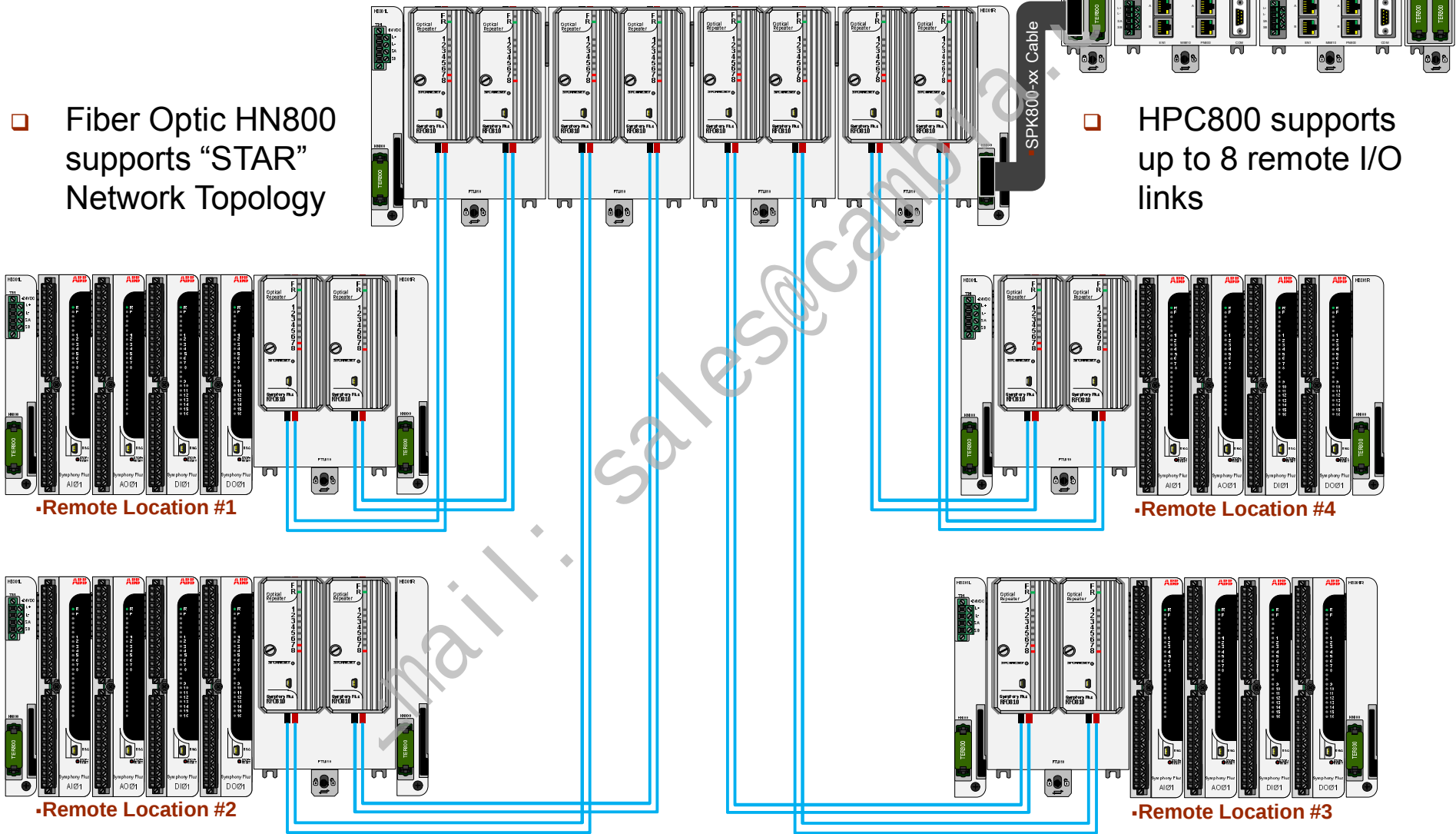
- ❑ Electrical HN800 maximum total bus length of 30 meters
- ❑ Up to 64 “Local” SD Series I/O modules
- ❑ RFO810 Fiber Optic Repeaters support links up to 3.0 km
- ❑ 62.5/125 μm Multi-Mode Fiber Optic Cable
- ❑ Up to 64 “Remote” SD Series I/O modules per link

SD Series Control & I/O Overview

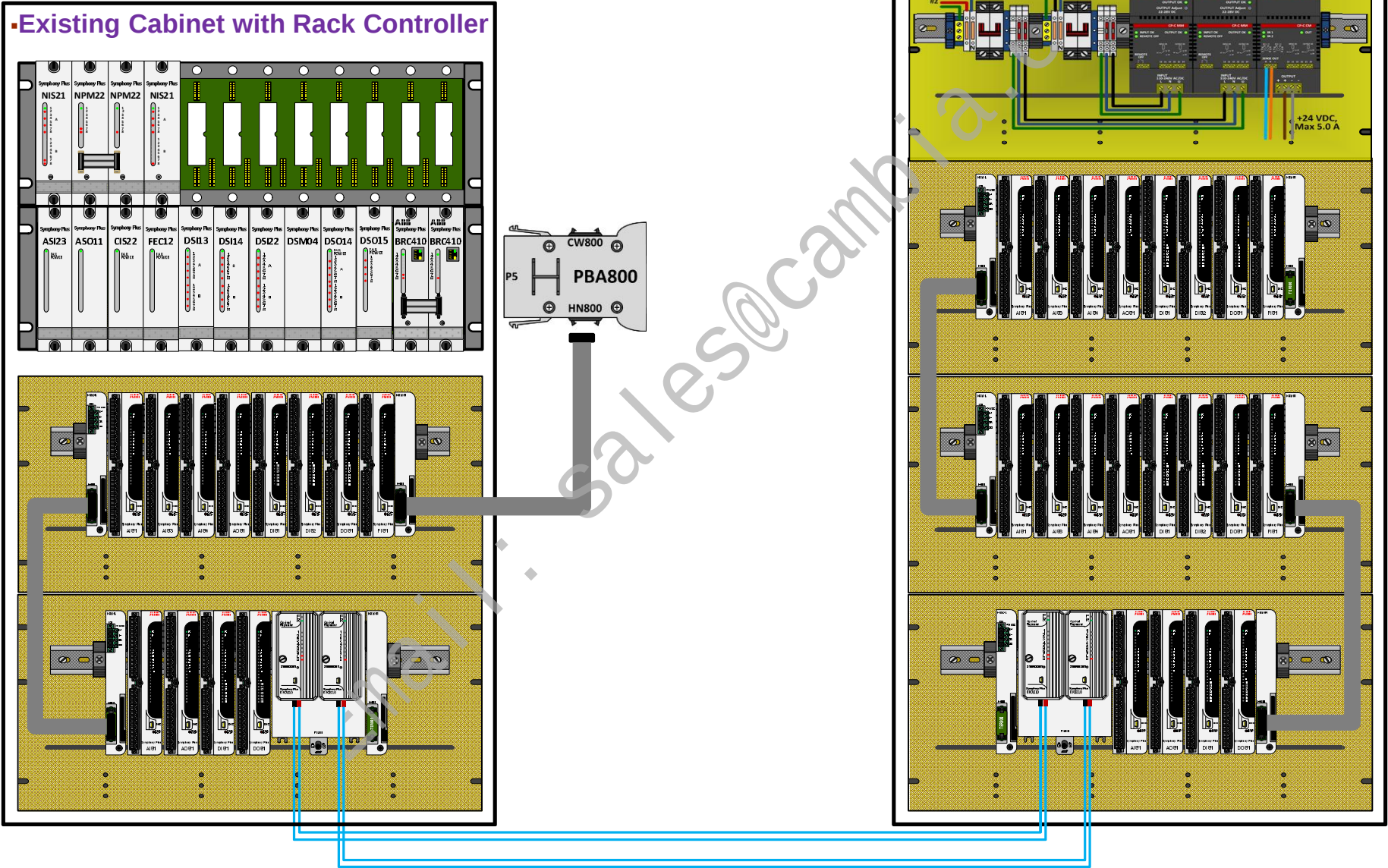
Fiber Optic HN800 Bus Architecture

Fiber Optic HN800 supports “STAR” Network Topology

HPC800 supports up to 8 remote I/O links

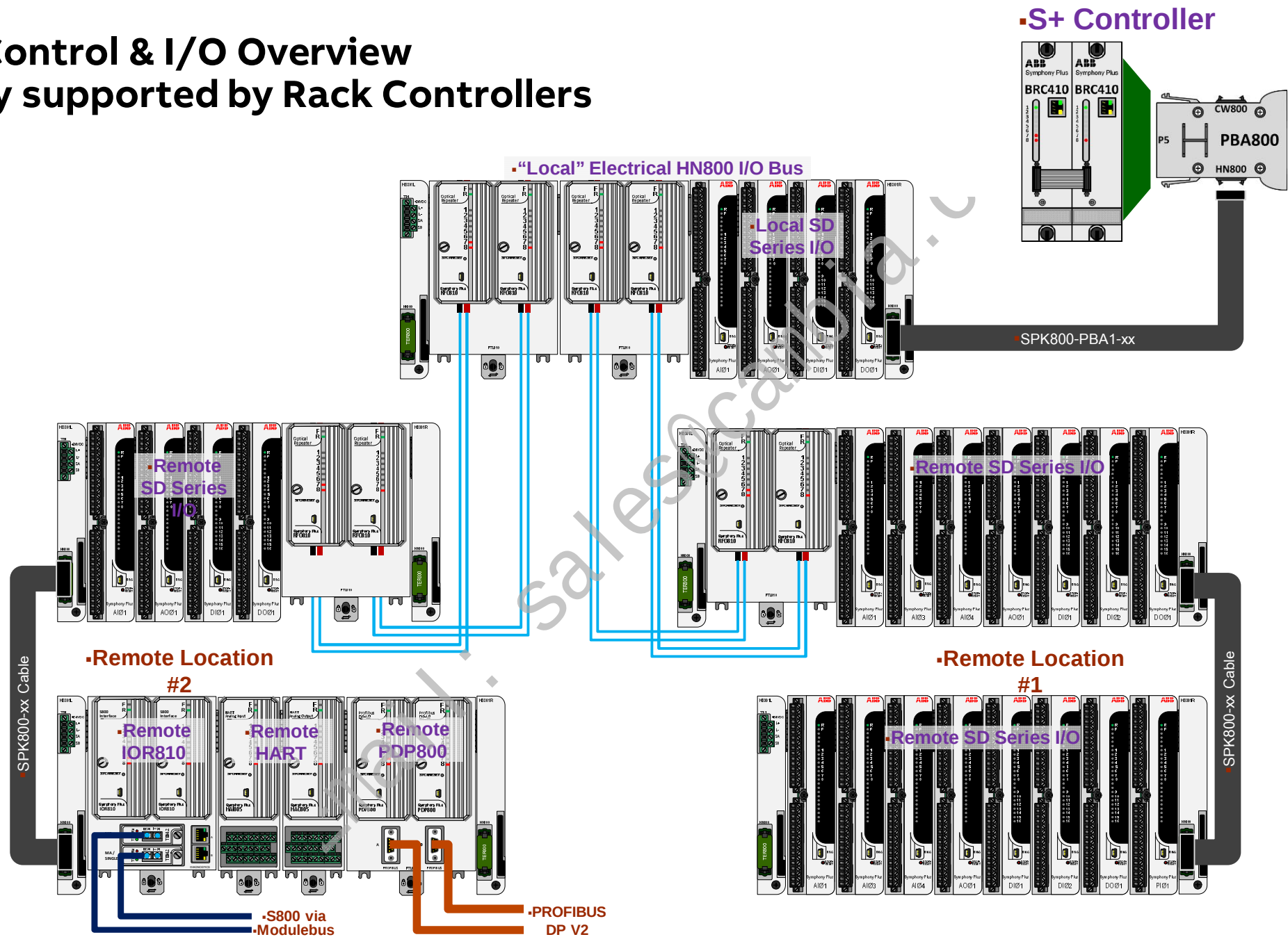


Extend existing systems with SD Series I/O Products



SD Series Control & I/O Overview

HN800 fully supported by Rack Controllers

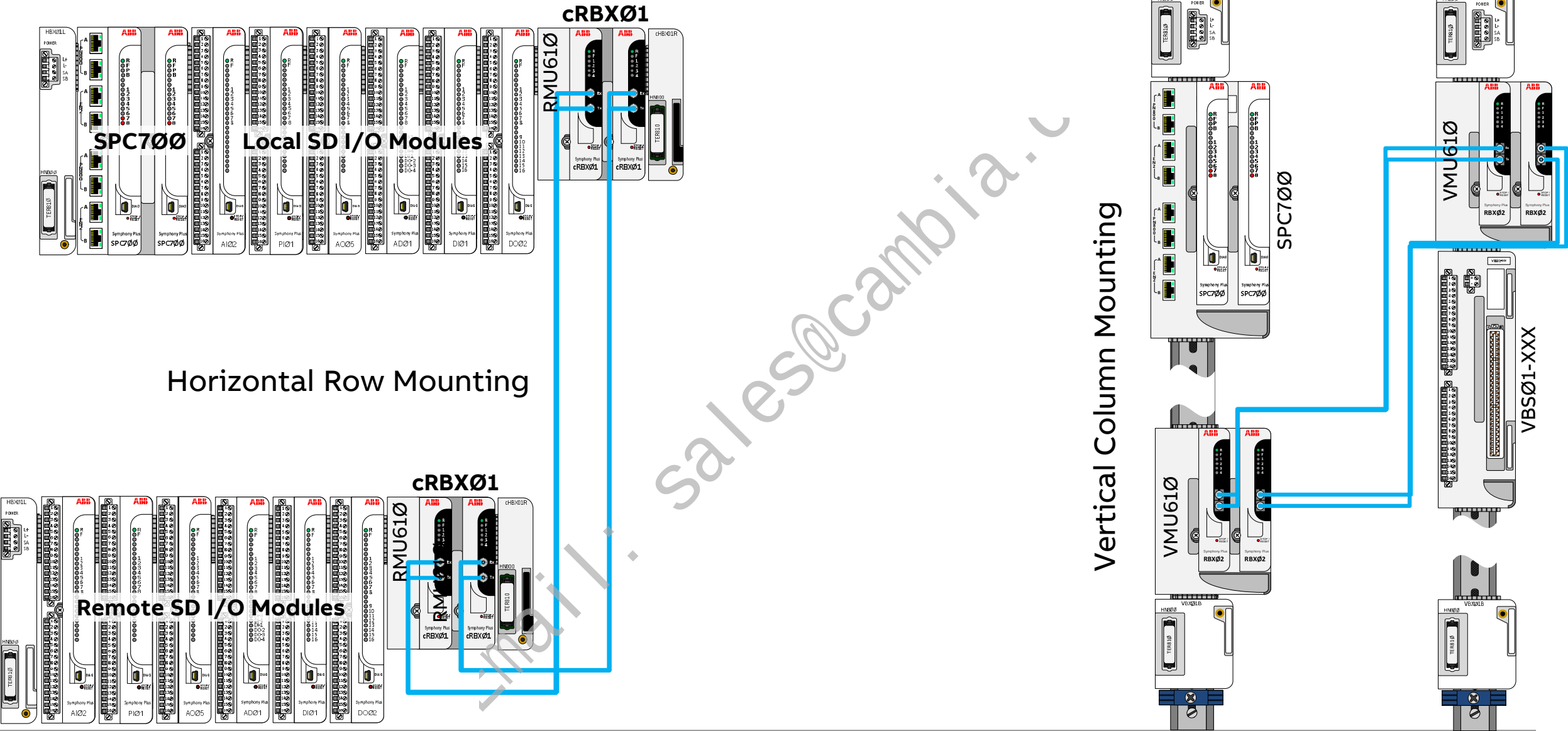


SD Series: Compact Fiber Optic Repeater cRBXØ1



Property		Characteristic / Value
Power Requirements	100 mA @ 24 VDC +/- 10%, 2.4 W (per module)	
Standard 35mm wide DIN Rail Mounting	Horizontal Row: RMU610 Vertical Column: VMU610	
Dimensions	cRBXØ1 module	W = 27 mm, H = 127 mm, D = 107.5 mm
	RMU610	W = 90 mm, H = 127 mm, D = 127 mm
	VMU610	W = 101mm, H = 145mm, D = 100mm
Temperature Range	Operating:	-20 to +70 deg C
	Storage:	-40 to +85 deg C
Relative Humidity (Non-Condensing)	20% to 95% from 0 deg C to 55 deg C	
Air Quality	Standard:	ISA S71.04 G1
	Optional:	ISA S71.04 G3
Fiber Optic Cable	Fiber Size	62.5/125 µm
	Fiber Attenuation	-3.5 dB / km
	Index	Graded
	Wavelength	840 nm
	Bandwidth	160 MHz / km
	Connector Type	ST, right angle strain relief
	Transmission Mode	Multi-Mode

SD Series: Compact Fiber Optic Repeater cRBXØ1



SD Series: Standard I/O

Type	Module	#CH / Signals	Description / Properties
Analog	AIØ1	16 AI	4-20 mADC / 1-5VDC, 2x8 Group Isolation, 16-bit ADC
	AIØ2	16 AI with HART	4-20 mADC, HART AI, 1x16 Group Isolation, 16-bit ADC
	AIØ3	8 RTD	2/3/4 Wire RTDs, 100 Ω Platinum U.S. & European Standards
	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
	AIØ5	8 AI with HART	HART AI, Individual CH Isolation, Dedicated ADC, HART modem & 24V Field PS per CH
	AOØ1	16 AO	4-20 mADC / 1-5VDC, Group Isolation, 12-bit DAC
	AOØ2	16 AO with HART	HART AO, 1x16 Group Isolation, 4-20 mADC, 12-bit DAC
	AOØ5	8 AO with HART	HART AO, Individual CH Isolation, Dedicated DAC & HART modem per CH
Mixed	ADØ1	4x(AI,AO, DI,DO)	1x8 Group Isolated Analog I/O with HART, 24/48 VDC DI's, 24/48 VDC DO's
	ADØ2	4x(AI,AO, DI,DO)	1x8 Group Isolated Analog I/O with HART, 110VAC/125VDC DI's, 24/48 VDC DO's
Digital	DIØ1	16 DI	24 / 48 VDC Digital Inputs, SOE (1 msec resolution)
	DIØ2	16 DI	110 VAC / 125 VDC Digital Inputs, SOE (10/20 msec resolution)
	DIØ3	16 DI	24 VDC Digital Inputs [SOE not supported]
	DIØ4	16 DI	48 VDC Digital Inputs [SOE not supported]
	DOØ1	16 DO	24/48 VDC Open-Collector DO, max 250 mADC
	DOØ2	16 DO	24/48 VDC Open-Collector DO, Short-Circuit detection & protection
	PIØ1	8 PI	Modes: Freq.(5 Hz to 100 kHz), Period (1 μ s to 30sec), Count (0 to 1.073B)

SD Series is designed for extremes



Property	Characteristic / Value
Density	Over 1,000 I/O in 19" Rack cabinet
Operating Temperature Range	From -20 to +70 ° C
Corrosive Environments	G3 Conformal Coating, optionally available
Low Power Requirements	I/O Modules 1 to 2 W, SPC700 3.6W per module
Backward Compatibility	Supported by HPC800, SP700 & BRC300/400/410

HR: Harmony Rack Series Evolution Mapping to SD Series I/O

Module	# CH	I/O	Signal Ranges	HR Harmony Rack Replacement		SD Symphony DIN Replacement	
				HR Module	Comment	SD Module	Comment
NASIO1	15	AI	1-5VDC, 0-1VDC, 0-5VDC, 0-10VDC, -10VDC to 10VDC, 4-20mA	SPFEC12	FEC12 does not support Smart Transmitter communications. Uses FC132 and FC133.	AI01	AI01 does not support Smart Transmitter communications
NASIO2	15	AI	1-5VDC, 0-1VDC, 0-5VDC, 0-10VDC, -10VDC to 10VDC, 4-20mA	SPFEC12	FEC12 does not support Smart Transmitter communications. Uses FC132 and FC133.	AI01	AI01 does not support Smart Transmitter communications
NASM01	16	AI	1-5VDC, 0-5VDC, 0-10VDC, -10 to 10VDC, 4-20mA	SPFEC12	Sixteen high-level inputs. System or field powered current, or single ended or differential voltage.	AI01	
NASM02	8	AI	-100 to 100mV, 0 to 100mV, Thermocouples	SPASI23	Supports types E, J, K, T, S, R, Chinese E, and Chinese S thermocouples. Also supports millivolt inputs.	AI04	AI04 provides 16 TC / mV inputs
NASM03	8	AI	100 Ohm Platinum RTD, 120 Ohm Nickel RTD, 53 Ohm Chinese Copper RTD	SPASI23	RTDs: 100 Ohm US Lab, 100 Ohm US Industrial, 100 Ohm Platinum European, 120 Ohm Nickel, 53 Ohm Chinese Copper	AI03	
NASM04	8	AI	10 Ohm Copper RTD	IMASM04	Limited Lifecycle Phase	None	
NASO01	14	AO	1-5VDC or 4-20mA	SPASO11	Maximum load 750 Ohms. Uses FC149.	AO01	
NCIS01	3	DI	24VDC, 125VDC, 120VAC	SPCIS22	Interfaces to NDCS03 or IISAC01 manual/auto stations. Used with FC79.	AD01 AD02	AD01 provides 4x LV-DI (24 / 48 VDC) + 4x AO AD02 provides 4x HV-DI (120VAC / 125VDC) + 4x AO Both AD01 & AD02 support HART on Analog I/O No solution or support for NDCS03 or IISAC01
	4	DO	24VDC				
	4	AI	1-5VDC, 4-20mA				
	2	AO	1-5VDC, 4-20mA				
NCIS02	3	DI	24VDC, 125VDC, 120VAC	SPCIS22	Interfaces to NDCS03 or IISAC01 manual/auto stations. Used with FC79.	AD01 AD02	AD01 provides 4x LV-DI (24 / 48 VDC) + 4x AO AD02 provides 4x HV-DI (120VAC / 125VDC) + 4x AO Both AD01 & AD02 support HART on Analog I/O No solution or support for NDCS03 or IISAC01
	4	DO	24VDC				
	4	AI	1-5VDC, 4-20mA				
	2	AO	1-5VDC, 4-20mA				

HR: Harmony Rack Series Evolution Mapping to SD Series I/O

Module	# CH	I/O	Signal Ranges	HR Harmony Rack Replacement		SD Symphony DIN Replacement	
				HR Module	Comment	SD Module	Comment
NDSI01	16	DI	24VDC, 125VDC, 120VAC	SPDSI22	Inputs optically isolated, however, 2 pairs share a common on TU (inputs 7 and 8, and 15 and 16) and these pairs must use same voltage source. Used with FC84.	DI01 DI02 DI03 DI04	DI 24/48 VDC (supports 1 msec SOE) DI 120VAC / 125 VDC (supports 10msec SOE) DI 24 VDC (does not support SOE) DI 48VDC (does not support SOE)
NDSI02	16	DI	24VDC, 125VDC, 120VAC	SPDSI22	Inputs optically isolated, however, 2 pairs share a common on TU (inputs 7 and 8, and 15 and 16) and these pairs must use same voltage source. Used with FC84.	DI01 DI02 DI03 DI04	DI 24/48 VDC (supports 1 msec SOE) DI 120VAC / 125 VDC (supports 10msec SOE) DI 24 VDC (does not support SOE) DI 48VDC (does not support SOE)
NDSM01	16	DI/O	24VDC, selectable as inputs or outputs in groups of 8				
NDSM02	16	DI	24VDC, 125VDC	SPDSI22		DI01 DI02	DI 24/48 VDC (supports 1 msec SOE) DI 120VAC / 125 VDC (supports 10msec SOE)
NDSM03	16	DI	24VDC, 125VDC, 120VAC		24VDC use SPDSI13. 125VDC or 120VAC use SPDSI22	DI01 DI02 DI03	DI 24/48 VDC (supports 1 msec SOE) DI 120VAC / 125 VDC (supports 10msec SOE) DI 24 VDC (does not support SOE)
NDSM04	8	PI	0-50KHz, 4-6VDC, 21.627VDC	SPDSM04	Performs totalization (FC104), frequency count (FC103), or pulse count (FC102). Must change dip-shunt and reverse polarity of field wires when replacing NDSM05 with DSO14 for outputs or DSI for inputs.	PI01	
NDSM05	16	DI/O	24VDC, selectable as inputs or outputs in groups of 8	INS: SPDSI22 OUTS: SPDSO14		INS: DI03 OUTS: DO01	DI03 provides 16 DI 24 VDC DO01 provides 16 DO 24/48VDC, max 250mA
NDSO01	8	DO	24-240VAC	IMDSO01	Limited Lifecycle Phase	None	
NDSO02	8	DO	4-50VDC	IMDSO02	Limited Lifecycle Phase	None	
NDSO03	8	DO	5-160VDC	IMDSO03	Limited Lifecycle Phase	None	
NDSO04	16	DO	24VDC	SPDSO14		DO01 DO02	DO01 provides 16 DO 24-48 VDC, max 250mA DO02 provides 16 DO 24/48VDC, max 250mA w/ SC protection

HR: Harmony Rack Series Evolution Mapping to SD Series I/O

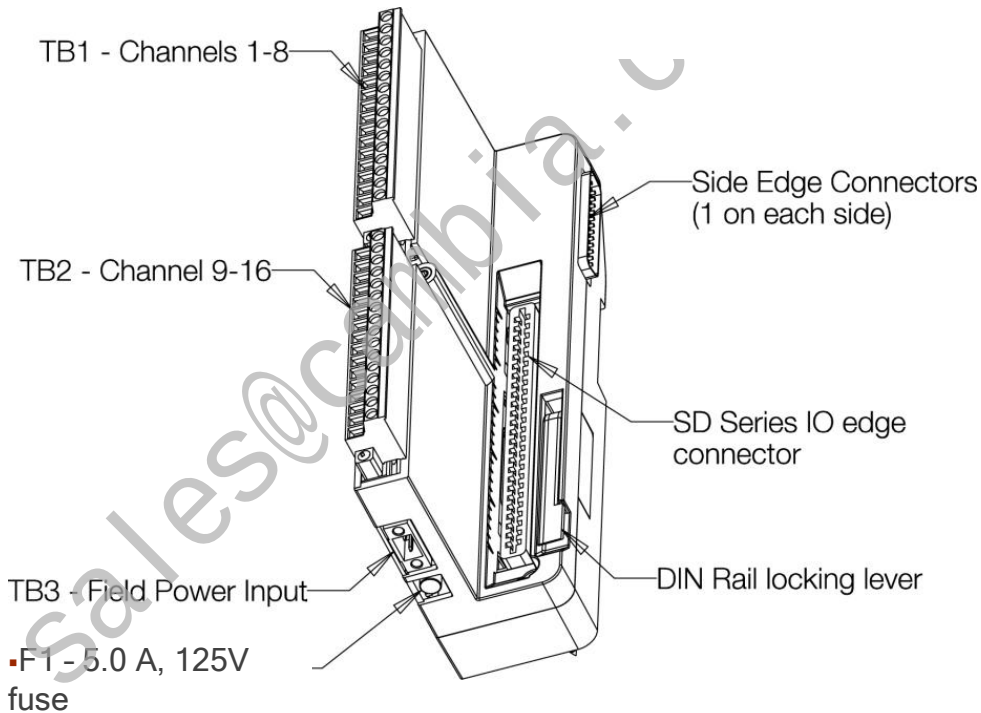
Module	# CH	I/O	Signal Ranges	HR Harmony Rack Replacement		SD Symphony DIN Replacement	
				HR Module	Comment	SD Module	Comment
IMASO01	14	AO	1-5VDC or 4-20mA	SPASO11	Maximum load 750 Ohms. Uses FC149.	AO01	AO01 provides 16 AO's
IMASO11	14	AO	1-5VDC or 4-20mA	SPASO11	Maximum load 750 Ohms. Uses FC149.	AO02	AO02 provides 16 AO's with HART
IMCIS02	3	DI	24VDC, 125VDC, 120VAC	SPCIS22	Interfaces to NDCS03 or IISAC01 manual/auto stations. Uses FC79.	AD01, AD02	AD01 provides 4x LV-DI (24 / 48 VDC) + 4x AO AD02 provides 4x HV-DI (120VAC / 125VDC) + 4x AO Both AD01 & AD02 support HART on Analog I/O No solution or support for NDCS03 or IISAC01
	4	DO	24VDC				
	4	AI	1-5VDC, 4-20mA				
	2	AO	1-5VDC, 4-20mA				
IMCIS12	3	DI	24VDC, 125VDC, 120VAC	SPCIS22	Interfaces to NDCS03 or IISAC01 manual/auto stations. Uses FC79.	AD01, AD02	AD01 provides 4x LV-DI (24 / 48 VDC) + 4x AO AD02 provides 4x HV-DI (120VAC / 125VDC) + 4x AO Both AD01 & AD02 support HART on Analog I/O No solution or support for NDCS03 or IISAC01
	4	DO	24VDC				
	4	AI	1-5VDC, 4-20mA				
	2	AO	1-5VDC, 4-20mA				
IMCIS22	3	DI	24VDC, 125VDC, 120VAC	SPCIS22	Interfaces to NDCS03 or IISAC01 manual/auto stations. Uses FC79.	AD01, AD02	AD01 provides 4x LV-DI (24 / 48 VDC) + 4x AO AD02 provides 4x HV-DI (120VAC / 125VDC) + 4x AO Both AD01 & AD02 support HART on Analog I/O No solution or support for NDCS03 or IISAC01
	4	DO	24VDC				
	4	AI	1-5VDC, 4-20mA				
	2	AO	1-5VDC, 4-20mA				
IMDSI02	16	DI	24VDC, 125VDC, 120VAC	SPDSI22	Inputs optically isolated, however, 2 pairs share a common on TU (inputs 7 and 8, and 15 and 16) and these pairs must use same voltage source.	DI01/02/03/04	DI01 24/48 VDC (supports 1 msec SOE) DI02 120VAC / 125 VDC (supports 10msec SOE) DI03 24 VDC (does not support SOE) DI04 48VDC (does not support SOE) No solution or support for high & low voltage inputs mixed on same module
IMDSI12	16	DI	24VDC, 48VDC, 125VDC, 120VAC	SPDSI22	Uses FC84	DI01/02/03/04	
IMDSI13	16	DI	24VDC	SPDSI22	Uses FC84	DI03	
IMDSI14	16	DI	48VDC	SPDSI22	Uses FC84	DI04	
IMDSI15	16	DI	125VDC, 120 VAC	SPDSI22	Uses FC84	DI02	
IMDSI22	16	DI	24VDC, 48VDC, 125VDC, 120VAC	SPDSI22	Uses FC84	DI01/02/03/04	

HR: Harmony Rack Series Evolution Mapping to SD Series I/O

Module	# CH	I/O	Signal Ranges	HR Harmony Rack Replacement		SD Symphony DIN Replacement	
				HR Module	Comment	SD Module	Comment
IMDSI22	16	DI	24VDC, 48VDC, 125VDC, 120VAC	SPDSI22	Uses FC84	DI01 DI02 DI03 DI04	DI 24/48 VDC (supports 1 msec SOE) DI 120VAC / 125 VDC (supports 10msec SOE) DI 24 VDC (does not support SOE) DI 48VDC (does not support SOE)
IMDSM04	16	PI	0-50KHz, 4-6VDC, 21.627VDC	SPDSM04	Performs totalization (FC104), frequency count (FC103), or pulse count (FC102).	PI01	
IMDSM05	16	DI/O	24VDC, selectable as inputs or outputs in groups of 8	OUTS: SPDSO14 INS: SPDSI22	Must change dipshunt and reverse polarity of field wires when replacing IMDSM05 with IMDSO14 for outputs or IMDSI22 for inputs. No direct replacement when IMDSM05 is used for both inputs and outputs, or when used with digital logic station (DLS).	INS: DI01 OUTS: DO01	DI01 provides 16 DI 24/48 VDC (supports 1 msec SOE) DO01 provides 16 DO 24/48VDC, max 250mA
IMDSO01	8	DO	24-240VAC		Used with FC83.		
IMDSO02	8	DO	4-50VDC		Used with FC83.		
IMDSO03	8	DO	5-160VDC		Used with FC83.		
IMDSO04	16	DO	24VDC	SPDSO14	Must reverse polarity of output wires when replacing a DSM05 with a DSO04. Does not support DLS when replacing DSM05. Used with FC83.	DO01 DO02	DO01 provides 16 DO 24-48 VDC, max 250mA DO02 provides 16 DO 24/48VDC, max 250mA w/ SC protection
IMDSO14	16	DO	24VDC	SPDSO14	Must reverse polarity of output wires when replacing a DSM05 with a DSO14. Does not support DLS when replacing DSM05. Used with FC83.	DO01 DO02	DO01 provides 16 DO 24-48 VDC, max 250mA DO02 provides 16 DO 24/48VDC, max 250mA w/ SC protection
IMDSO15	8	DO	EMR outputs 48VDC, 120VAC	SPDSO15	Discrete electromechanical relays on-board. Used with FC83.		

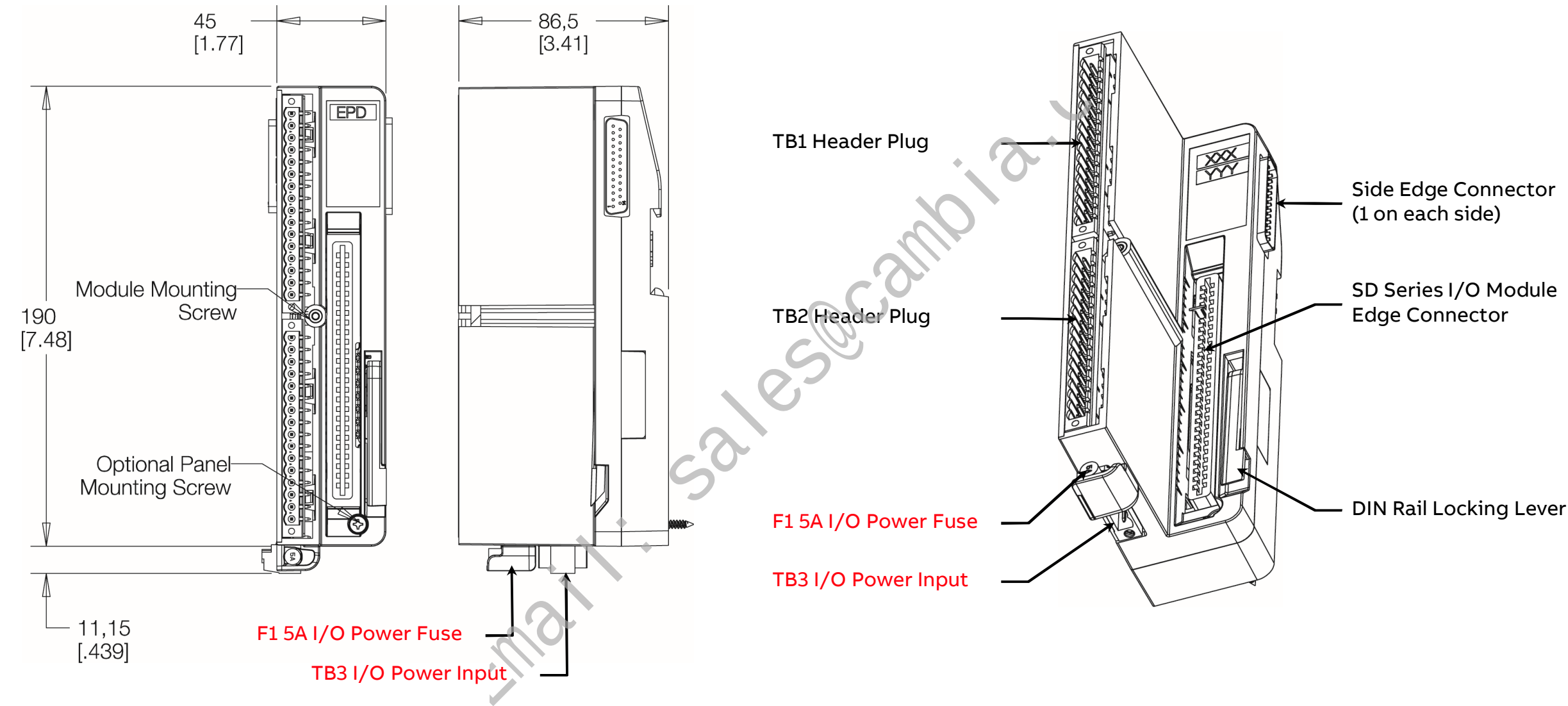
SD Series Control & I/O Product Overview

List of new SD Series I/O Module Bases



#	Base	AI01	AI03	AI04	AO01	DI01	DI02	DO01	PI01	Horizontal, Base, Single module
1	HBS01-FPH	X				X	X	X	X	Field Power (switch) High
2	HBS01-FPN					X	X	X	X	Field Power (switch) Neutral
3	HBS01-EPD	X			X	X	X	X	X	External Power or Differential I/O
4	HBS01-CJC		X	X						Cold Junction Compensation

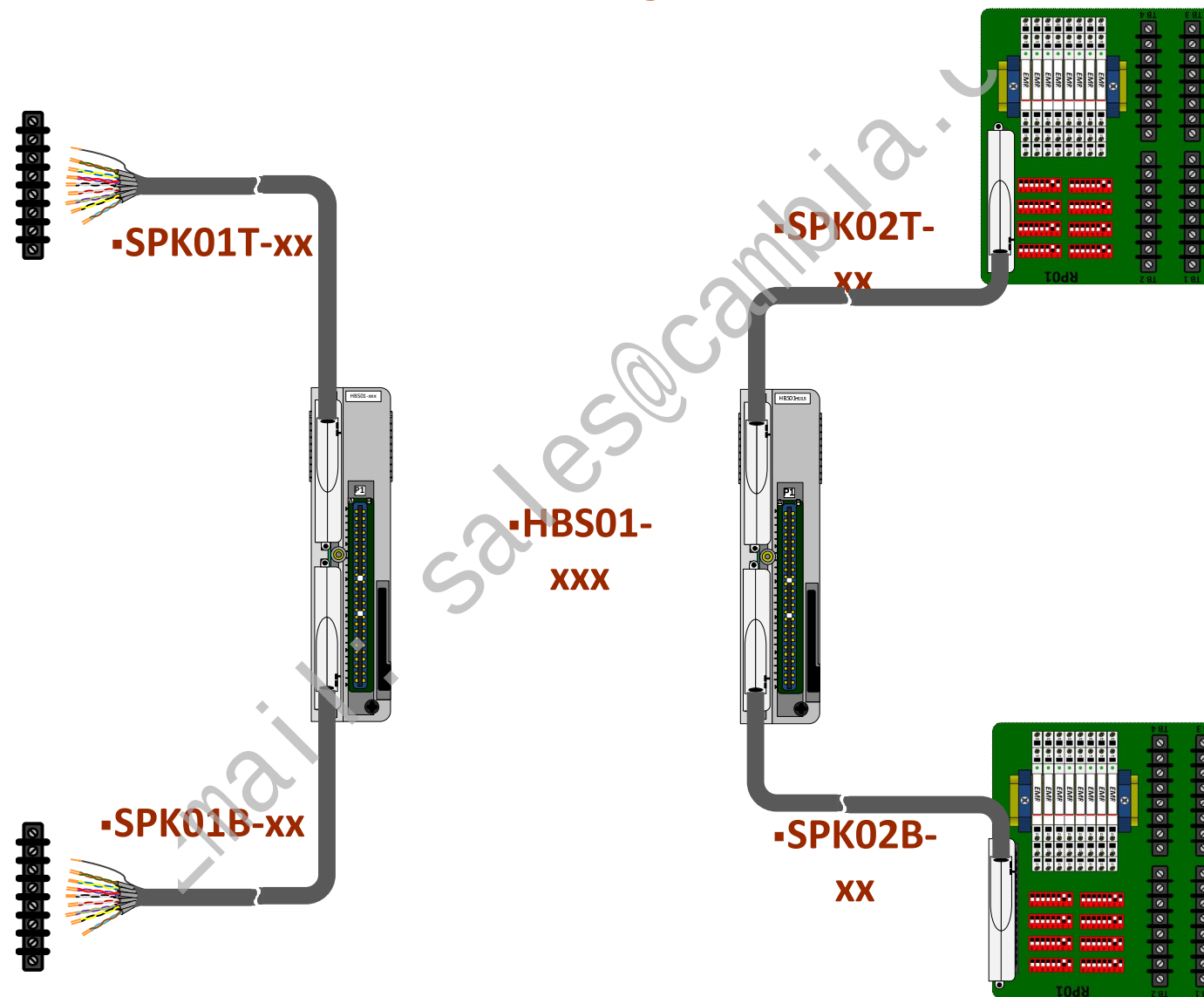
SD Series: Enhanced Horizontal Bases HBSØ1-xxx



Enhanced HBSØ1-xxx bases to begin shipping 2Q-2017

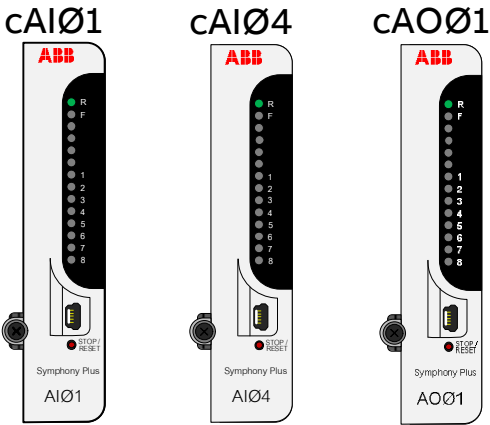


SD Series I/O SPK01_ & SPK02_ Marshaling Cables

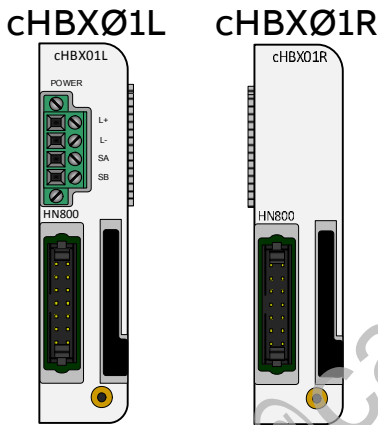


SD Series: Compact I/O

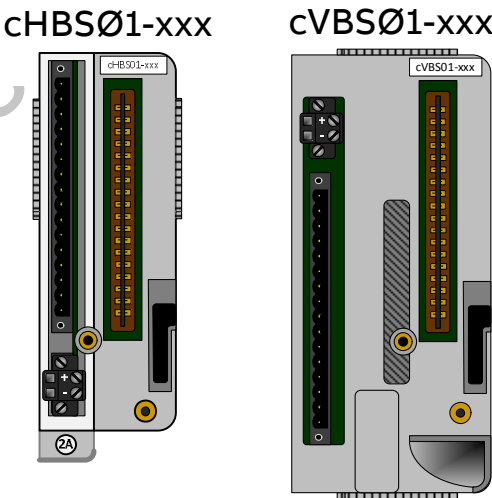
Compact Modules



Compact Bus Extenders



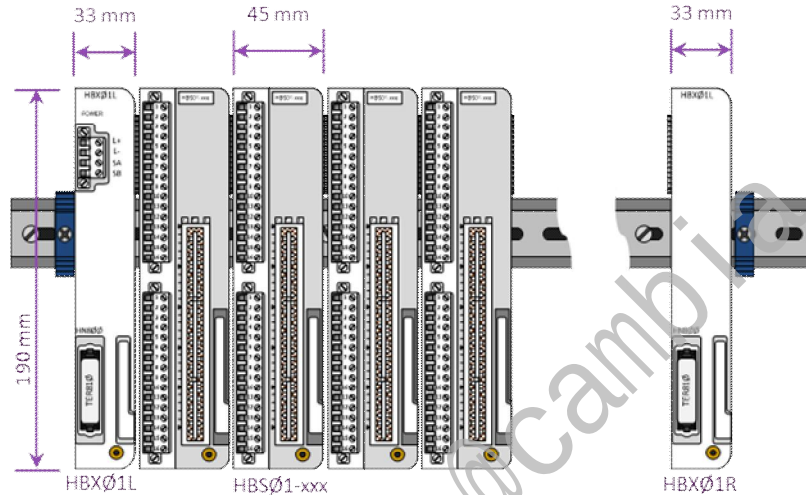
Compact Module Bases



#	Module	#CH / Signals	Description / Properties
1	cAIØ1	8 AI	4-20 mADC / 1-5 VDC, AI, 1x8 Group Isolation, 16-bit ADC
2	cAIØ4	8 TC / mV	-100 to +100 mV, 0 to +100mV or Type: B/E/J/K/L/N/R/S/T/U TC's
3	cAOØ1	8 AO	4-20 mADC, HART AO, 1x8 Group Isolation, 12-bit DAC
4	cHBXØ1L / R	n/a	Compact Horizontal Bus Extenders
5	cHBSØ1-xxx	n/a	Compact Horizontal Base Single module – CJC, EPD, FPH, FPN
6	cVBSØ1-xxx	n/a	Compact Vertical Base Single module – CJC, EPD, FPH, FPN

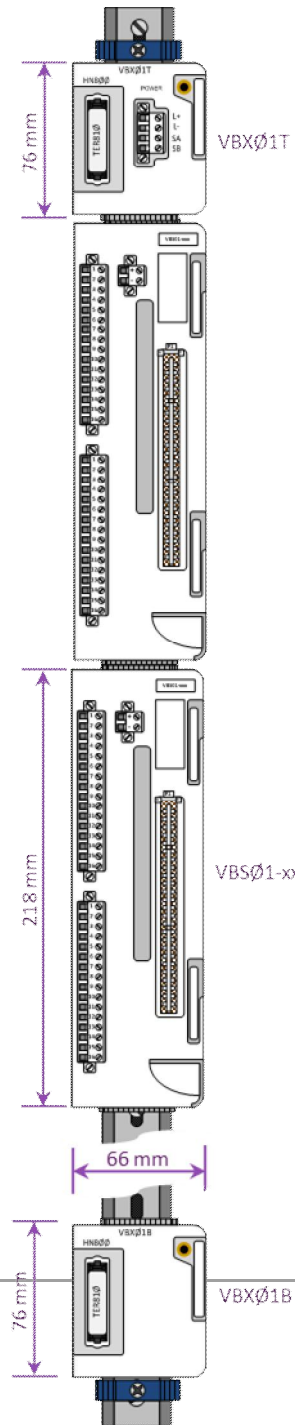
SD Series: Standard I/O

- ❑ Up to 10 horizontal rows (Bus Segments) can be connected in single HN8ØØ electrical bus
- ❑ Up to 10 vertical columns (Bus Segments) can be connected in single HN8ØØ electrical bus
- ❑ Rows & columns are connected using SPK8ØØ-xx cables
- ❑ SPK8ØØ-xx cables must remain within cabinet enclosure



Horizontal Rows

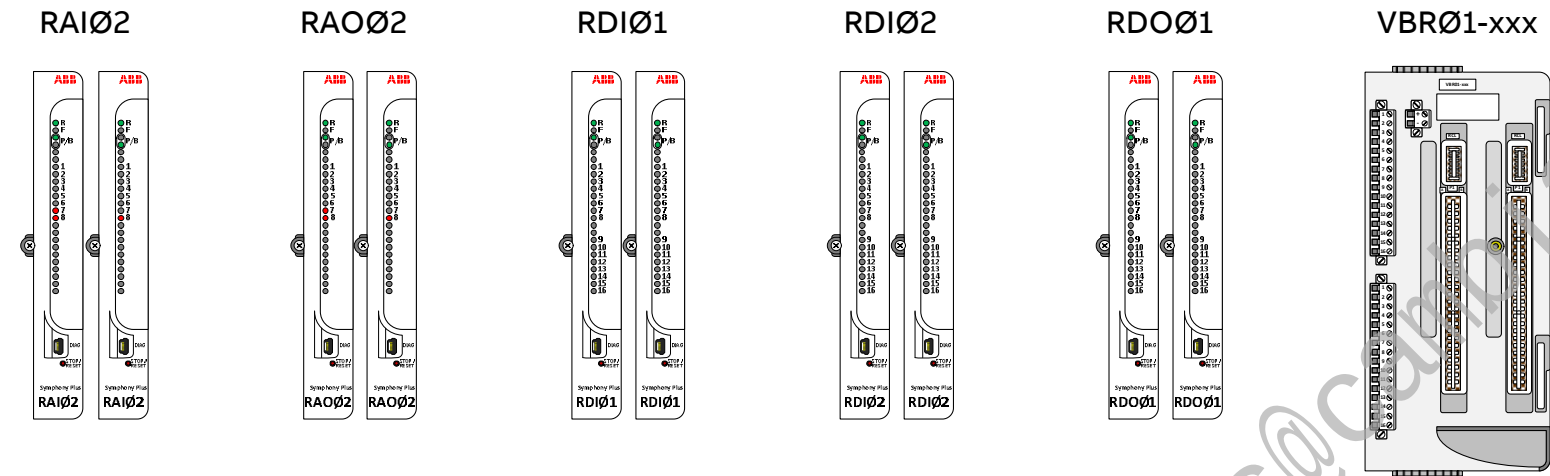
# Mods	Total Width (mm)	# Mods	Total Width (mm)	# Mods	Total Width (mm)
1	117	9	501	17	885
2	165	10	549	18	933
3	213	11	597	19	981
4	261	12	645	20	1029
5	309	13	693	21	1077
6	357	14	741	22	1125
7	405	15	789	23	1173
8	453	16	837	24	1221



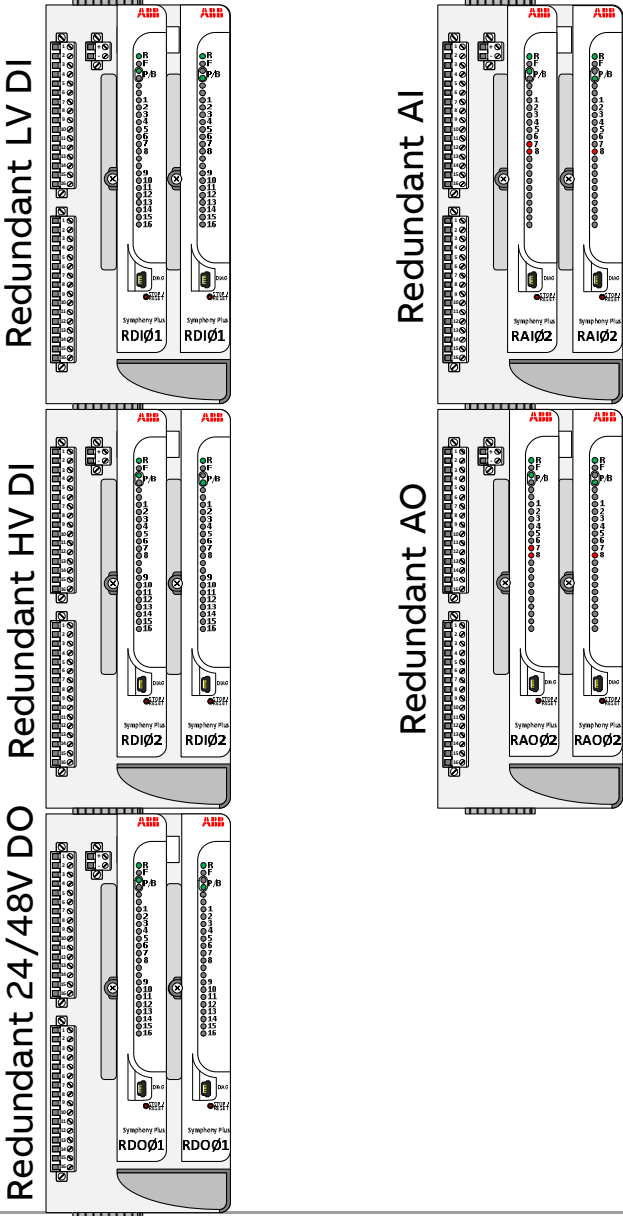
Vertical Columns

# Mods	Total Length (mm)
1	376
2	597
3	818
4	1039
5	1260
6	1481
7	1702
8	1923

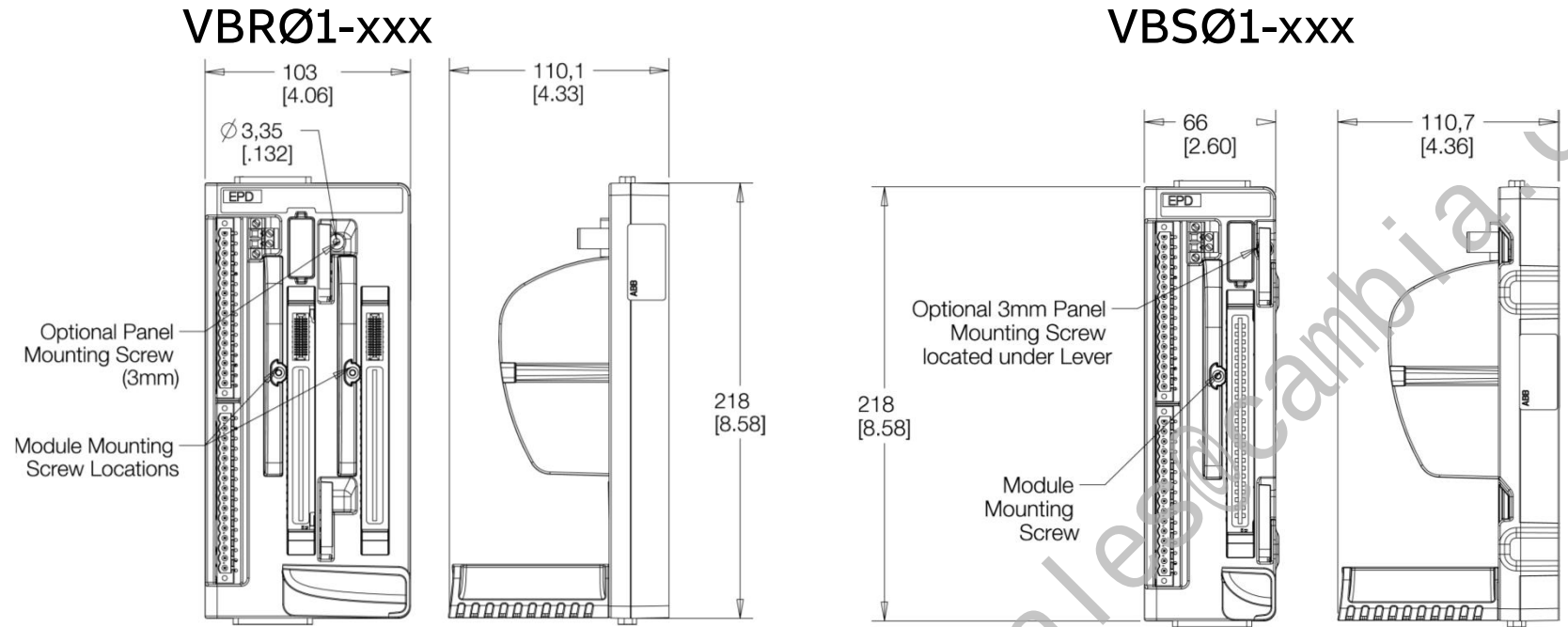
SD Series: Redundant I/O



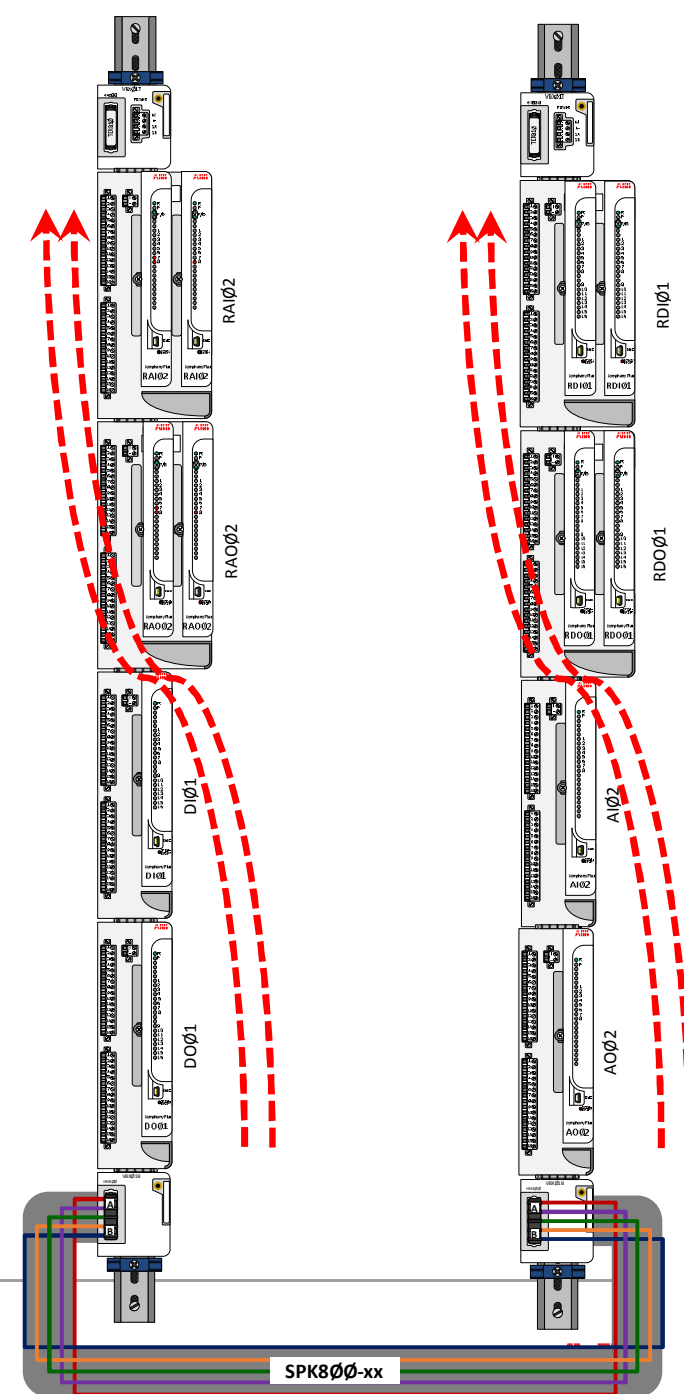
#	Module	I/O Type	Description / Properties
1	RAIØ2	16 AI	Group-Isolated (1-5 VDC, 4-20 mA) HART AI
2	RAOØ2	16 AO	Group-Isolated (1-5 VDC, 4-20 mA) HART AO
3	RDIØ1	16 DI	24 / 48 VDC Digital Input, 1 msec SOE
4	RDIØ2	16 DI	110 VAC / 125 VDC Digital Input, 10/20 msec SOE
5	RDOØ1	16 DO	24 – 48 VDC Digital Output, max 250 mA
6	VBRØ1-xxx	16 CH	Vertical Base Redundant Modules: [xxx = FPH, FPN, EPD]



SD Series: Redundant I/O

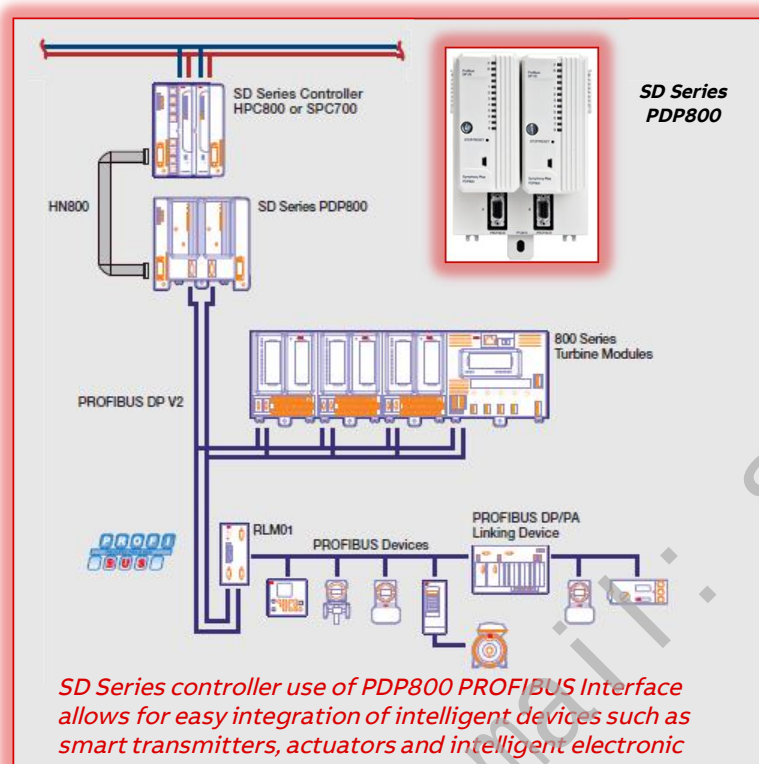


- ❑ Redundant & Non-Redundant I/O bases are 100% compatible
- ❑ Redundant & Non-Redundant I/O can be mounted in the same column
- ❑ Keep Redundant I/O at top of the column in order to minimize “Stove Pipe” effect
- ❑ Avoids need to de-rate operating temperature range: -20 to +70°C



SD Series Control and I/O

SD Series: Device integration via PROFIBUS DP



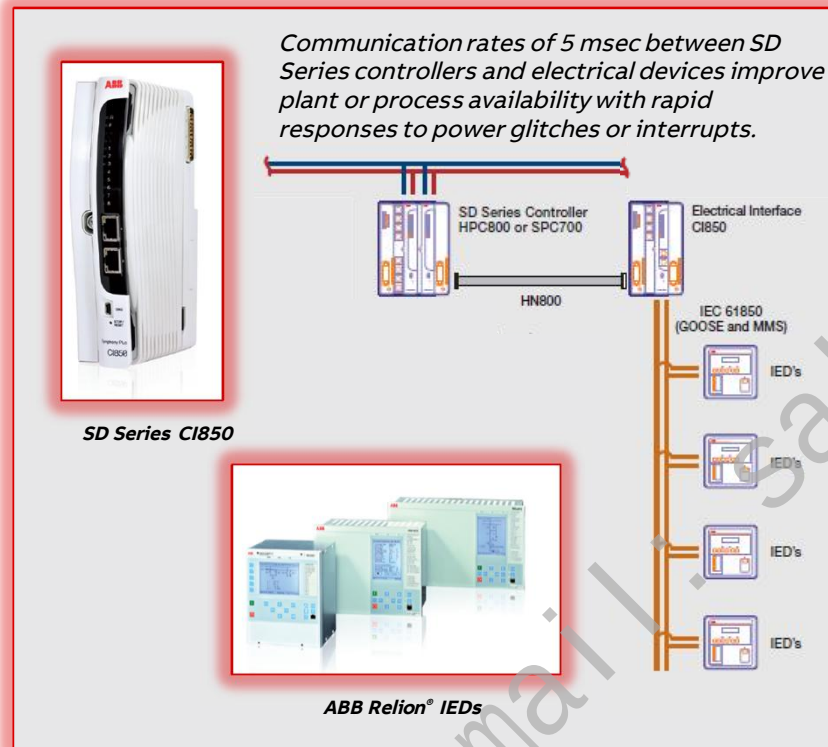
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PDP800 PROFIBUS Interface Module supports:

- Module redundancy
- PROFIBUS DP line redundancy
- PROFIBUS DP V0, V1, V2
- PROFIBUS PA devices through DP/PA linking device
- 1 msec time stamping of devices by PROFIBUS DP V2
- Electric and fiber optic media for PROFIBUS DP link
 - Up to 12 Mbps rate of PROFIBUS DP link
 - Up to 15 km by fiber optic PROFIBUS DP link
 - Up to 125 slave devices

SD Series Control and I/O-CI850

SD Series: Electrical integration via IEC61850



February 27, 2017

CI850 IEC61850 Interface Module supports control and supervision of MCCs, switchgear, transformers, excitation systems, and protective relays via IEC61850

Data modeling according to IEC 61850-7-3/4

MMS client functionality according to IEC 61850-7-2

GOOSE publisher and subscriber functionality

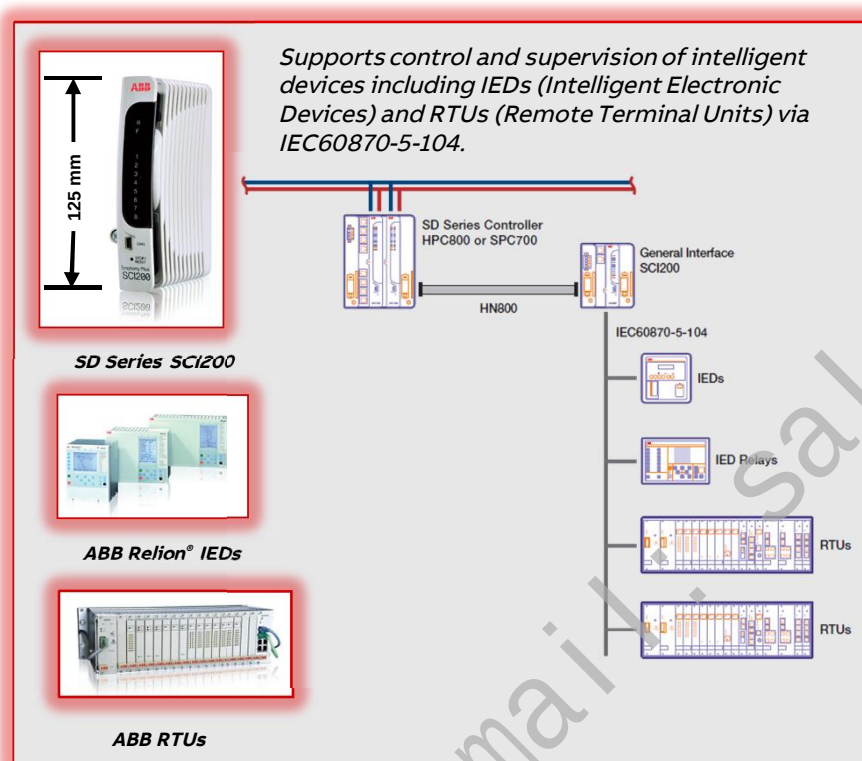
Capability to send Single and Double Commands

Capability to send Select Before Operate Commands

Up to 20 IEDs connected to a single CI850

SD Series Control and I/O -SCI200

SD Series: General interface (multiple protocol integration)



Utilizes compact SD Series packaging (125mm height vs standard 190 mm height)

SCI200 is a multi protocol interface that includes support for IEC60870-5-104

SCI200 IEC60870-5-104 features include:

- Data exchange can be accomplished in 100 milliseconds
- Master and Slave capabilities
- Supports all major data types
- Capability to send Single and Double Commands
- Capability to send Select Before Operate Commands
- As a Master, supports up to 16 devices with time synchronization to slaves
- As a Slave, supports up to 8 masters connected simultaneously
- Dual high-performance 32 bits CPUs (almost 800MIPS total)

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Product life cycle status

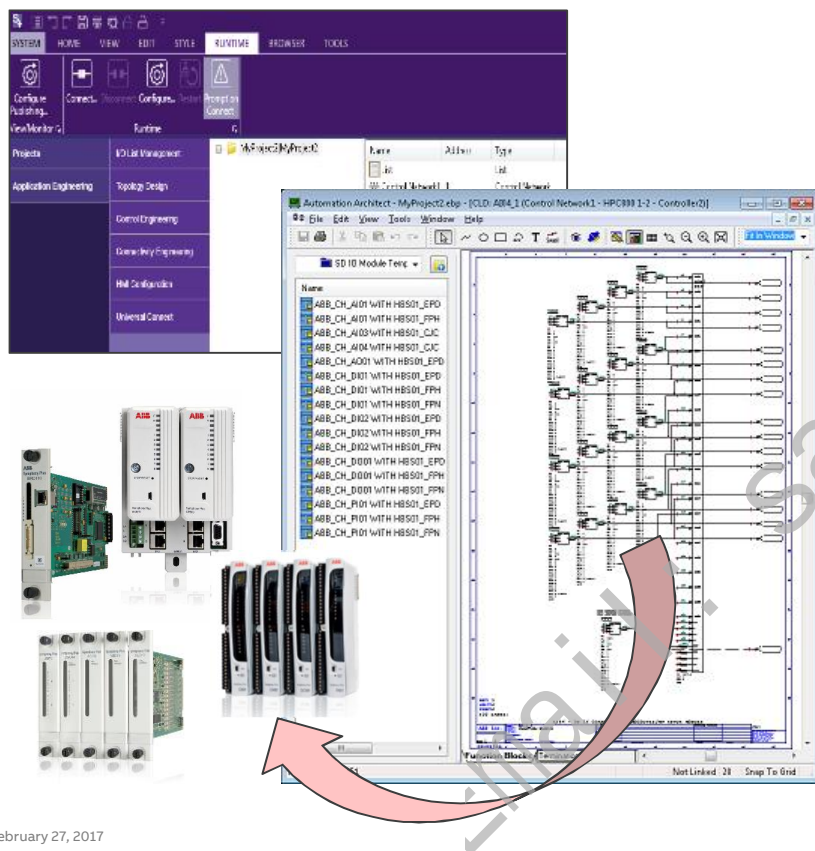
Engineering tools

Active
Classic
Limited
Obsolete

Class: Engineering tools	Product Family	Remarks
	S+ Engineering	The "Active" version is S+ Engineering 1.0 (introduced in September 2014). Through its unified engineering environment, S+ Engineering provides all the necessary functionality needed to engineer, configure, administrate, secure, commission and maintain every component in a Symphony Plus Control System - from control and I/O (HR Series and SD Series controllers), field instrumentation and electrical devices to network architecture, and operations, engineering, and advanced system applications. Note, S+ Engineering 1.0 is the tool required for engineering / configuration of the entire SD Series portfolio. *S+ Engineering's control engineering application is based on Composer Harmony.
	Composer	The "Active" version of Composer Harmony is version 6.1. It provides support for all HR Series (and all previous rack generations) and HPC800 DIN controllers. Use with Composer Field 1.1 provides additional support for PROFIBUS DP (PDP800) and HART I/O (HAI805 / HAO805) device configurations.
	WinTools	Moved to "Obsolete" in January 2009. Contains components not supported by newer PCs. Recommend evolution to S+ Engineering or Composer.
	DOSTools	"Obsolete" since December 31, 1999. Recommend evolution to S+ Engineering or Composer.

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S+ Engineering for Harmony



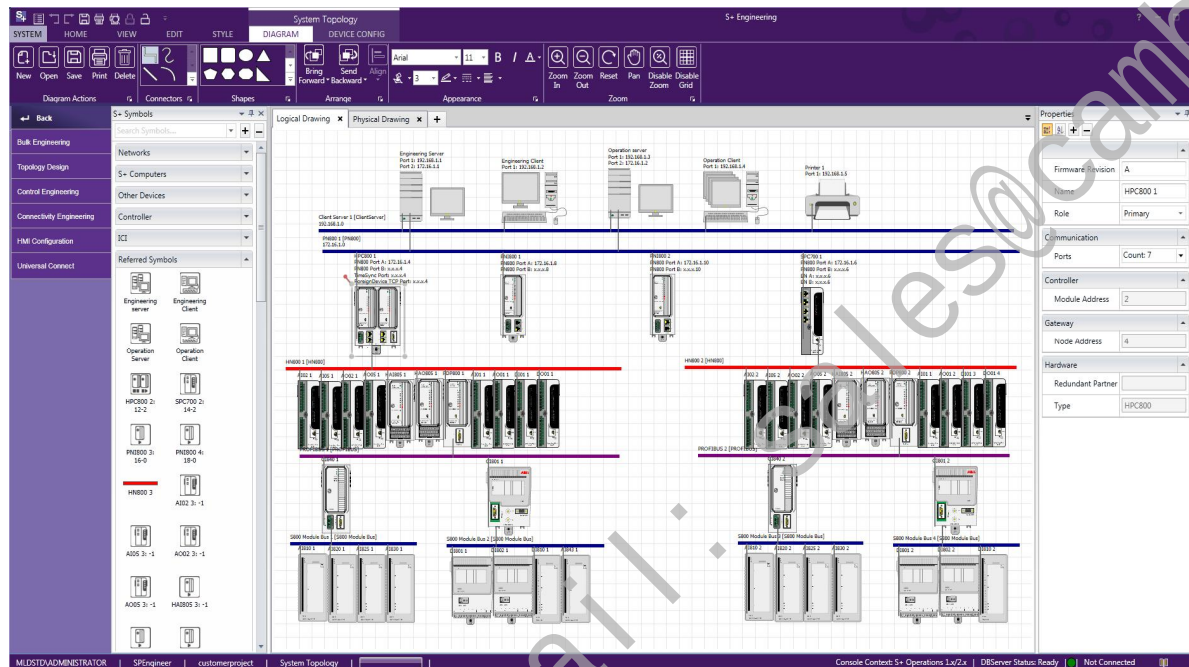
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Enhancement of the time-tested and proven Composer engineering platform

- Compatible with Symphony Plus HR (Harmony Rack) Series and SD (Symphony DIN) Series (including support for Rack I/O, SD Series I/O, S800 I/O, and 800 Series Turbine)
- Compatible with S+ Operations and other ABB HMI platforms
- An efficient platform to engineer, configure, administrate, secure, commission and maintain Symphony Plus / Harmony system
- Seamlessly integrates previous generation Wintools and Composer projects for evolution

S+ Engineering for Harmony

Engineering Workbench: system topology engineering



Visual method to define topology from plant network to the I/O and field device level

Device specific property window

Synchronizes control topology with control engineering

Support system setup

- Publish IP to reachable computer nodes
- Share information with Install and Update (I and U) tool and enables central I and U

HMI configuration support

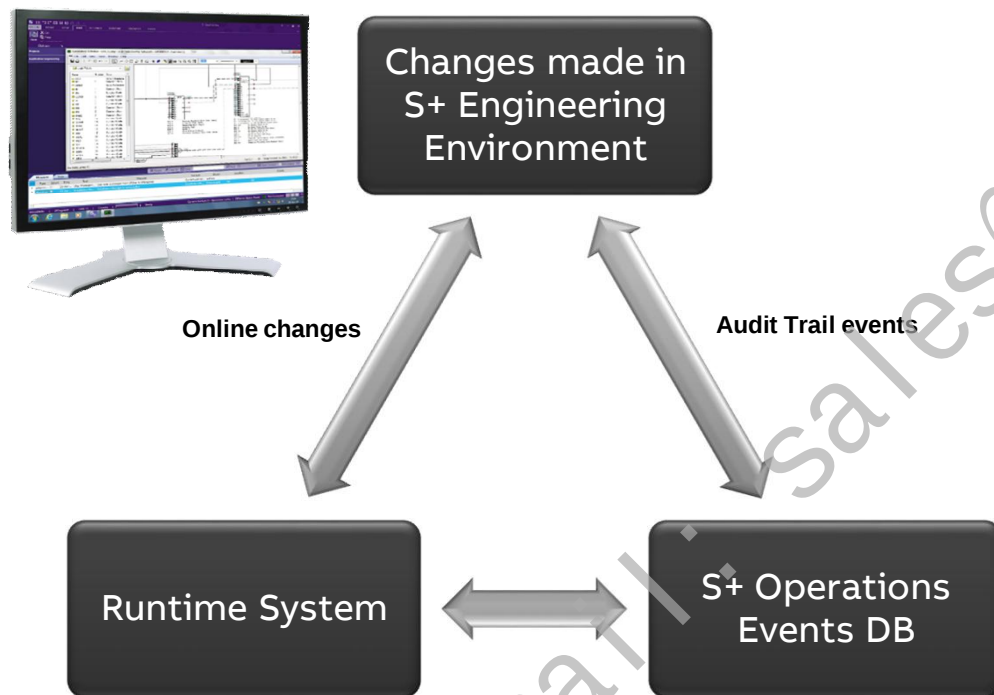
- Shares HMI topology information and enables further configuration in S+ Operations

Effortless documentation and report generation

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27, 2017

S+ Engineering for Harmony

Audit trail



Complete audit trail support for those who require regulatory compliance

Effective way of improving security of your Symphony Plus system

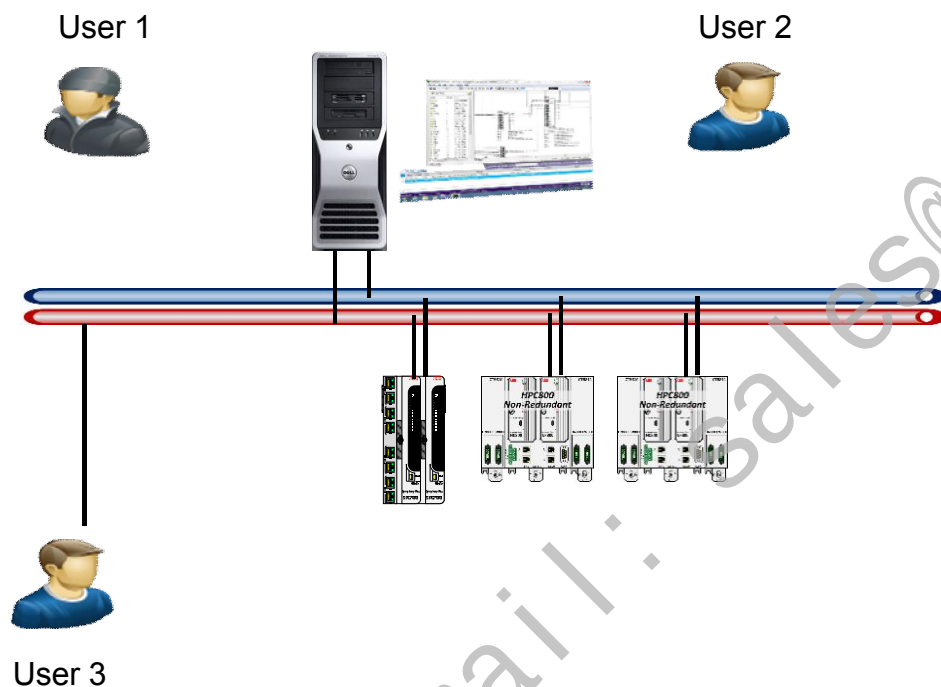
Track and archive system changes made at any engineering station

All event logs are traced in a central event database

Long term archiving in plant historian

S+ Engineering for Harmony

Multi user engineering / remote engineering



Multiple users (max 10) can work on the same project in parallel saving valuable commissioning time

Automatic “lock” on the document – so individuals can work on it without interruption and avoid simultaneous edits

Different users can update and tune different function loops within the same controller at the same time

Collaboration throughout the process –
from definition of process points to system/cabinet layout to diagnostics and service

S+ Engineering for Harmony

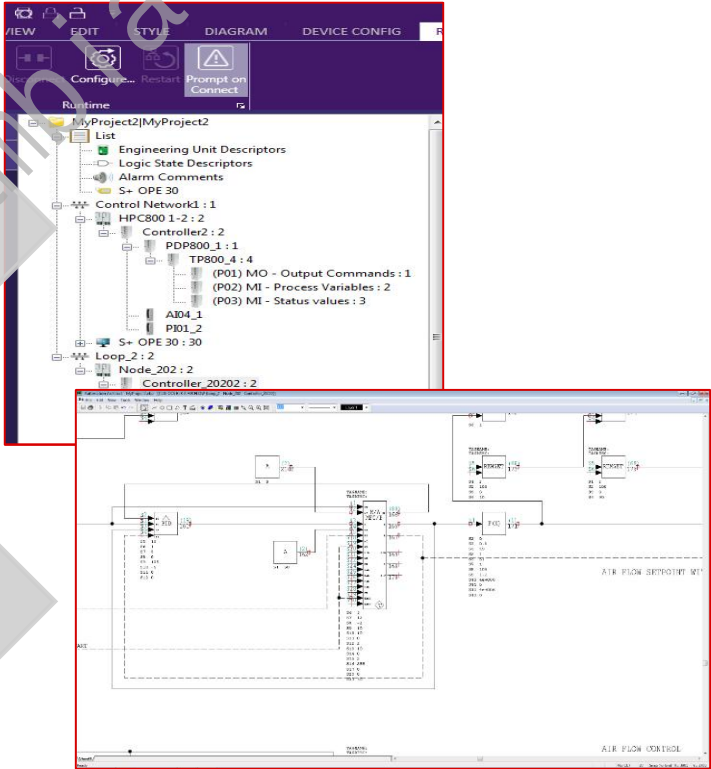
Explorer and Automation Architect

Explorer

- Intuitive means of organizing and locating system configuration information
- Microsoft Explorer style left-pane menu provides hierarchical view of S+ System

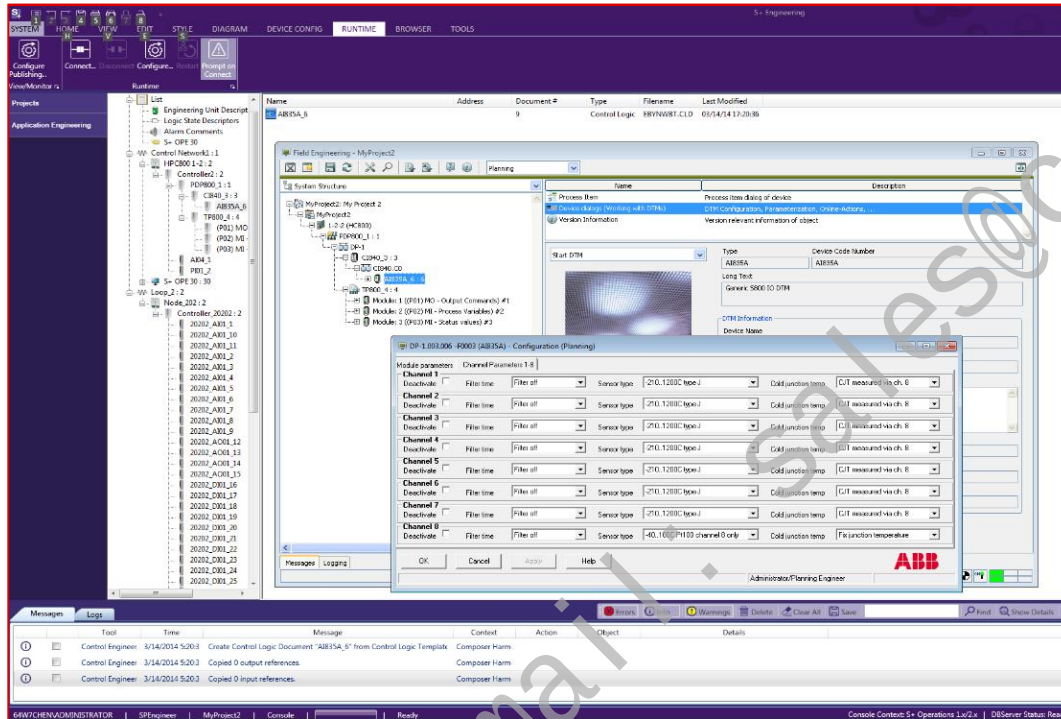
Automation Architect

- Visual creation, editing, monitoring and tuning of control logic
- Drag and drop function codes from libraries right into the control logic document (CLD)



S+ Engineering for Harmony

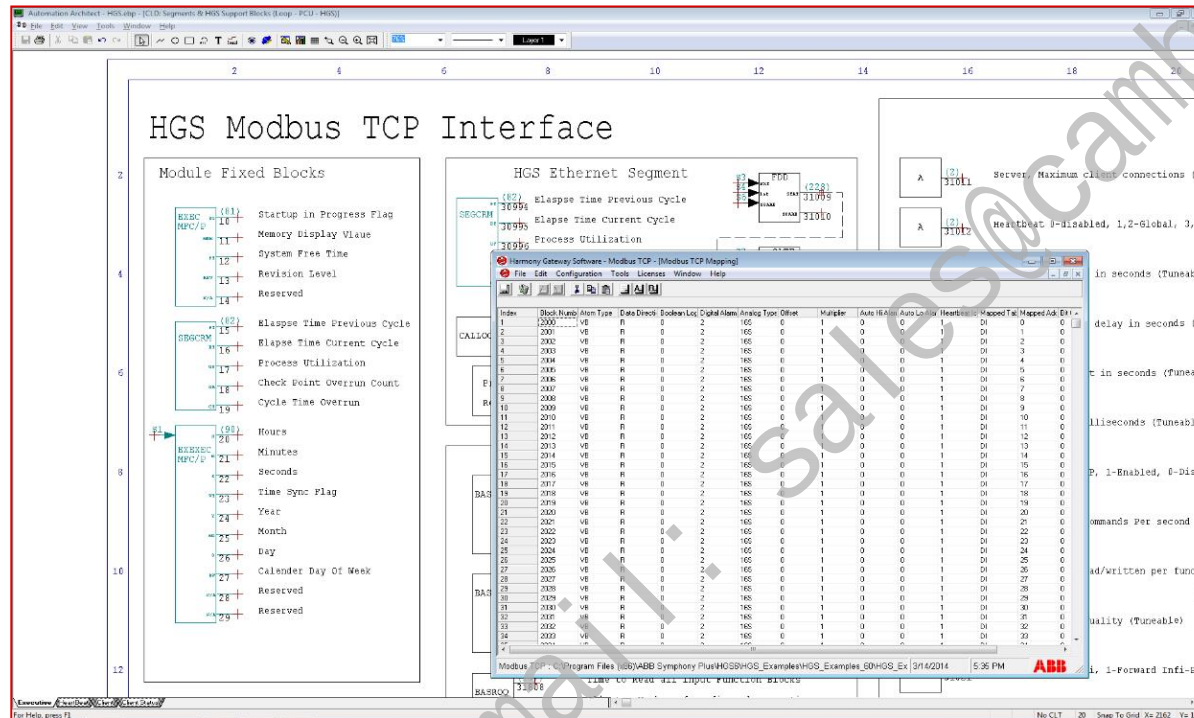
Field device integration



- 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 (SOE and diagnostic) as well as PROFIBUS-PA
- Use of standard HART and PROFIBUS DTMs – no need of any additional tools
- Shortens commissioning time by allowing single platform (without additional tools/software) for smart device configuration

S+ Engineering for Harmony

Modbus TCP device integration



- Built-in functionality of Harmony Gateway Software (HGS)
- Complete integration of Modbus 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 client, server or client/server concurrently

Product life cycle status

Operator consoles

Active Classic Limited Obsolete	Class: Operator consoles	Product Family	Remarks
		S+ Operations	S+ Operations is the HMI for Symphony Plus and is in the "Active" phase of its product life cycle. The current version is S+ Operations 2.0
		800xA Process Portal	800xA Process Portal is in the "Active" phase of its product life cycle (version 6.0).
		Power Generation Portal (PGP)	PGP (version 4.1) moved to "Classic" in January 2014. Recommend evolution to S+ Operations which re-uses native PGP HMI operator graphics, tags, and symbols.
		LAN90 PCView	Recommend evolution to S+ Operations HMI. S+ Operations SODG translation features allows direct –re-use of LAN90 PCView operator graphics, tags, and symbols.
		Process Portal	Process Portal B(version 2.0) moved to "Limited" in January 2014. Recommend evolution to S+ Operations or 800xA Process Portal. Standard conversion process allows for re-use of existing PPB SLGMS based operator graphics, tags, and symbols.
		Conductor NT	Conductor NT (version 6.0) moved to "Limited" in January 2014. Recommend evolution to S+ Operations or 800xA Process Portal. Standard conversion process allows for re-use of existing CNT SLGMS based graphics, tags, and symbols.
		OIS40 Series (includes CVMS software)	Recommend evolution to S+ Operations or 800xA HMI.
		OIS20 (includes OIS20 & OIS25) & MCS Series	Recommend evolution to S+ Operations HMI. S+ Operations SODG translation feature allows for direct –re-use of OIS 20 / MCS operator graphics, tags, and symbols.

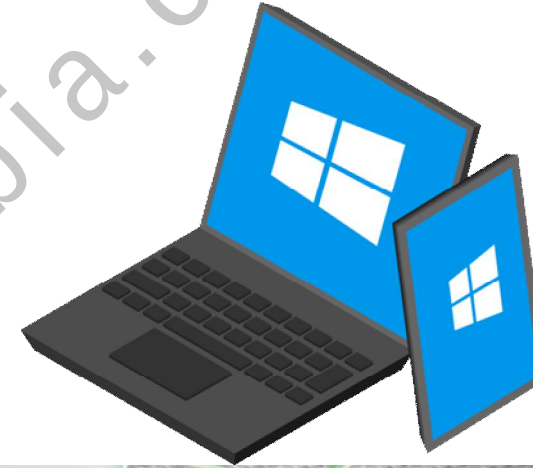
February 27, 2017

800xA 6.0 for Symphony Plus Harmony connect

What is New for 800xA Symphony Plus Harmony?

Support new Operating System

- Windows 8
- Windows 2012 server
- Support Virtualization



The Power of Integration

- Flexible System Architectures
- Improving operator effectiveness
- Easier to setup and maintenance
- EOW support



800xA for Symphony Plus Harmony

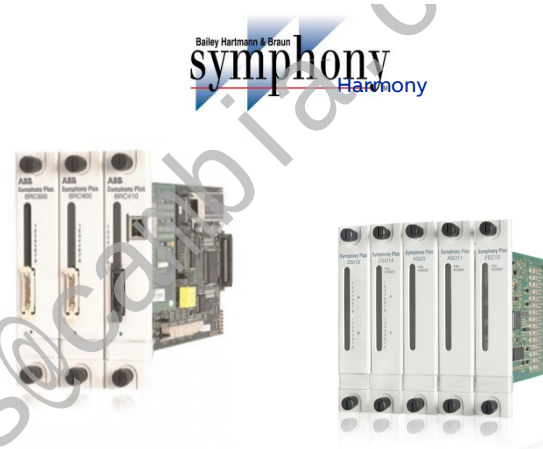


Full support for all Harmony and Symphony Plus hardware

- Connectivity Server streamlined
 - SQL removed!

Composer Database imported directly into Aspect Directory

**Easier to configure
and maintain!**



Symphony Plus



Future Software Releases

S+ Operations S+ Operation 2.1 • Windows 10 • Windows 2016 Server • Quality Improvements S+ Operations 3.1 • Smart Configurator (post setup wizard) • Pocket Portal • Panel HMI • Virtual PNI support • Cyber Security Improvements	S+ Engineering S+ Engineering 1.4 • Windows 10 • Windows 2016 Server • Quality Improvements S+ Engineering 2.1 • New Database • Ethernet I/P intergration • Updates for Configurable Function Codes • Updates to Soft Controller • Quality Improvements
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email: sales@cambia.a.c

ABB