

HC900 Hybrid Controller

EASIER BY DESIGN

HC900 Redundancy Overview



Secure

**Redundant CPUs
Redundant Networks
Redundant Power**

Cost Effective

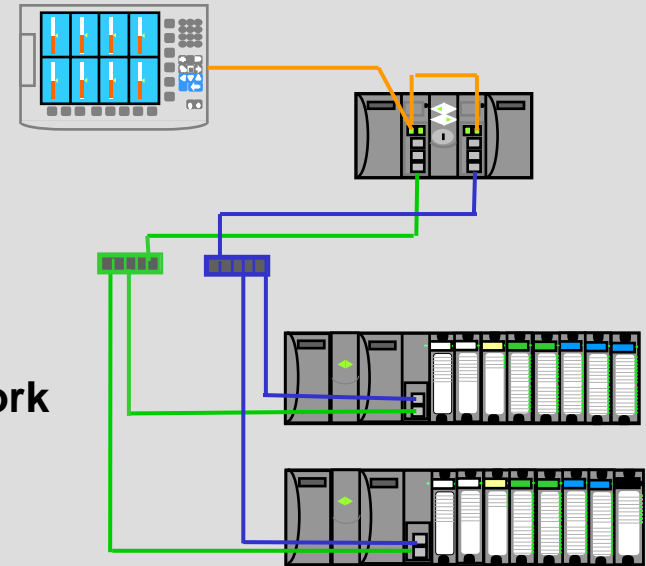
Operational systems under \$16K

Easy to Use

**Automatic Reserve CPU setup
No special configuration
Existing file conversion**

HC900 Redundancy

- Provides “no single point of failure” for:
 - Controller CPU
 - Controller Power Supply
 - Controller communications to a dual Plant Network
 - Controller communications to its I/O
 - I/O Power supply (Optional)



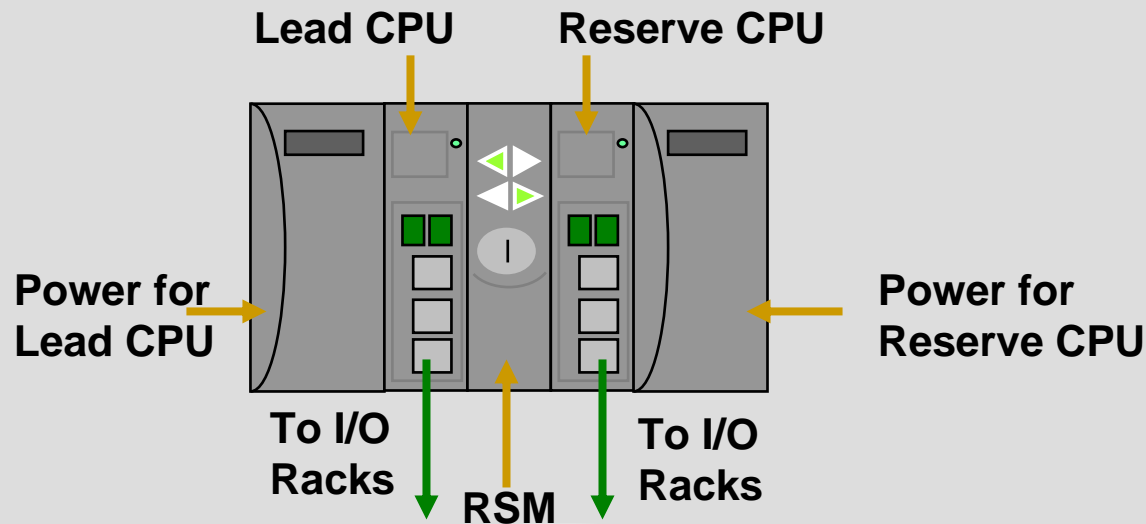
- Provides “bumpless transfer” between redundant controllers
- Maintains form / fit / function consistency with non-redundant HC900 Controllers
- Provides ease of configuration
- Offers a competitive price

HC900 Redundant Controller Rack

- Compact CPUs, single rack design
- Internal high speed CPU to CPU communications
- Two network Ports per CPU (Simplex or Redundant)
- Synchronized CPU operation
- 1042, 559 or 3rd party Operator Interface support
- Independent CPU Power
- Distinct Lead/Reserve controller status indication
- Secure key-lock mode access

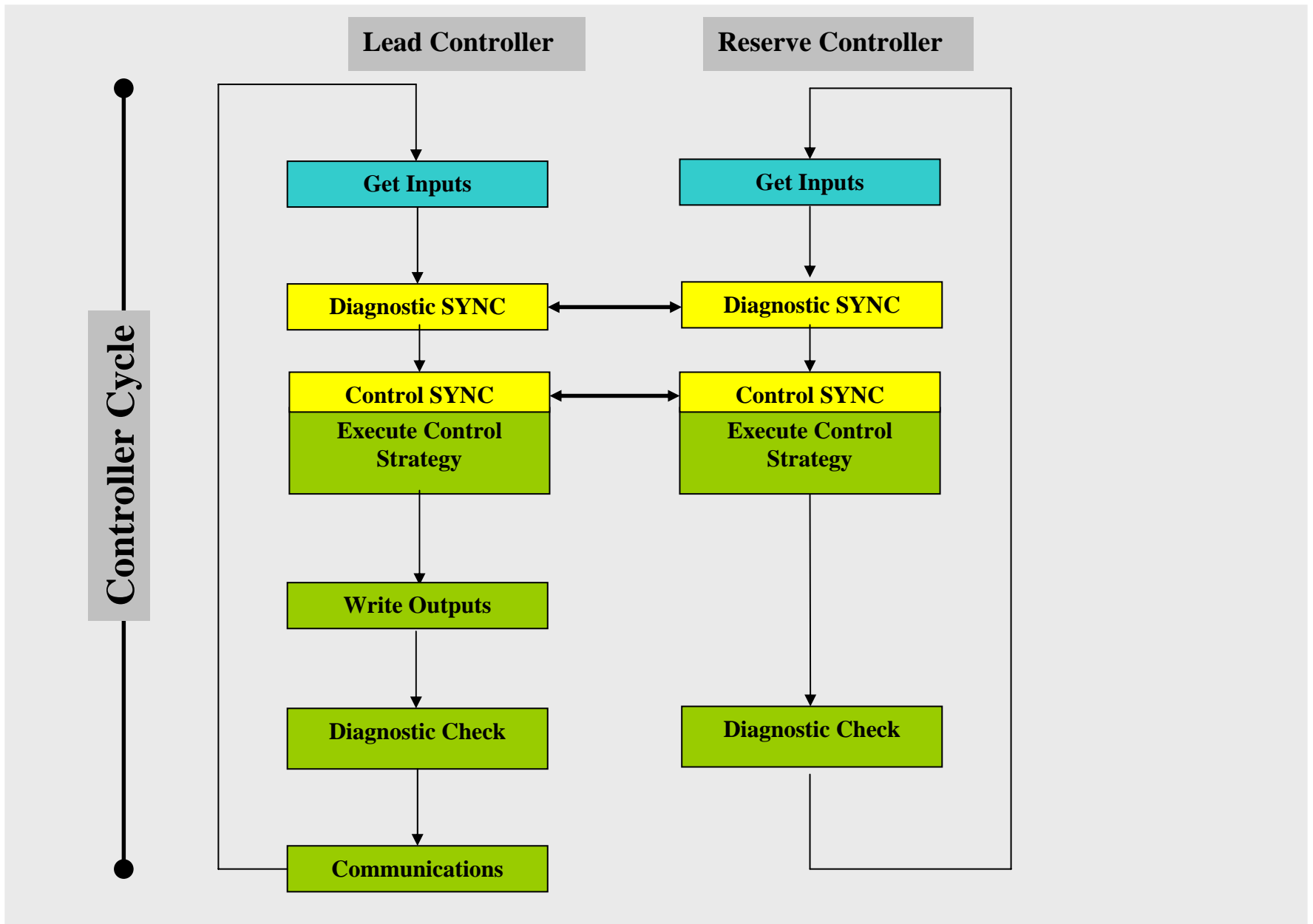


HC900 Redundant Controller Operation



- **All user and process interaction is with the Lead CPU.**
 - Either CPU can be the Lead
 - Both CPUs receive Inputs
 - Both CPUs execute function blocks
 - Lead CPU writes outputs
- **All communication is with the Lead CPU**
- **Lead CPU detects a Reserve CPU and automatically configures the Reserve**
- **Redundant Switch Module (RSM) identifies the Lead and Reserve CPUs**
- **RSM supports manual Fail-over of the Lead CPU**
- **Function Block execution resumes on start of next scan following a fail-over**

CPU Execution



HC900 Redundant Controller

▪ C70R Controller CPU

- Based on proven HC900 C50 CPU design
- Standard 10/100BaseT Ethernet Communications
- Peer to Peer Communications
- Network and Serial PC Configuration Access
- 2 Serial Ports (RS232 or RS485, switch selectable)
 - Modbus RTU Master or Slave Protocol
- 5000 Function Blocks
- Configuration backup in Flash Memory
- Dynamic data backup via Battery backed RAM



HC900 Redundant Controller



Redundancy Switch Module (RSM)

- Identifies Lead & Reserve CPUs
 - Secure key switch to set:
 - o RUN Mode (no program changes)
 - o RUN / PROGRAM Mode (on-line changes)
 - o PROGRAM Mode (outputs off)
 - o Force manual fail-over (momentary)
- RIUP** - Replace under power

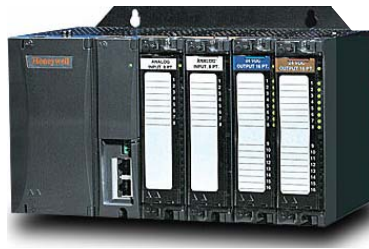
Power Supplies

- 28W
- Same as I/O Rack Power



I/O Racks

- Remote mount up to 300M from CPUs
- 3 sizes, 4, 8 and 12 I/O Modules
- Up to 5 Remote Racks per CPU
 - 2 or more racks require Industrial (Ethernet) Hub
- Up to 960 total I/O, 256 analog Inputs



- Dual-Ported Scanner Module
- Optional Redundant I/O Power
 - 8 & 12 Slot Racks
- Power Status Module

- One Scanner2 Module per I/O Rack
- Two ports – one for each C70R CPU
- Maintains communications with Lead and Reserve C70R CPU's to facilitate fail-over
- Reads inputs from modules & writes outputs to modules in rack



Status LED Indicator

Connection to C70R-A (I/O A)

Connection to C70R-B (I/O B)



Redundant I/O Power

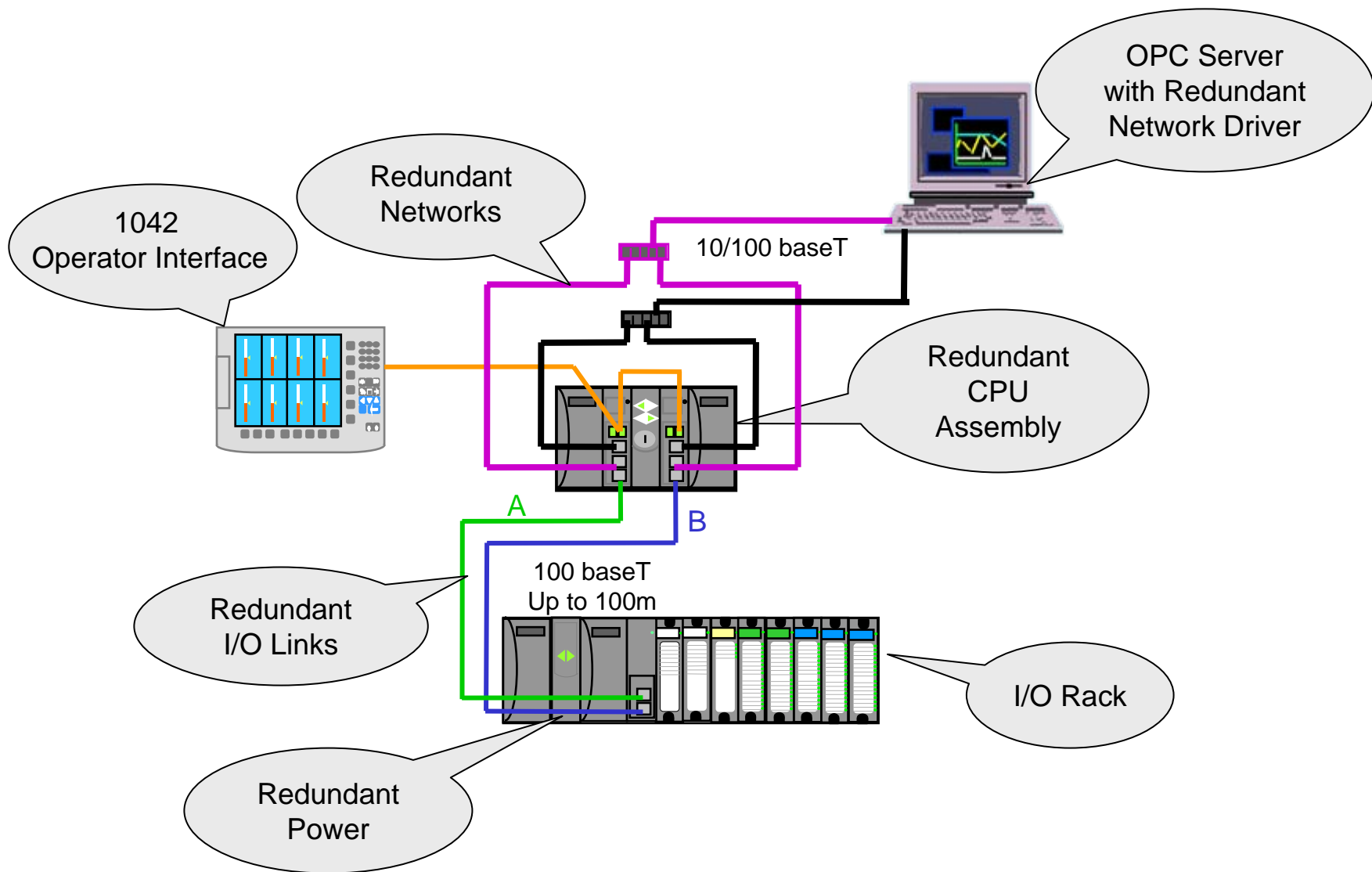
- Provides backup power for Racks with I/O
- Maintains power to the rack if the Primary Power Supply fails
- May be used with Redundant and Non-redundant systems
- Supports P01 (60W) and P02 (28W) Power Supplies
- Available for 8-Slot and 12-Slot I/O Racks



- Power Status Module (PSM) provides status of power supplies
- Uses an extended rack to hold a 2nd (Reserve) Power Supply and Power Status Module.
- Either Power Supply may be replaced while maintaining power to the rack
- Also available as an field installation kit

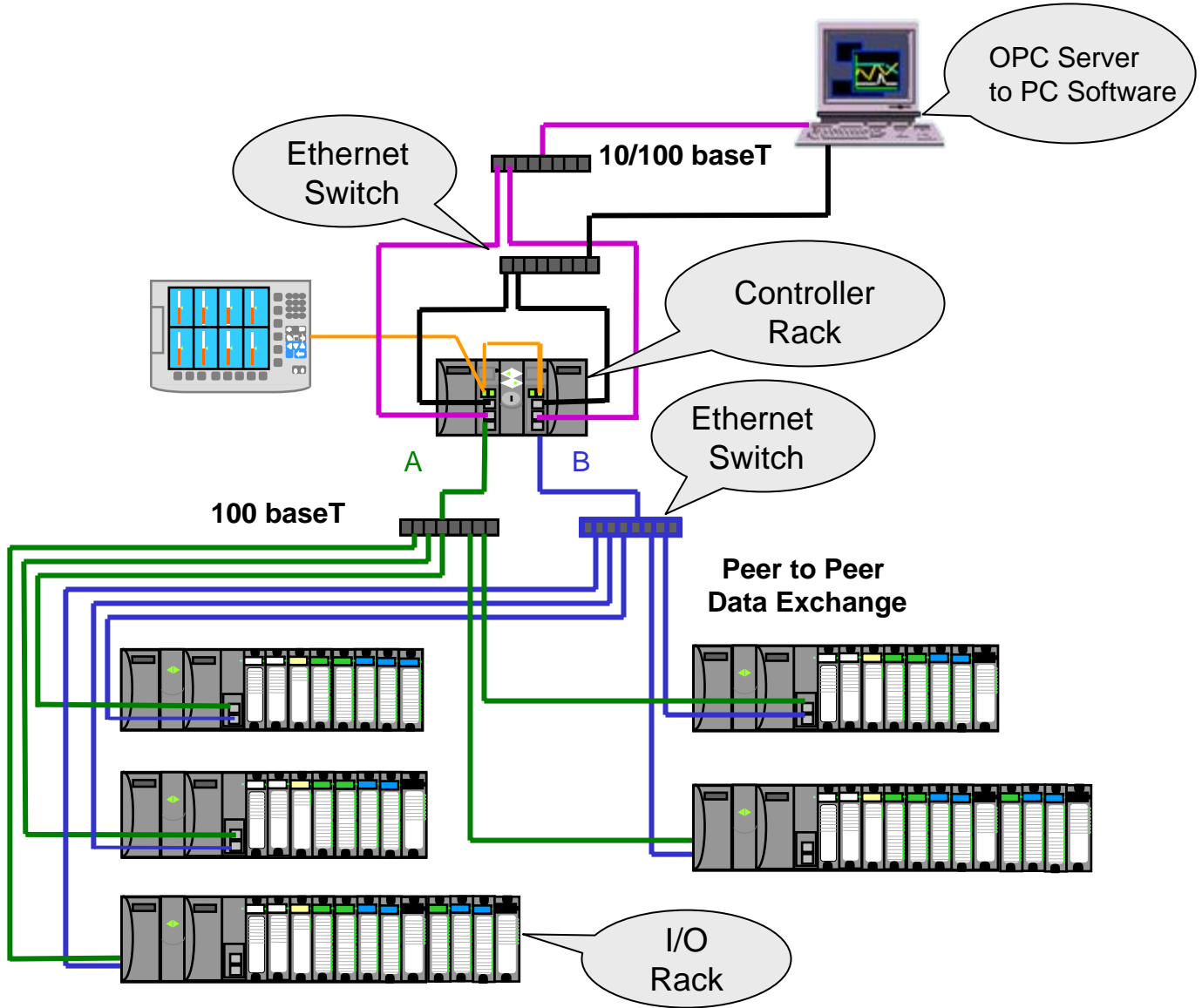
Small Redundant System

Redundant HC900 Controller with One I/O Rack



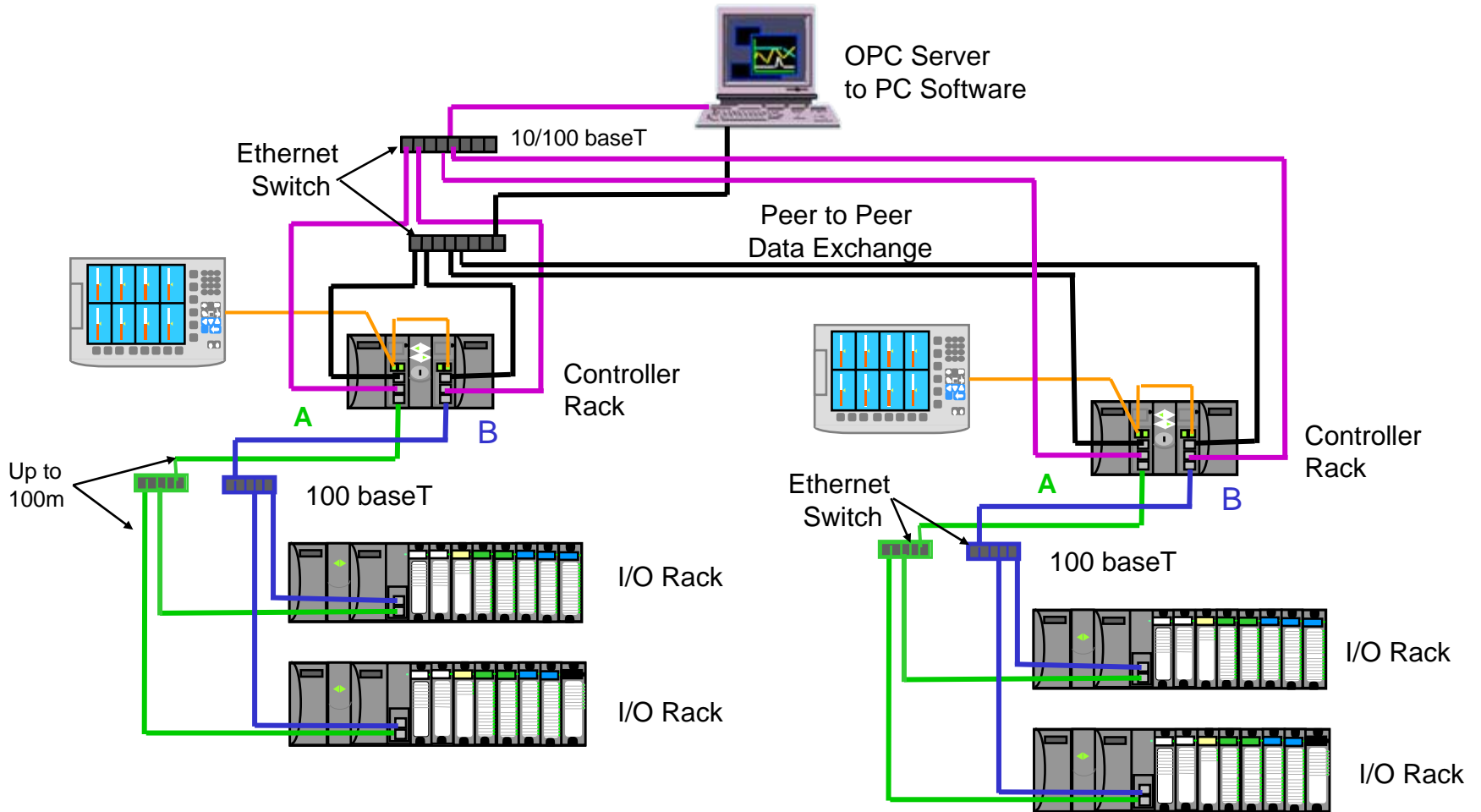
Large Redundant System

Redundant HC900 Controller with Five I/O Racks



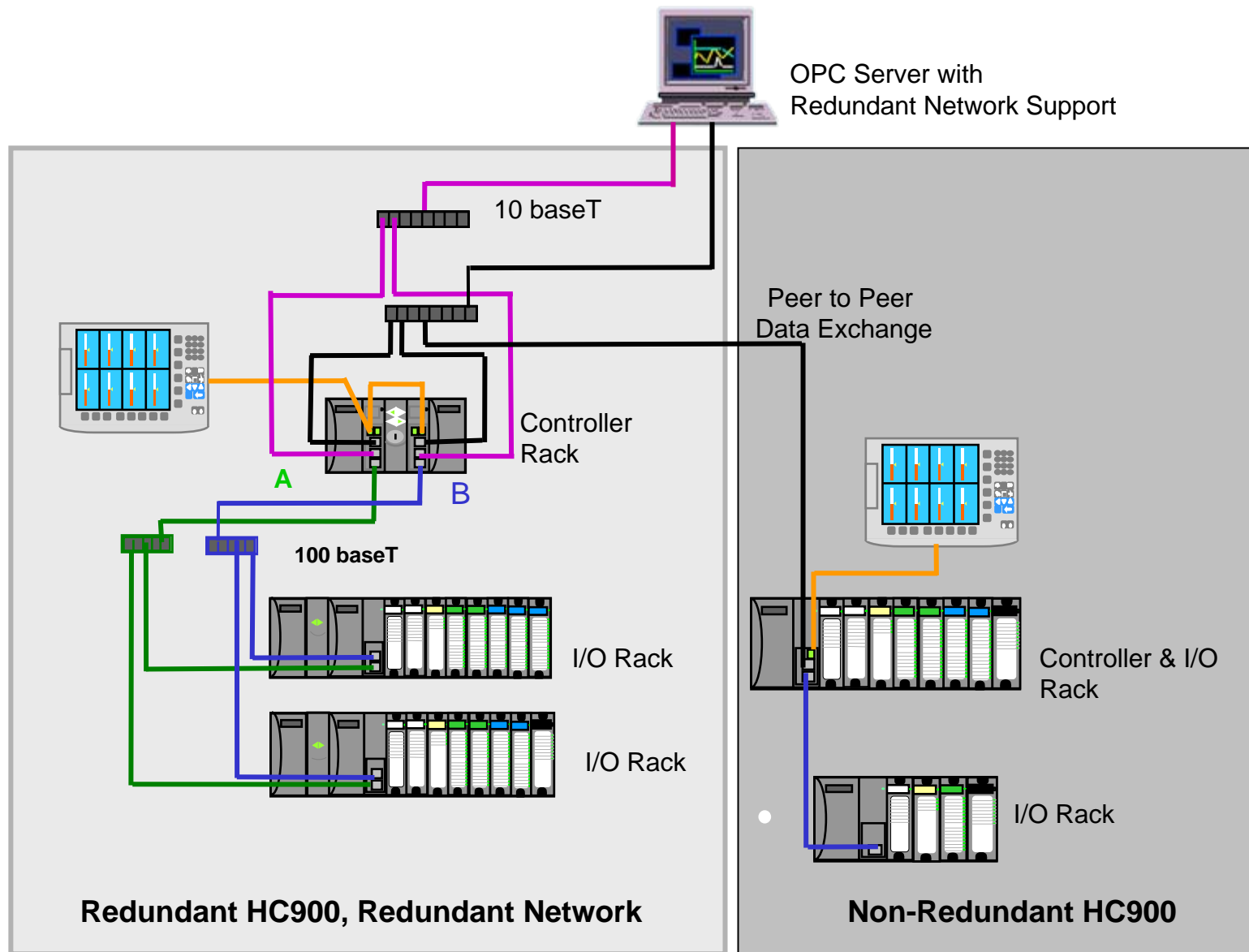
Expanded Architecture

Two redundant Systems with PC Supervision



Expanded Architecture

Network with Redundant & Non-redundant Controllers



Redundant Controller Operation

Lead Controller

- Controls Operation of Outputs
- Accepts Configuration and Edits Programs and Updates Reserve
- Communicates with Host
- Communicates to Local OI
- Accepts operator changes
- Checks status of Reserve
- Interchanges data with peers
- Interchanges data with Modbus Slaves

Reserve Controller

- Accepts configuration from Lead
- Accepts operator changes from Lead
- Assumes Lead on Lead failure

Assigning Lead

- On power up, first ready assumes lead
- On tie, CPU on left assumes lead.
- Manual fail-over



Redundant Configuration

- No special requirements
- Function block for Reserve status
- Use C50 or C30 configurations

Fail-over

- Outputs hold last position
- Detection & Fail-over in 4 scan cycles or less
- Functions resume on next scan

Failure Recovery Procedure

- Power down failed CPU
- Replace Module
- Power up new CPU
- New Reserve configured by Lead
(Backup restored)

- **Cost Effective**

 - Backup of critical assemblies

 - C70R CPU

 - Network Communications

 - Power (CPU and I/O)

- **Easy to Implement**

 - No complex configurations

 - No Reserve Controller Configuration

 - Operator Interface auto transfer, Lead to Reserve

 - Peer to Peer Comm. Auto transfer, Lead to Reserve

- **Secure Operation**

 - Key lock for Mode changes

 - Configure only Lead controller – guaranteed synchronization

- **Performance to meet future needs**

 - Ethernet 100 baseT Communications

 - 5000 Controller function blocks

HC900 Hybrid Controller

Now with Redundancy

