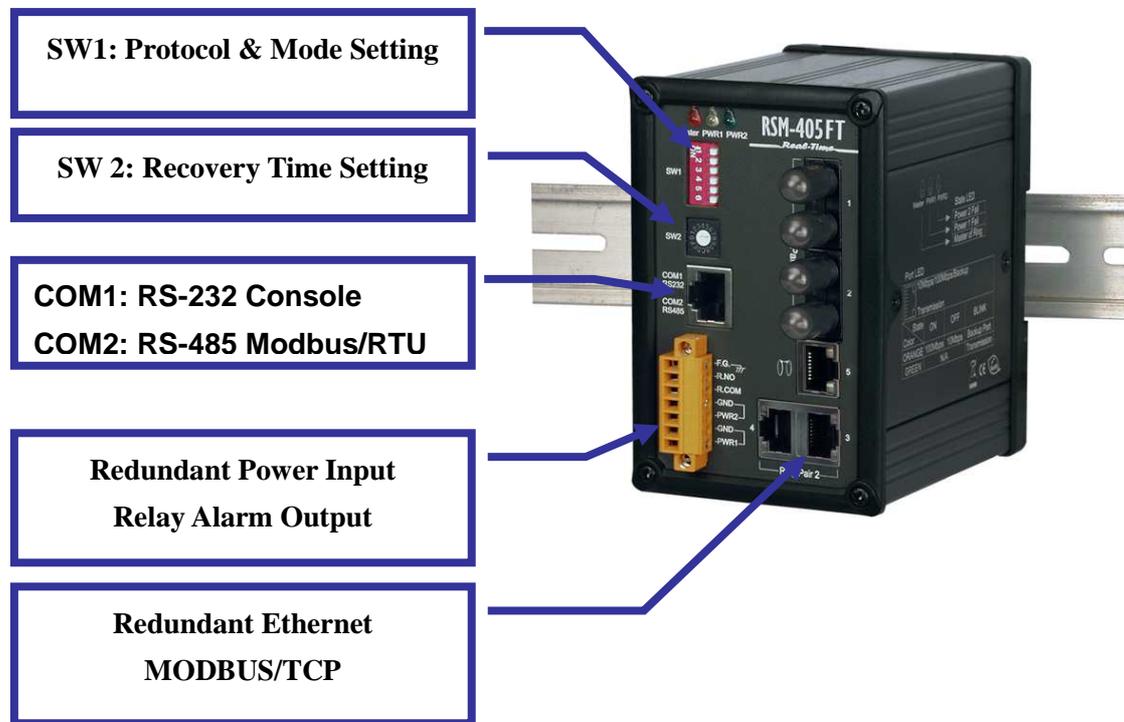


# *How to Setup a Self-healing Redundant Network in Three Steps*

It is undoubted that the power of an Ethernet is tremendous when applied to factory floor or industrial automation applications. However, you cannot just use commercial Ethernet switch there. Harsh environment will become a challenge to your switch, and, in many case, fault-tolerant network is also a must. To satisfy these, ICPDAS's Cyber-Ring technology provides you a rugged fault-tolerant, plug and play Ethernet solution.



The RS-405 series is a 5-port Industrial Ethernet Real-time Redundant Ring Switch. Built-in ICP DAS Cyber-Ring technique enables multiple switches to be placed into a redundant network. To establish a simple ring redundant network, only 2 jumpers on the front panel to set to form a ring. It does not depend on web configuration interface, neither a management server. This application note describes the step by step process to configure a simple ring redundant network with Cyber-Ring technology.

### Step 1: Enable 1<sup>st</sup> Ring Pair

A simple ring redundant network is a network topology in which each device connects to exactly two other devices, the ring switch operates from specifically ring pair with two defined port that have Cyber-Ring technology Ethernet devices attached.

There is dual Ring Pair supported in RS-405 and this application note shows how to configure a simple ring redundant network with 1<sup>st</sup> ring pair. Identify DIP switch 6 of SW1 is set to “ON” and other is set to “OFF” position to enable 1<sup>st</sup> ring pair of RS-405. Then identify Rotary Switch SW2 is correctly set to 3 to select recovery time 300ms.

#### **DIP/Rotary Switches**

**SW1: Redundancy mode configuration**



	OFF	ON
1	Redundancy Mode	Tradition Mode
2	Normal State	Default Setting
3	Primary Switch	Secondary Switch
4	Ring Protocol	STP Protocol
5	Disable Ring Pair2	Enable Ring Pair2
6	Disable Ring Pair1	Enable Ring Pair1

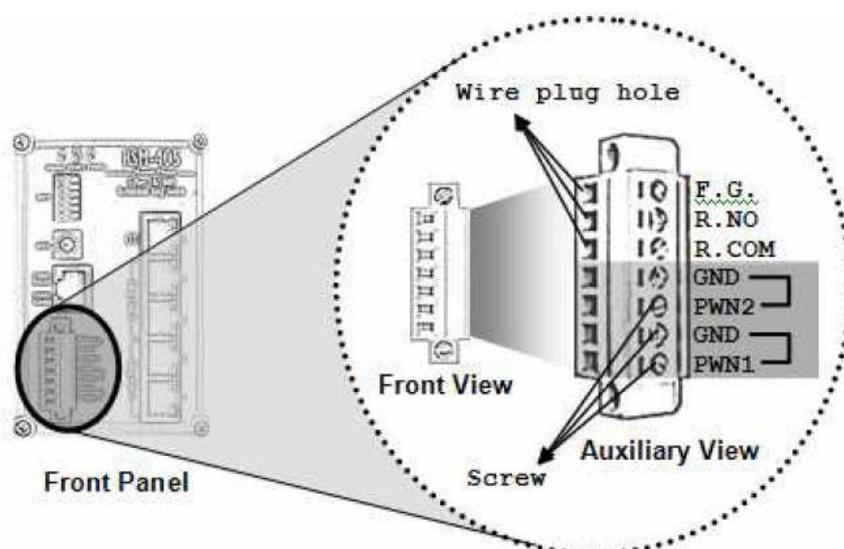
**SW2: Max. Recovery time selection**



State	Time	State	Time	State	Time
F	1.5 s	9	900 ms	3	300 ms
E	1.4 s	8	800 ms	2	200 ms
D	1.3 s	7	700 ms	1	100 ms
C	1.2 s	6	600 ms	0	N/A
B	1.1 s	5	500 ms		
A	1.0 s	4	400 ms		

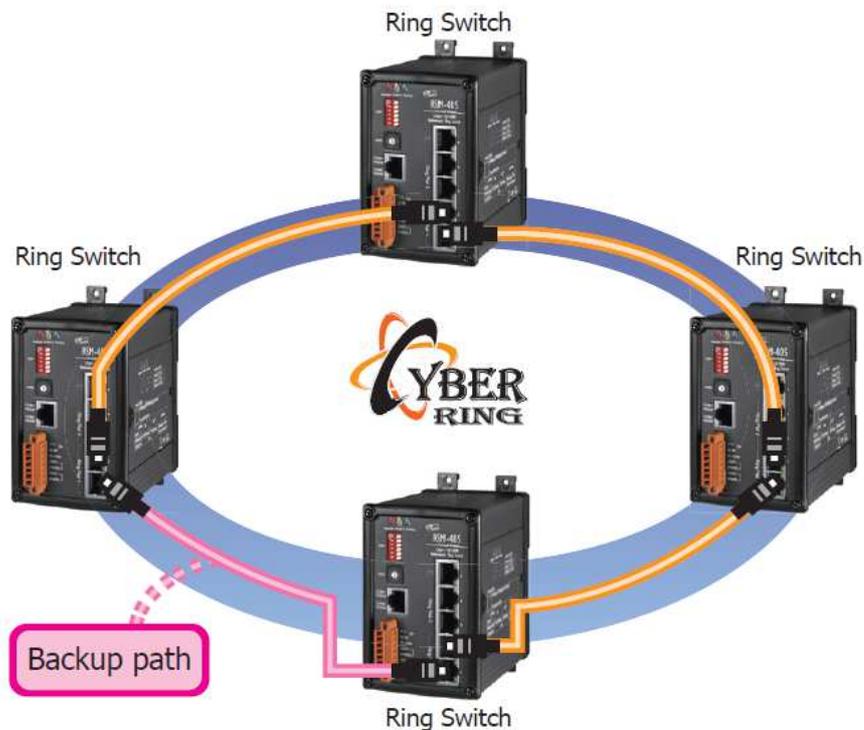
### Step 2: Connecting Input Power

The redundant power input provides two power inputs that can be connected simultaneously to live DC power sources. If one of the power inputs fails, the other live source will act as a backup to automatically support the device's power needs. And the relay output facility can deliver warning signal while power or network link failure.



### Step 3: Wire Ethernet Cables for Redundant Ring Network

In the simple ring redundant network, all the Ethernet ports of 1<sup>st</sup> ring pair are connected to each-other in such a way that they make a closed loop, every switch or network node has two adjacent neighbors for communication purposes.



In normal operation, traffic on the backup path is either blocked or ignored. If any network node or cable segment of active path is failure, Cyber-Ring will redirect traffics to the backup path automatically. After repair of the failed path, the network is again reconfigured to normal operation status.

The ICP DAS's proprietary Cyber-Ring self-healing Ethernet technology can establishes industrial Ethernet with high reliability and fault-tolerant capability. It can employ a redundant network of either copper or fiber optic cable. While standard STP typically requires 20s to 30s to reconfiguration network structure following a link failure, Cyber-Ring technology reduces this downtime to within half a second.