

# Application Note

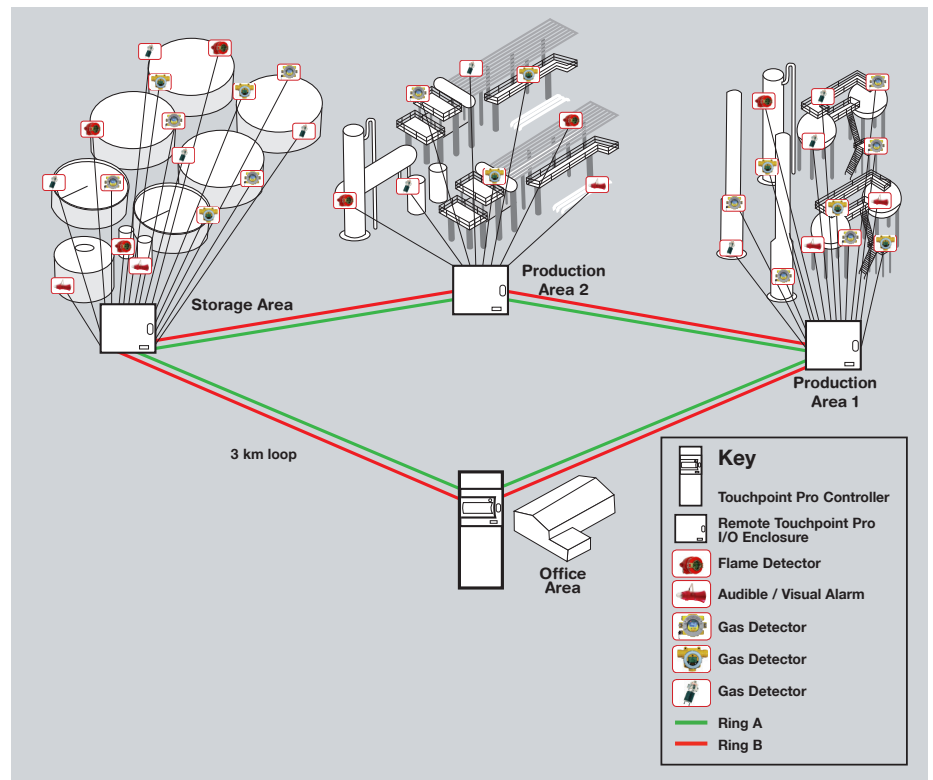
## Touchpoint Pro - Ring Network



### Unique design self-heals with enhanced diagnostics and delivers a reduced cost of ownership



The Touchpoint Pro Ring Network is the communication link between Input and Output (I/O) Modules in a Touchpoint Pro System and the Control Module which is part of the Touchpoint Pro Controller. The Ring Network is the only communication link between a Touchpoint Pro Controller and the I/O Modules (which form part of the Touchpoint Pro units).



### Redundancy

The Ring Network implementation uses two rings, A and B, running simultaneously in opposite directions. Ring A runs clockwise whilst Ring B runs anti-clockwise. This adds redundancy to the Ring Network and provides high availability and the ability to self-heal.

On the Ring Network, each I/O Module is physically only connected to its adjacent I/O Modules. This means that the Ring Network consists of peer-to-peer connections. If disturbances or cable breaks occur, only the peer-to-peer connections will be affected - not the complete network system. In summary:

### How self-healing is achieved

In an Touchpoint Pro system each Module only communicates with the one next to it. If a Module fails, the Module after it continues to transmit data in the direction moving away from the failed Module. The Module located before the failed Module continues to transmit data in the direction moving away from the failed Module, thus closing the communication loop.

- If an I/O Module fails, its adjacent I/O Modules detect this failure and automatically close the communication loop.
- Even if Ring Network cable is broken at one location or if a short occurs at one location, communication is still available.

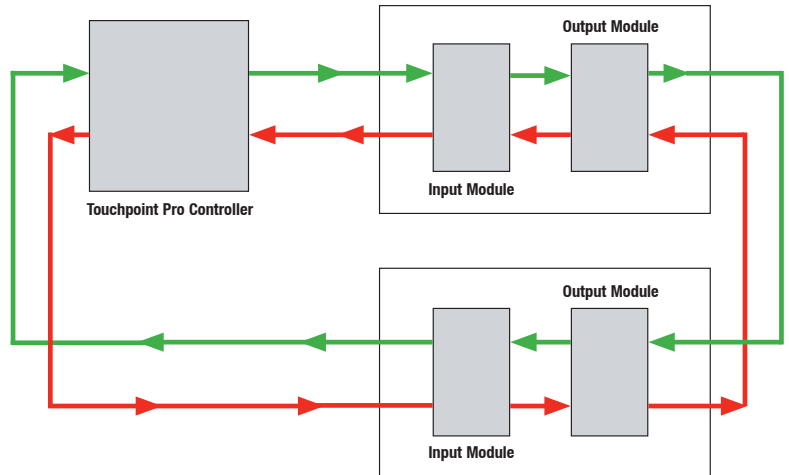
The picture overleaf shows the self-healing process of a peer-to-peer connection.

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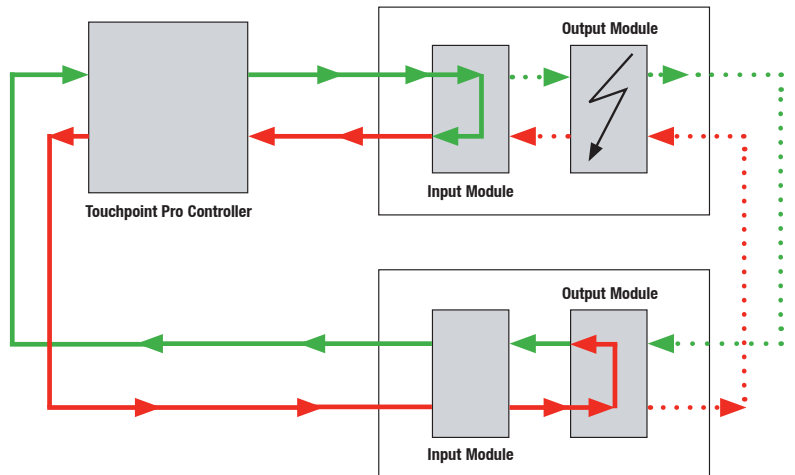
## Independent Safety Instrumented System Touchpoint Pro Ring Network continued...



Ring Network working in normal condition



Self-healing Ring Network with a Module Failure



### Diagnostics

The Touchpoint Pro system can immediately detect and locate a failed Module. Each Module can monitor the two communication ways and detect the communication errors. This ensures high level of diagnostic information. Each message on the ring network includes a checksum and a message counter, which ensures a high level of error detection. The Touchpoint Pro Controller flags ring interruptions as fault events, which identify the location of the interruption on the Ring Network.

This allows the user to easily find the physical location of the ring interruption on the system, be it a faulty module or a broken connection.

### Reduced costs

Each Touchpoint Pro system can contain up to 48 I/O Modules which can be part of multiple remote Touchpoint Pro units.

Remote I/O Modules can be located up to 1 km (cable length) from the Touchpoint Pro Controller. The maximum cable length for the complete system is 3 km. There is no need for additional expensive network interfaces/transceivers, boosters or special wiring (e.g. fibre), which helps to reduce the installation and cabling costs.

### Innovation and value

Today, communication networks typically communicate via a shared bus, where all nodes are connected. This involves the risk that a failure of one node can affect the complete system (single point of failure); e.g. by causing a short on the communication bus or by using up the full communication bandwidth due to a configuration error or other fault.

Such issues cannot occur on the Touchpoint Pro Ring Network, since the ring consists of isolated peer-to-peer connections. Due to a strict Master-Slave principle, the network behavior and response time is deterministic and does not increase with the number of network nodes.

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