



**Leveraging the Anybus ProfiHub B5+R to reduce common network faults and build a robust, high-availability PROFIBUS DP network.**

## Changing the topology of a network to reduce risk, downtime, and fault-finding efforts

A large platinum mine in South Africa experienced a complete PROFIBUS network failure within one of its main Motor Control Centres (MCCs), and as a result Industrial Data Xchange (IDX) was contracted to conduct a site-wide network audit.

After creating post-audit reports illustrating recommended changes to address detected faults across various networks, IDX was further contracted to implement the recommendations resulting from the audit by re-segmenting the PROFIBUS DP networks within this MCC using multiple ProfiHub B5+R's from the Anybus Diagnostics portfolio.

IDX offered a turnkey solution, from initial diagnostics, hardware procurement, network segmentation, B5+R installations, pre-installation and post-installation network testing, and the drafting of high-level network diagrams to illustrate the updates and new topology.

## Unravelling the causes of network disruption

The client initially experienced a complete network failure in their MCC due to multiple instances of non-compliance to best standards and installation practices within the PROFIBUS DP systems. Even with the faults listed below, the PROFIBUS system was generally still able to continue operating due to the robustness of the PROFIBUS DP protocol. However, the system remained very unstable and sensitive, resulting in a very low Mean Time Before Failure (MTBF) which was problematic for consistent plant operation and network availability.

IDX was first contracted for an emergency callout to address the fault, stabilise the network, and restore operations. Thereafter, IDX was tasked with a comprehensive site-wide PROFIBUS DP audit to identify all faults and recommend corrective actions. During the audit, IDX uncovered hinderances to current and future fault-finding, and various faults and latent defects, that could cause future instability and network failure, such as:

- A large network in a line topology
- Devices assigned reserved addresses, such as 126
- EMI and electrical coupling
- No network drawings and difficulty tracing cables
- Duplicate addressing
- Over and under terminations

### At a glance

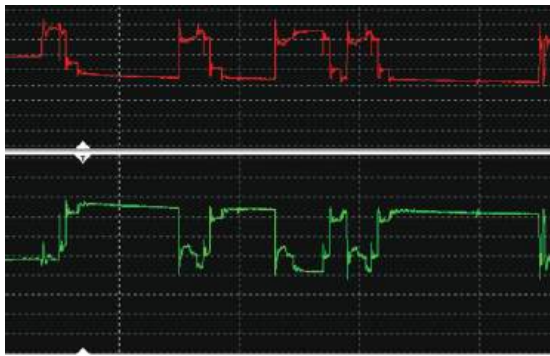
#### Benefits:

- Significantly reduce downtime
- Illuminate intermittent network faults
- Mitigate network failure
- Decrease overall cable length
- Futureproofing
- High availability

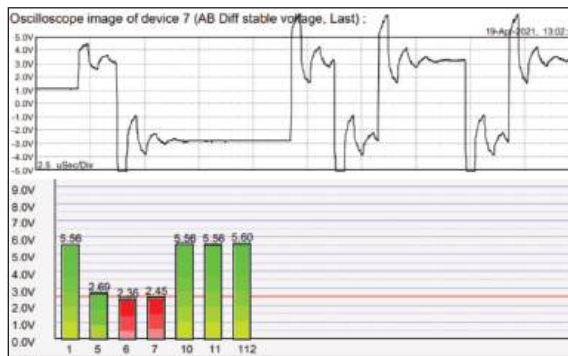
#### Features:

- Simplified fault finding
- Network stability
- Diagnostic LEDs
- Diagnostic capabilities
- Galvanically isolated segments

## Faults that were detected



Distorted waveform due to multiple devices with the same address



Over termination within PROFIBUS



PROFIBUS cable attached to high-voltage

## Installation of the Anybus Diagnostics ProfiHub B5+R within the MCC of the mine

IDX re-segmented the PROFIBUS DP networks using multiple ProfiHub B5+R multi-channel repeaters, each of which created five additional separate, galvanically isolated, channels or segments. This approach reduced EMI coupling from devices, minimised overall cable length per segment, reduced the number of devices present on each section, and enhanced network availability and reliability.

The ProfiHub B5+R also simplifies fault finding within the network with useful diagnostic LEDs which indicate a channel experiencing a fault. This functionality also reduces the complexity of extensive cable tracing and fault identification compared to the scenario where all devices are connected on a standard line topology system. This results in a reduction in the time it takes to identify where the fault is and to apply corrective action.

## Network re-segmentation with ProfiHub

During the re-segmentation, IDX rewired all of the PROFIBUS DP connectors replacing the old connectors that were faulty. Each cabinet and panel was labelled, and the wiring topology was redesigned to streamline device cabling and eliminate unnecessary or legacy cabling practices.

IDX also created simple network drawings, which were laminated and affixed on the outside of the network panels and cabinets. These drawings show the ProfiHub wiring topology, the locations of terminations within the network, and the allocation of devices to each ProfiHub channel.

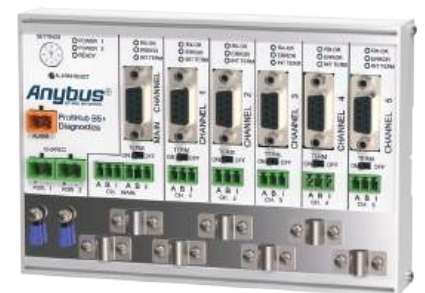
An additional benefit of the ProfiHub is that it enables the customer to easily generate reports of the entire network in one centralised place using a ProfiTrace or Mercury Troubleshooting tool. The ProfiHub features PG ports, allowing for the connection of testing devices. Once the installation was completed, IDX generated reports to demonstrate the network's stability compared to its previous design. As a result, the mine has since opted to re-segment the remainder of the PROFIBUS-DP networks at the plant, using the Anybus Diagnostics ProfiHub B5+R.

## Key take away

In conclusion, it is a best practice to ensure that your PROFIBUS DP networks have been audited by a professional PROFIBUS engineer, who can accurately determine any faults and risks within your networks, and how you can best correct these faults and improve network reliability. Implementation of corrective recommendations is essential if improved performance is to be realised.

It is also good practice to consider re-segmenting your networks from standard vulnerable line topology to star type topology by utilising ProfiHub multi-channel repeaters. This adjustment will give you the benefit and confidence of a stable and reliable network. It will also simplify fault detection and enable rapid restoration of the system when network faults are encountered. It also makes the addition of new devices possible without influencing network reliability.

The ProfiHub and professional PROFIBUS engineering services have so many benefits for your plant network availability that the cost is typically recovered within a very short time of more stable and predictable operation.



The Anybus ProfiHub B5+R