



# HIRSCHMANN

A **BELDEN** BRAND

## Application Note

**AN00008**

**Gigabit fiber backbone combines wired and wireless components into a complete network solution**

Belden fulfills customer needs with a broad product portfolio and full service package



### Project Overview

Operating with a high-level automation system, a Chinese coal preparation plant (washer facility) needed to implement a wireless solution for mobile management across the total facility. The plant produces up to 126.5 million tons of raw coal annually. The site incorporates a production workshop, a high and low voltage power distribution room and a storage bunker. There are more than 1500 pieces of primary production equipment plus almost 1300 pieces of auxiliary equipment and 1700 pieces of power distribution equipment. More than 600 employees work at the site.

### The Challenge

The project goal was to provide engineers the ability to remotely access and monitor the automation system in the factory, using a customized tablet computer loaded with the company's proprietary automation software. The engineers wanted the ability to check the motor, PLC, temperature sensor, vibration sensor, industrial meter, conveyor belt and other machine operations. Control Center operators wanted the ability to check in with the engineers as they moved through the facility. They also requested that the engineers be able to transmit photos or video footage from any plant location.

Environmental conditions also had to be considered in the solution design. Poor emission control, high vibration, high noise levels, and narrow spaces in equipment areas were critical factors. In addition, coal dust permeates the site, and combustible gas is used at several plant locations.

Per the project specifications, the wireless signal needed to provide coverage with no dropout zones, including both indoor and outdoor areas. Roaming time needed be less than 100 ms.

Finally, the total project covered design, installation and support in addition to the products. The mining plant was looking for a vendor that could support the total industrial network solution after the sale. The support plan had to include technical support and troubleshooting for all cables, switches, connectors and network management software.

**Be certain.  
Belden.**



In a northern province of China, a coal preparation plant needed to integrate mobile technology into its operations for better site management and troubleshooting.



Belden experts were onsite to lead the installation process.



Belden engineers conducted multiple rounds of onsite testing to ensure system performance,

The technical requirement included:

- Wireless coverage area signal level: -70dbm to -80dbm
- Signal Noise Rate: 15-20db
- Required bandwidth:  $\geq 2$ Mbps
- Ping packet delay: 64bytes, 1500bytes,  $\leq 50$ ms, packet loss  $\leq 1\%$
- AC+AP wireless network
- Wireless LAN products with ATEX Zone 2 approval
- Roaming time:  $\leq 100$ ms
- Danger area switch with explosion-proof housing to meet Chinese MA certification standards for mining equipment

### The Belden Solution

Belden engineers created an integrated wired and wireless network, using industrial layer 2 and layer 3 switches to build a Gigabit fiber backbone. This star topology design has a bandwidth of 1000 Mbps and connects all access points through Power over Ethernet (PoE). In areas with combustible gases BAT300-FX2 with ATEX Zone 2 approvals are installed. A Wireless LAN Controller (WLC) provides an easy and consistent deployment of the access points. The whole installation is monitored by the network management software Industrial HiVision.

### Product Details

The wireless network is equipped with Hirschmann industrial graded access points of the BAT300 family powered via Power over Ethernet. In areas where combustible gases are present the design engineers selected the BAT300-F X2 with ATEX Zone 2 approval. In the other locations the BAT300-F was deployed where IP67 protection was required or the BAT300-R with its IP40 protection class. All BAT300 support the latest technologies according to IEEE 802.11 a/b/g/n to achieve higher performance. The complete wireless installation includes the access points as well as the antenna cables, overvoltage protections and selected antennas for best coverage.

The access points are either connected to RS32 switches where DIN-Rail mounting is required or to 19-inch rack-mount MACH100 switches supporting PoE to power the access points. A central MACH1040 with layer 3 functionality connects the switched infrastructure with the control room. To facilitate the field commissioning and to maintain and supervise the installation the network management software Industrial HiVision is used.



Mounted BAT antennas facilitate the wireless communication across the site.

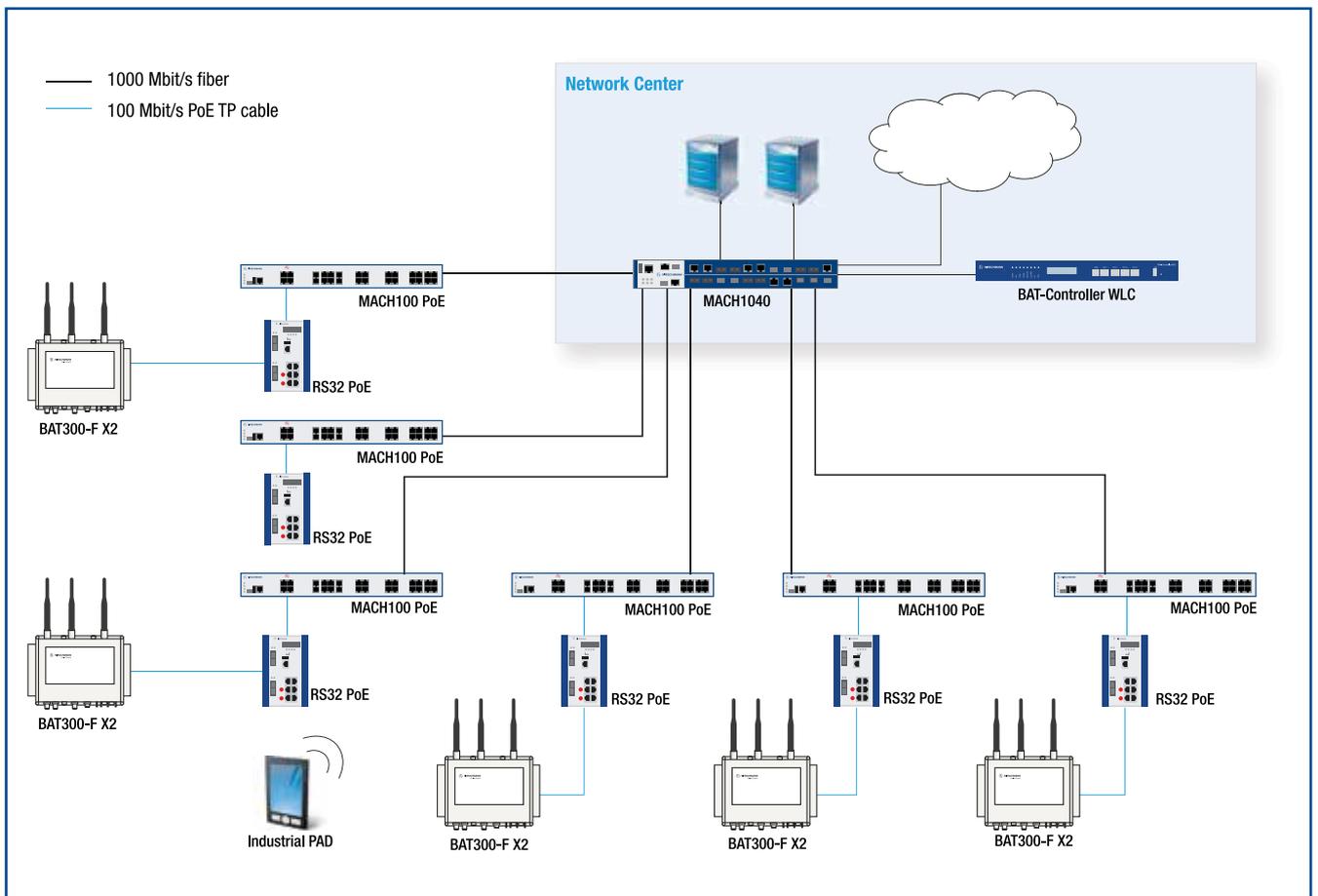


Industrial WLAN access points like this BAT300-F X2 are specially designed for hazardous environments and are approved for ATEX Zone 2 applications.

With its broad product portfolio, Belden was able to satisfy all the customer specifications. In addition, the Belden team provided the customized network design and coordinated with the local distributor and site engineer to create a full implementation plan. Belden ran preliminary tests in Germany and Suzhou, China then had personnel on hand to perform four onsite tests, while leading the installation process. Follow-up support continues to be available to ensure ongoing operations.

**Why Belden**

What this customer found at Belden was a complete team of professionals and quality products to meet their specialized needs. For every obstacle, Belden was able to work with the local team to identify possible solutions and select the best plan of action.

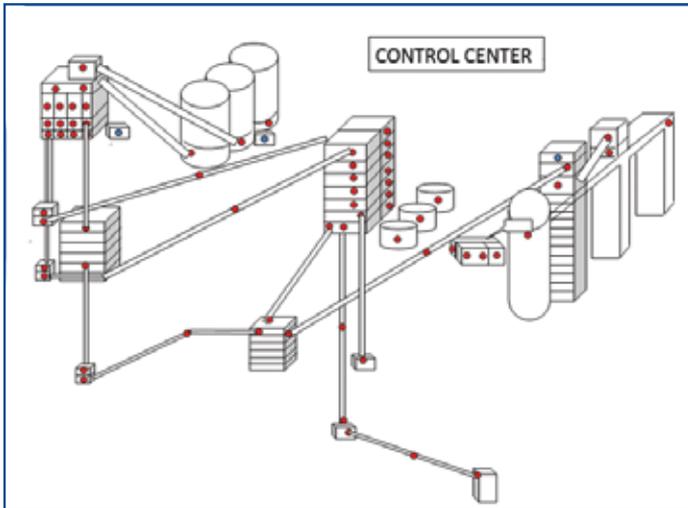


The finished application looks like this.

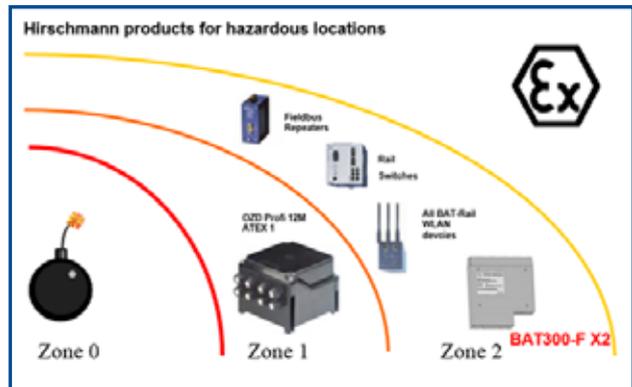


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Mapped Wireless Access Point positions



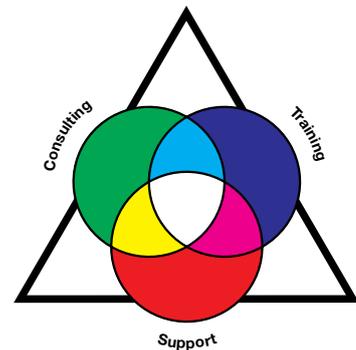
| Zone   | Description for areas with gas explosion hazard   |
|--------|---|
| Zone 0 | Area where a potentially explosive atmosphere is present permanently, over long periods of time or frequently.<br>Examples: Inside of containers and apparatus (e. g. vaporizers, vessels) if the conditions for the definition of Zone 0 are met.  |
| Zone 1 | Area where a potentially explosive atmosphere may occur occasionally during normal operation.<br>Examples: Immediate vicinity of Zone 0, areas close to filling and emptying openings. Areas close to easily breakable apparatus or tubes made of glass, ceramic or similar material. Areas close to stop plugs that are not adequately sealed, e. g. at pumps or slide valves. |
| Zone 2 | Area where a potentially explosive atmosphere does not occur or only briefly.<br>Examples: Areas surrounding Zone 1 or Zone 0.  |



For the combustible gas areas, Belden supplied the switch inside this MA certified, explosion-proof housing to meet the customer's requirements.

## Belden Competence Center

As the complexity of communication and connectivity solutions has increased, so have the requirements for design, implementation and maintenance of these solutions. For users, acquiring and verifying the latest expert knowledge plays a decisive role in this. As a reliable partner for end-to-end solutions, Belden offers expert consulting, design, technical support, as well as technology and product training courses, from a single source: Belden Competence Center. In addition, we offer you the right qualification for every area of expertise through the world's first certification program for industrial networks. Up-to-date manufacturer's expertise, an international service network and access to external specialists guarantee you the best possible support for products. Irrespective of the technology you use, you can rely on our full support – from implementation to optimization of every aspect of daily operations.



### About Belden

Belden Inc., a global leader in high quality, end-to-end signal transmission solutions, delivers a comprehensive product portfolio designed to meet the mission-critical network infrastructure needs of industrial, enterprise and broadcast markets. With innovative solutions targeted at reliable and secure transmission of rapidly growing amounts of data, audio and video needed for today's applications, Belden is at the center of the global transformation to a connected world. Founded in 1902, the company is headquartered in St. Louis, USA, and has manufacturing capabilities in North and South America, Europe and Asia.

For more information, visit us at [www.beldensolutions.com](http://www.beldensolutions.com) and follow us on Twitter [@BeldenInc](https://twitter.com/BeldenInc).

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