**A modern approach to transit upgrades**

**Summary**
- As part of a track expansion project for a major metropolitan transit system, B&C Transit modernized the communications and signaling (C&S) system with microprocessors and other critical electronics.
- Products like VAL MS-AR surge protection and terminal blocks with Push-in Technology were key to reducing installation time and saving labor.
- The partnership between B&C Transit, ATSI, Steven Engineering, and Phoenix Contact resulted in safer, more cost-efficient technology.

**Customer profile**
B&C Transit Inc. has excelled in serving the public transit sector for over 25 years in automate train control design, technical engineering, system installations, field testing, networked and stand-alone control, office monitoring systems, station communications, and design-build engineering.

Advanced Transit Solutions, Inc. (ATSI) is the quality signal wiring shop on the West Coast. ATSI specializes in the manufacturing of railway transportation equipment & controls. The company uses state-of-the-art machinery to produce a very clean, custom product in less time with fewer employees, resulting in a lower overall cost.

B&C Transit and ATSI partnered with Steven Engineering, a Phoenix Contact channel partner, and Phoenix Contact’s IMA Transportation group to develop innovative end-user system design solutions that challenged traditional methods of in-track communications and signaling (C&S).

**Challenge: 1940s technology cannot support modern electronics**
"If it ain't broke, don't fix it" has long been the unofficial motto of the rail industry. Since the rail industry's inception, the industry has relied on electromechanical communications. As federal regulations require higher safety standards, however, these old technologies are becoming obsolete, setting the stage to change this traditional approach.

"It’s given us an opportunity to separate and differentiate ourselves by putting in something that’s modern and current and designed to work with the microprocessors that we are putting in today."

Jason Gomez, Vice President of Engineering at B&C Transit, Inc.

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**Figure 1:** Today’s rail transit industry requires sensitive electronics to operate sophisticated communications and signaling (C&S) systems.
“We’re talking about technology that you would see in the 1940s that people are still putting in place today,” said Jason Gomez, vice president of Engineering at B&C Transit, Inc.

A major transit agency began a project to add miles of new track and stations to its light rail system. The expansion required new C&S technologies along the route, so the transit agency contracted with B&C Transit to modernize the electronics in the C&S system.

B&C Transit deploys many projects for light rail, and communications are primarily based on Ethernet technology and serial links to connect different public address systems, SCADA systems, and traction/power systems.

Gomez explained, “Ethernet is helping to bring the signaling world into the 21st century. We get an opportunity to take old relay systems that are 30 years old and upgrade them to microprocessors and computers. We do that all over the country. So it’s a little bit of old-style solutions, that is relay logic, being put into new computer-style boxes.”

Protecting those sensitive electronics is critical to continuous operation. Since the 1940s, the railway industry has relied on the American Association of Railroad (AAR) ice-cube-style surge protectors. This method required a lot of wrenching to install or replace. With this old technology, if a lightning storm hit the area, there was no easy way to know if surges had triggered the SPDs so they were no longer working. The technicians had to visually inspect each module for smoke damage and rewire each replacement module, which was a time-consuming process.

Gomez stated, “The biggest problem that we had with it [the AAR solution] was that the assembly time is... pretty cumbersome. It’s a process of putting on nuts, putting on washers, putting on more nuts and then more nuts again, over and over again. One of the big reasons we wanted to switch to the VAL MS-AR or a different solution in general is to make our installations faster, and also to find something that is current and designed to work for microprocessors, not just because it had worked in the past. We wanted to find a better mousetrap, as it were.”

B&C partnered with ATSI to build and wire the required bunkers that would house these new systems. ATSI specializes in fast wiring and fabrication. Ken Basore, vice president of ATSI, said: “We are a wire fabrication shop, and the concept here is to use the latest and best processes possible to provide our customers the highest quality possible.”

**Solution: A modern approach**

B&C chose Phoenix Contact’s VAL MS-AR surge protective devices. The VAL-MS AR series protects the critical circuits defined in 49 CFR Part 236, and enables the monitoring requirements to extend to the surge protection for these circuits. Also, the series is AREMA C&S manual-compliant.

Installing the pluggable VAL MS-AR SPDs is easy. There is no wiring or bolting, and there is visual indication, so the technician knows for sure if the SPD has expired. If a module needs replacement, the VAL MS-AR has a hot-swappable design, so the technician just needs to plug in a new unit.

“The VAL MS-AR as a product is different than everything else out there... It’s given us an opportunity to separate and differentiate

![Figure 2: Unlike the AAR-style SPDs used since the 1940s, the VAL MS-AR SPDs have a visual indication, so technicians know when they need to be replaced. If replacement is necessary, it is easy, thanks to a pluggable, hot-swap design.](image1)

![Figure 3: Phoenix Contact's Push-in Technology – available in terminal blocks, connectors, power supplies, relays, and other products – reduces the team's wiring time significantly.](image2)

ourselves by putting in something that’s modern and current and designed to work with the microprocessors that we are putting in today,” said Gomez.

**Reducing time to market with Push-in Technology and fast wiring**

The team also specified Phoenix Contact Push-in Technology wherever possible: in terminal blocks, connectors, power supplies, and relays. Dorothy Barnett, field sales engineer at Steven Engineering, explained that the Push-in Technology saves time. “They don’t have to go back and torque and make sure every connection is tight.**
It's tight right from the beginning, and it saves tremendously on time to market. B&C makes more connection points than any other customer I deal with, so time is everything, and the Push-in Technology has been a really positive winner here.”

Barnett explained the time-sensitive nature of B&C’s typical projects. “Most of these projects that B&C works on, they're years in the making, and then when it comes down to actually getting the ‘go’ light to build them, there's very little time. And so being able to make sure that they meet deadlines, to be able to make sure that everything tests out accurately—when there are so many connection points, you want to make sure that everything is tight, torqued, and ready to go, and Push-in Technology has really helped us there.”

According to Gomez, Push-in Technology “has been absolutely revolutionary for our wireman.” While there are different use cases for push-in versus screw terminal versus spring clamp, the training has always been cumbersome, and the team had to work around the quality levels. “With the Push-in Technology, the feedback has been fantastic from our wireman. Our runover time has increased quite a bit.” He said when working with other connection technologies, “the biggest feedback we get from our wireman is, ‘Why can't this be push terminal too?’”

ATS1's flexibility also played a key role in meeting the tight deadlines. Basore said, “We're very, very quick at being able to wire any products, whether they be cases, houses, walk-in, and any other sort of equipment.”

**Results: Remote access pays off**

The final result will help the transportation industry transition to newer, cost-efficient C&S technologies that will extend far beyond this single project.

Figure 4: With a Phoenix Contact wireless radio installed in the machine, an operator can use a tablet or laptop to control the machine from any nearby location.

Figure 5: Thanks to the new technologies, rail systems will run more reliably and safely.

Barnett said that specifying these products has been all about “saving time, space, and money.”

Basore said his company wants “less footprint, higher-end product” so that ATSI can move customers away from older technologies and bring them into the future. He stated, “I believe the transit agencies will benefit greatly from Phoenix Contact product incorporated with ATSI expertise.”

Gomez concluded, “It's been kind of the culmination of what we've been working on the past five years since the first product was put in service… we had some successes, and we had some things that we're going to deploy, maybe on the next round, but I think overall, our design hasn't been better in our history.”