1553 Bus Defender

Protecting fielded warfighting systems using 1553 buses from both zero-day and known cyber threats

The challenge

Warfighting systems are built for longevity. Many of their embedded components, including the MIL-STD-1553 (1553) data bus, were designed long before the days of widespread, computer network hacking. The 1553 bus and the line-replaceable units (LRUs) on it are vulnerable to unimpeded adversary mission execution and attacks such as denial of service (DoS) and exfiltration of critical data. Depending on the scope and nature of the compromise, adversaries can cause neutralization or destruction of the warfighting system, mission failure and loss of life.

The solution

The Bus Defender™ device from Perspecta Labs provides protection to the warfighting system without requiring any modifications to LRUs – a key advantage over software-based approaches. Sophisticated security processing prevents a compromised LRU from performing malicious activities via the 1553 bus and stops both attacks against other LRUs and attacks that leverage other LRUs. Bus Defender primarily targets run-time attacks, but also prevents supply chain attacks by verifying LRU images when images are loaded via the 1553 bus.

Benefits of the Bus Defender solution:

- Requires no changes to existing warfighting system software or configurations
- Makes it very difficult for an attacker to disable security, unlike software-only solutions
- Supports multi-level security objectives to protect against untrusted LRUs
- Stops zero-day attacks as well as known vulnerabilities
- Prevents the loading of malicious operational programs onto the LRUs
- Meets stringent delay constraints for the MIL-STD-1553 protocol
- Can be configured to meet platform-specific architecture requirements

Deployment options

Bus Defender devices are deployed in-line on a 1553 bus to successfully detect and block attacks while ensuring proper bus transmission and operation. The devices can be deployed in a variety of bus configurations allowing the customer to make trade-offs between size, weight and power (SWaP), security and cost.
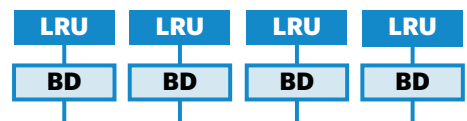
Centralized

LRU		LRU
	Bus Defender	
LRU		LRU
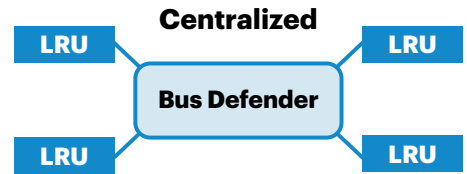
• Basic configuration – bus converted to star

Distributed – Partial Protection

LRU	LRU	LRU	LRU
BD		BD	

• Some LRUs unprotected. Decision to protect may be based on expense or risk.
• Encryption between BD's prevents sniffing by unprotected LRUs.

Distributed – Full Protection

LRU	LRU	LRU	LRU
BD	BD	BD	BD

• Bus Defender device in front of each LRU
• No need to convert bus topology to star

Bus Defender is proven technology

Bus Defender is a mature prototype that has been successfully tested in Department of Defense (DoD) system integration labs and proven to prevent diverse attacks launched by DoD testers. It is at Technology Readiness Level 6 (TRL-6) based on System Integration Laboratory (SIL) testing; validation with on-aircraft ground testing is planned for the near future.

About Perspecta Labs

At Perspecta Labs, we refuse to think inside the box. As the innovation hub of Perspecta, we are molding the future of emerging technologies. Our experts conduct leading research into cybersecurity, machine learning, artificial intelligence, mobile communications and internet of things technologies that provides customers with transformative insights and real-time situational intelligence. With our finger on the pulse of next-gen technology, you'll gain an essential edge.

Drawing on our Bell Labs and Applied Communication Sciences heritage, Perspecta Labs creates innovative technologies and services to solve the most difficult and complex information and communications challenges.