

Critical Infrastructure Solutions

Securing Digital Assets Against Cyber Threats





OWL
Cyber Defense

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The 16 Sectors of Critical Infrastructure

- Chemical
- Commercial Facilities
- Communications
- Critical Manufacturing
- Dams
- Defense Industrial Base
- Emergency Services
- Energy
- Financial Services
- Food and Agriculture
- Government Facilities
- Healthcare and Public Health
- Information Technology
- Nuclear Reactors, Materials, & Waste
- Transportation Systems
- Water and Wastewater Systems

Protecting Critical Infrastructure

Defined by the U.S. Department of Homeland Security (DHS), critical infrastructure is divided into 16 distinct sectors, including a wide array of industries that form the backbone of the economy; from energy and chemicals to transportation and agriculture. Critical infrastructure (CI) supports not only the global economy, but also our way of life. The fundamental need to fuel transportation, power homes and businesses, and provide safe drinking water is essential to a functional society.

As critical infrastructure systems have become more connected, they have provided operators with important operational data that enables performance and production improvements. Unfortunately, this connectivity has also exposed previously isolated equipment to cyberattack.

Cyberattacks against critical infrastructure providers can result in major disruptions to utilities and services, damage to equipment, or worse. Complicating matters is the fact that many systems within critical infrastructure organizations are dated and vulnerable, and limited downtime demands mean that patch windows are few and far between, if they come at all.

Unfortunately, software-based security, such as firewalls, often means heavy change management, (re)configuration, and its own significant downtime. Not to mention that firewalls themselves require regular patches and updates, ongoing configuration, and specialized support in order to remain at all effective.

Owl Cyber Defense provides proven, hardware-based network security, endorsed by the DHS for the protection of critical infrastructure from external cyber threats; and reliable one-way data transfers, without the need for heavy configuration, ongoing management, and patching.



**DEFENSE-
IN-DEPTH**

**HIGH
SECURITY**

**ENTRY-
LEVEL
PRICING**

**SEAMLESS
INSTALLATION**

INTEROPERABLE

Owl Comprehensive Cyber Defense Solutions



File Transfer

Reliably transfer files or data sets one-way across network/security boundaries. Owl solutions can transfer any file type of any size and can automatically replicate source directory structures on the destination network.



Real-Time Data Streaming

Transfer real-time data one-way, as packet streams. Owl solutions range from massive network-wide deployments transferring raw Ethernet packets at full line rate, to smaller tactical deployments with a single UDP video stream.



Historian & Database Replication

Replicate full or partial historian and relational databases across network domain boundaries. Owl enables insert/update/delete functionality and complete replication from source schema, with high availability and historical backfill capabilities.



Remote Monitoring

Enable real-time remote monitoring without remote access. Owl solutions securely transfer syslog, OPC, SNMP, SIEM, operations alarms & events, and HMIs to external end-users while keeping critical systems isolated and protected.



Process Control Interfaces

Securely transfer DCS and SCADA data to external/business networks without jeopardizing plant network security. Owl solutions have been tested and verified to support most major process control vendor systems.



Software Updates & Patching

Safely vet, import, and install software updates in isolated control networks. Owl solutions enable secure "low to high" data transfers with a full arsenal of filtering, antivirus, and file verification.

What is a Data Diode?

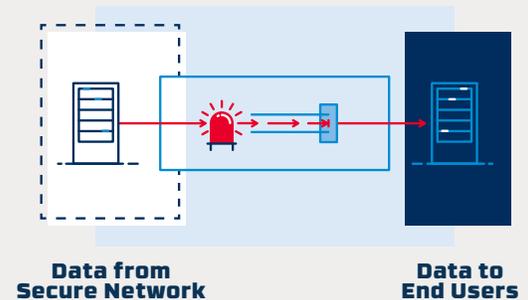
A data diode is a piece of hardware that physically enforces a one-way flow of data. As one-way data transfer systems, data diodes are used as cybersecurity tools to isolate and protect networks from external cyber threats, while still allowing isolated networks to share data with outside users and systems. It is perhaps simplest to think of data diodes as digital one-way valves for data, allowing data to flow out, without a way back in.

To learn more, download the free eBook, “The Definitive Guide to Data Diodes” at www.whatisadatadiode.com.

One-Way Data Valve



One-Way Data Diode Circuit



The Commercial Product Line

The Owl Commercial product line represents the gold standard in data diode cybersecurity, designed to support the varied and complex cybersecurity needs within the wide range of critical infrastructure industries. Acclaimed for their unmatched performance, reliability, and ease of use, Owl data diodes protect the operational networks and digital assets of some of the world’s largest critical infrastructure facilities, including power plants, banks, substations, laboratories, oil rigs, and more.

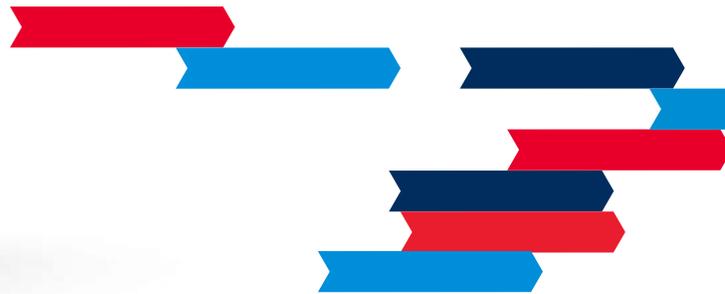
All Owl products support a wide range of data formats and transport layer protocols including: email (SMTP), FTP/SFTP, TCP and UDP (multicast/unicast/broadcast). The OPDS line also supports optional Owl software applications for standards-based interfaces (Modbus, OPC, SNMP, etc.) and industry-leading ICS vendor software (e.g. OSIsoft, GE, Schneider Electric, Rockwell Automation).





DiOTa

DiOTa is a single-purpose and compact data diode cybersecurity device designed to provide deep and scalable security for digital assets in the rapidly growing Industrial Internet of Things (IIoT).



OPDS-100D

Owl Perimeter Defense Solution-100D

Optimized to meet the needs of most industrial control applications, the OPDS-100D delivers scalable, deterministic one-way transfer capabilities from 10 Mbps up to 104 Mbps. Designed specifically for low size, weight, and power (SWaP) requirements, the compact form factor is DIN rail mountable and readily deployable in plants, substations, and other CI facilities.



OPDS-100

Owl Perimeter Defense Solution - 100

Owl's standard, all in one, 1U rack-mountable DualDiode cybersecurity platform, designed to address critical infrastructure applications

requiring low to moderate data throughput. The OPDS-100 delivers scalable performance from a base of 10 Mbps up to 104 Mbps, easily upgradeable through Owl's variable bandwidth licensing mechanism.



OPDS-1000

Owl Perimeter Defense Solution - 1000

A highly integrated, all in one, 1U rack-mountable cybersecurity platform. The OPDS-1000 represents the pinnacle of single-

box data diode solutions and supports the high-speed one-way transfer of multiple data types/formats concurrently. Optimized for more demanding applications, it delivers a scalable link rate from 104 Mbps up to 1 Gbps with variable bandwidth licensing.



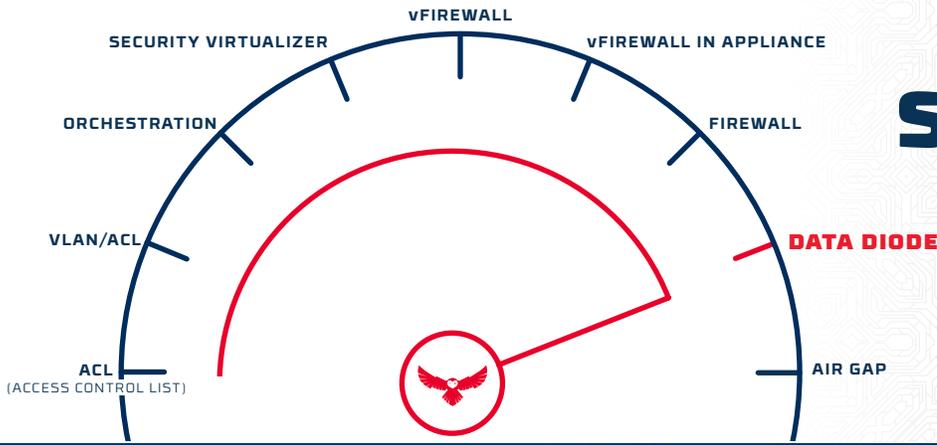
EPDS

Enterprise Perimeter Defense Solution

EPDS maintains process control network isolation while enabling critical information sharing with networks outside the electronic security perimeter.



**Owl Uses a Pair of Dell PowerEdge R620 Servers or Equivalent*



Spectrum of Security

Product Comparison Chart

	COMPACT / DIN RAIL	DIN RAIL	RACK-MOUNTED		
	DiOTa	OPDS-100D	OPDS-100	OPDS-1000	EPDS
FUNCTIONALITY	Single Purpose	Multi-Purpose	Multi-Purpose	Multi-Purpose	Multi-Purpose
MAX THROUGHPUT	5 Mbps	104 Mbps	104 Mbps	1000 Mbps	10 Gbps
FORM FACTOR	Compact/DIN Rail	DIN Rail	1U Rack Mount	1U Rack Mount	2U Rack Mount
BASE PROTOCOL SUPPORT	One of: UDP, TCP/IP, SNMP	UDP, TCP/IP, SNMP, SMTP, FTP			
SOFTWARE MODULE COMPATIBILITY					
OSISOFT PI SYSTEM TRANSFER OPTS			•	•	•
OPC TRANSFER OSTS		•	•	•	•
MODBUS TRANSFER MBTS		•	•	•	•
SCREEN REPLICATION OV2S		•	•	•	•
SQL DATABASE TRANSFER SDTS			•	•	•
REMOTE FILE TRANSFER RFTS	•	•	•	•	•
LOG FILE TRANSFER OLFS		•	•	•	•
OWL PERFORMANCE MANAGEMENT OPMS		•	•	•	•

One Device. Two Way. Zero Risk.



ReCon

Secure Bi-Directional Network Communication

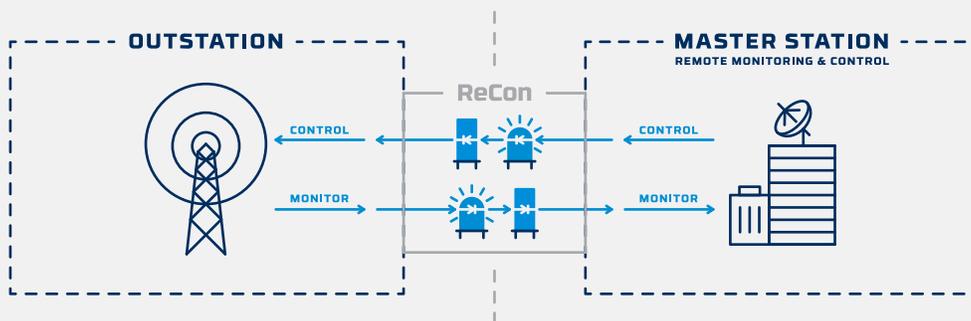
Digital transformation creates both opportunity and risk for today’s data-driven organizations. They are challenged with navigating the convergence of OT and IT systems, the emergence of the IoT and IIoT, and limiting or reducing the attack surfaces of their networks. As the evolution of this digital transformation unfolds and more networks and devices are connected, security concerns will only continue to grow. To address this pressing need for security, hardware-enforced data diodes have been proven time and again to protect the OT.

The ReCon solution was designed to combine the same proven security benefits of a hardware-enforced data diode cybersecurity solution with the ability to provide secure round trip, bidirectional communication. ReCon enables organizations to maintain secure two-way connections between networks, while reducing their attack surface with much higher security assurance than traditional firewalls.

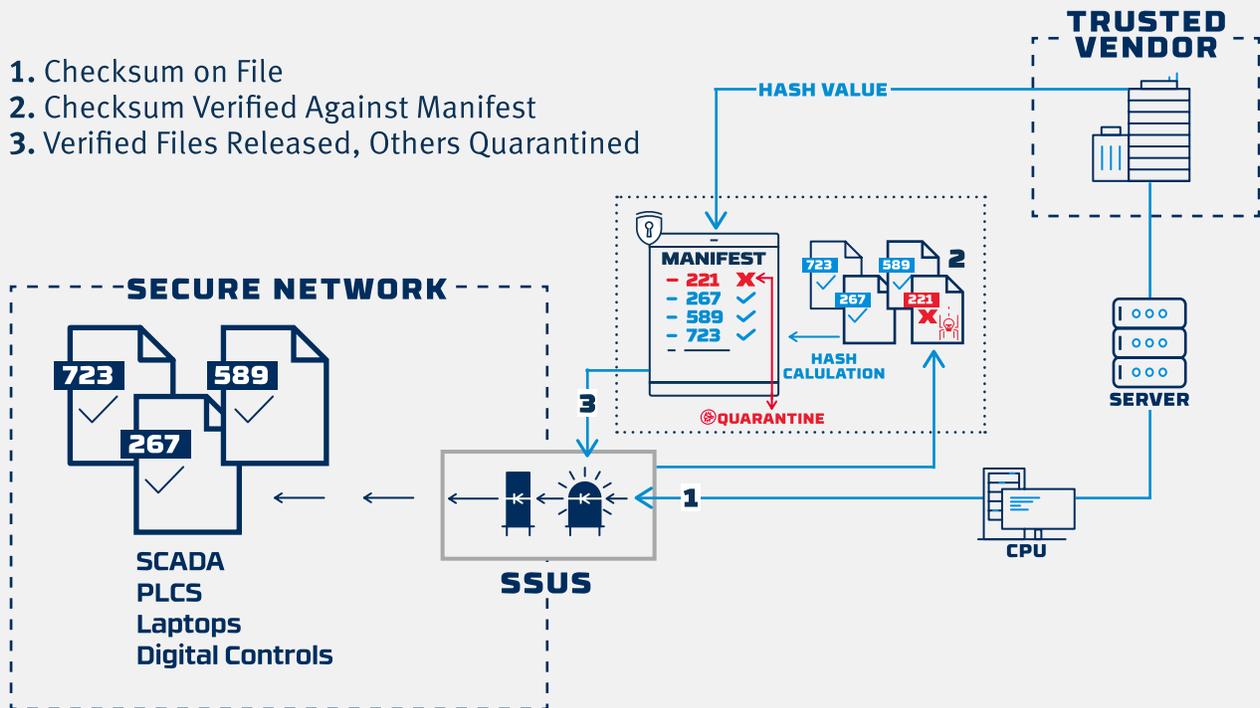
SECURE BI-DIRECTIONAL DATA DIODE COMMUNICATION, ABSOLUTE NETWORK SEGMENTATION

Possible use case scenarios:

- Communication between client and server
- Remote access
- Remote command and control
- Remote monitoring
- Safety system isolation
- No direct pass through of TCP/IP traffic



1. Checksum on File
2. Checksum Verified Against Manifest
3. Verified Files Released, Others Quarantined



Checks and Scans.



SSUS

Secure Software Update Solution

Safely Import Software Updates into Closed Networks

SSUS provides a mechanism that takes previously vetted files and subjects them to a comprehensive set of security scans. Once approved, SSUS uses Owl's data diode technology to transfer the file(s) across the security boundary of the OT network and into the plant. SSUS eliminates the security risk resulting from "Walk-Netting" a file across the security boundary using portable media devices like flash drives.

Configured by a system administrator, the scanning aspect of SSUS supports a number of checks including: file extension check, ASCII scan check, malware scanning and validating the file against a manifest (or list) consisting of pre-configured hash numbers. Files that pass the security scan are then transferred across data diode while files that fail the scan are quarantined and are not transferred into the control network. SSUS supports the ability to select and scan a single file or an entire directory of files. All transactions are logged in an Audit Table which is exportable to Microsoft Excel and other reporting software packages.

Proprietary Software for Owl Commercial Products

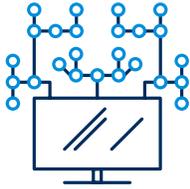
To expand the applicability of the OPDS product line, Owl has developed a library of optional software modules. These modules allow OPDS products to interoperate with a wide range of process control devices and also provide additional functionality, such as remote HMI screen view and database replication.



TALON

OPDS Software Platform

OPDS-Talon is the software layer that operates the device, manages data flows and protocols while allowing the data diode to interact with endpoints on the network. Built on a Defense-in-Depth strategy, the OPDS hardware and Talon software operate together in a layered approach to defend both the network and hardware from cyber attacks.



MBTS

Modbus Transfer Module

Allows real-time data collected from industrial control systems within a secure facility to be securely transferred across an OPDS data diode to end-users (operations, production, maintenance, etc.) outside the security perimeter of the facility. Enables external access to Modbus data while protecting the facility from cyberattacks.



OLFS

Log Forwarding Module

Provides a secure, automated method for the collection of performance data from OPDS products. Send and Receive side data is captured and transmitted to a remote server where it can be analyzed with an infrastructure management tool, such as the Owl Performance Management Module or HPE OneView. Log data from individual transfers and applications and overall system activities can be tracked and monitored.



OPMS

Performance Management Module

Provides centralized monitoring and management of one or more OPDS products. Performance and operating information (log files, alarms, etc.) from both the Send and Receive sides of the OPDS units is sent to a web server. Users then use their browser to log into the web server and obtain both current and historical performance information about the OPDS units on their network.





OPTS

Historian Replication Module

Replicates and transfers historian data across network domain boundaries via an OPDS data diode. Allows business users outside of the OT network segment to readily access historian database information without jeopardizing the cybersecurity of the OT network. Supports high availability configurations and historical data backfill in case of network connection outage.



OSTs

OPC Server Replication Module

Replicates and transfers historian data across network domain boundaries via an OPDS data diode. Allows business users outside of the OT network segment to readily access historian database information without jeopardizing the cybersecurity of the OT network. Supports high availability configurations and historical data backfill in case of network connection outage.



OV²S

Remote Screen View Module

Enables real-time, one-way transfer of HMI and other screen images from within a secured network to end-users on other networks. Remote access to screen content by the OPDS enables operators and administrators on different networks to monitor activity, troubleshoot systems, and recommend process changes without enabling access into a secured network.



RFTS

Remote File Transfer Module

Enables automated file and directory transfer across network security boundaries. Identifies and securely moves files and directories from a source network across the network security boundary via OPDS data diode to a destination network. The application can transfer single files, multiples files, and complete directory structures. Files can also be encrypted, scanned, and filtered before transfer.



SDTS

Database Replication Module

Enables relational database replication and transfer out of a protected source network (data center, plant, field office) to an external network or the cloud. An exact copy of the source database is created and transferred to an external location, allowing remote end-users to access database information in real time without introducing a potential cyber threat vector against the network.

Our Global Partners

All OPDS critical infrastructure network security solutions and software modules are available for purchase direct from Owl or from one of our regional master distributors.

NORTH AMERICA

GESCAN

Division of Sonepar Canada Inc.

www.gescan.com

Gescan West a wholesale electrical products distributor with headquarters in Calgary, Alberta, Canada that has branches across Western Canada. Gescan has been serving the needs of OEM, Industrial, Commercial, MRO and Residential markets since the 1920's. Gescan carries a wide-ranging inventory of quality commodities and unique speciality products from the industry's most trusted and respected manufactures. Gescan is focused on one goal and that is to become your primary supplier of electrical products. Let our focus exceed your expectations.

EUROPE



4Secure

www.4-secure.com

4Secure was set up ten years ago to give vulnerable organizations the most professional, well-qualified, experienced service. Now based in Northampton, our team covers the whole of the UK, as well as many overseas assignments. Integral to their ethos is an overriding sense of integrity and discretion, but within this modesty is a strong belief that no other security organization is as well accredited or experienced. 4Secure specializes in information security. Creating end-to-end secure systems. Advising on security. Preventing and solving problems with security.

MIDDLE EAST



Oregon Systems

www.oregon-systems.com

Oregon Systems is a leading IT systems integrator/distributor and managed services provider with a breadth of knowledge and expertise in: cybersecurity, communications, collaboration, data centres, critical infrastructure, and cloud services. With its international headquarters in the Kingdom of Bahrain, Oregon Systems employs nearly 250 people in Bahrain and the surrounding Gulf countries. Oregon Systems has partnered with Owl to become the regional Master Distributor of data diode-based cybersecurity solutions in the Gulf region and the Middle East.



www.simpro.com.tw

Simpro Technology Inc. was established in 2007. Prior to that, its technical and business experts have over 20 years' experience in network system integration and network security professional services. Simpro Technology Inc. are industry-leading, pioneers who are specialists in the installation, maintenance and consultancy of IT Services. The mission of Simpro Technology is to protect the government, enterprise and all internet users to ensure that they can enjoy and access the Internet in a safe environment through their existing network security equipment and highly skilled engineers' expertise.



www.direx.com

Japan Direx Corp. has pursued technologies and methodologies for network traffic metrics and predictive analysis. Focused on transforming the world's networks through real-time network intelligence analysis, Direx offers solutions that dramatically improve network communication quality and security. Services include design and integration of information communication networks, maintenance services, hardware components, software development, manufacturing, sales, rental and import and export services. Committed to the success of their customers, Direx is dedicated to building reliable networks that meet the needs of major domestic enterprises.



www.888techx.com

888 Tech Exchange Ventures is a privately owned technology services company established in 2006, operating as a one-stop provider of equipment, supplies, and engineering services, to utility companies. As a technology service provider, distributor and reseller, the company has the ability to meet unpredictable and constantly changing technology requirements while improving the overall performance of utilities by helping them reduce costs and improve efficiency.

HPC Links

www.hpclinks.com

HPC Links is a unique, world-wide provider of HPC, Big Data Analytics, cloud computing and cyber security applications and services. HPC Links is led by a global team of experienced professionals, with offices in both the United States and India. We provide parallel application programming and R&D services using our multidisciplinary skill pool with experience in a number of application domains such as oil and gas, non-conventional energy, weather and climate simulation, astrophysics, financial computing, trading analytics, health care and image processing.

Technology Partners & Integrations

Owl Cybersecurity solutions are integrated to protect products from a large number of equipment and software providers working in government and critical infrastructure. Tested and deployed, Owl solutions defend partner deployments from cyber threats while facilitating the transfer of critical data and information.



www.abb.com

ABB is a pioneering technology leader that is writing the future of industrial digitalization. For more than four decades, we have been at the forefront, innovating digitally connected and enabled industrial equipment and systems. Every day, we drive efficiency, safety and productivity in utilities, industry, transport and infrastructure globally. With a heritage spanning more than 130 years, ABB operates in more than 100 countries and employs around 132,000 people.



www.ge.com

GE imagines things others don't, builds things others can't and delivers outcomes that make the world work better. GE brings together the physical and digital worlds in ways no other company can. In its labs and factories and on the ground with customers, GE is inventing the next industrial era to move, power, build and cure the world.



www.mitsubishielectric.com

Mitsubishi Electric is one of the world's leading names in the manufacture and sales of electrical and electronic products and systems used in a broad range of fields and applications. As a global, leading green company, we're applying our technologies to contribute to society and daily life around the world.



www.morphodetection.com

Morpho Detection, formerly part of Safran Identity & Security, is now part of Smiths Detection. In an increasingly dangerous world, there's no time for downtime. For the past twenty-five years, authorities across the world have trusted Morpho Detection's deep expertise to design and implement leading-edge detection solutions.





www.osisoft.com

OSIsoft delivers the PI System, the industry standard in enterprise infrastructure, for management of real-time data and events. With installations in 107 countries spanning the globe, the OSIsoft PI System is used in manufacturing, energy, utilities, life sciences, data centers, facilities, and the process industries.



www.rockwellautomation.com

Rockwell Automation is Built on a strong foundation of integrity. Our reputation for quality, reliability and innovation is represented by the brands our products, software and services carry. As we increase our offerings, we remain keenly focused on enhancing our unique technology differentiation — and delivering integrated, value-added solutions.



www.schneider-electric.com

Schneider Electric is a global, innovative and responsible company, from steel in the 19th century, to electrical distribution and automation in the 20th and energy management in the 21st, Schneider Electric has always been driven by an international, innovative and responsible mindset to shape the transformation of the industry it was evolving in.



www.scientech.cwfc.com

Scientech is a global provider of commercial nuclear power instrumentation, electrical components, specialty hardware, process control systems, and proprietary database solutions aimed at improving safety, plant performance and reliability as well as reducing costs.



www.yokogawa.com

Yokogawa is a leading provider of Industrial Automation and Test and Measurement solutions. Combining superior technology with engineering services, project management, and maintenance, Yokogawa delivers field proven operational efficiency, safety, quality, and reliability.

As a part of Owl's technology partnership program, Owl cybersecurity solutions have been designed to interface with and protect a large number of devices and software tools available from various critical infrastructure equipment providers. Tested, proven, and currently deployed around the world, Owl solutions defend partner technology from cyber threats while facilitating the transfer of critical data and information.

**All trademarks are copyright of their respective owners.*

Use Cases:

With years of experience protecting critical infrastructure from cyberattack, including some of the largest and most complex organizations in the world, Owl has a great depth of expertise across a wide variety of industries. The following use cases feature industry leaders and demonstrate how Owl helped them to meet a number of security and operational requirements through a deterministic one-way data flow and sophisticated data replication technology.



Global oil & gas company enables secure, one-way production data transfer to HQ.

Company Overview

A global oil and gas producer, manufacturer and marketer, with crude oil production of over 3 billion barrels annually.



INDUSTRY:

Oil & Gas



CHALLENGE:

Malware breach destroyed data, causing company to disconnect operational and business networks. This disrupted the flow of OT network data into the corporate wide area network (WAN).



SOLUTION:

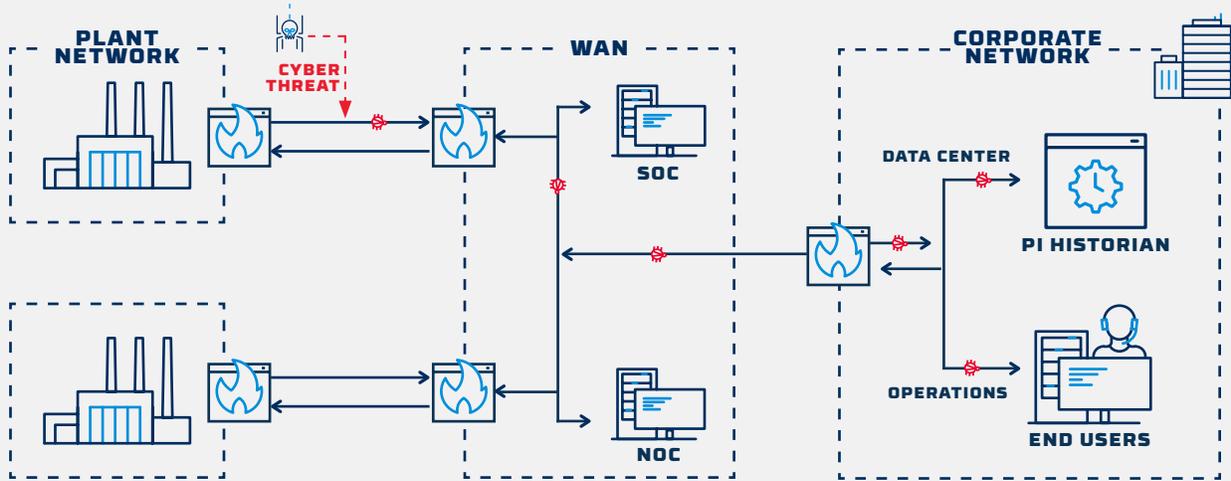
OPDS data diodes deployed along with Historian Replication Module, to replicate and transfer OSIsoft PI historian data one-way, from the OT network to the WAN, and from the WAN into the corporate HQ network.



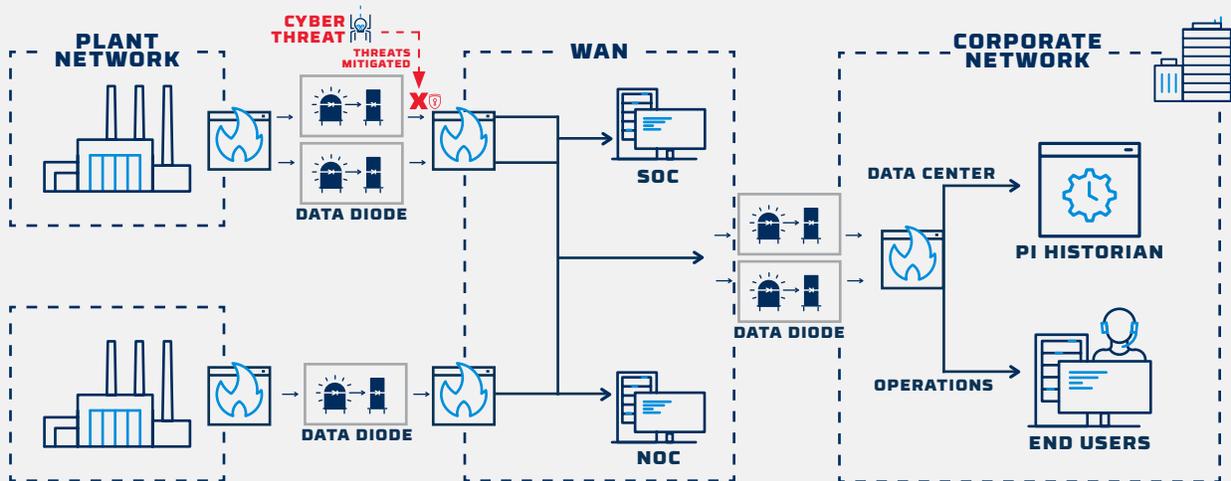
BENEFITS:

Deterministic, one-way flow of production data into HQ enabled increased visibility without increased risk. OT network remains secure from outside threats. Centralized performance and data flow monitoring.

Oil & Gas



USE CASE (BEFORE)



USE CASE (AFTER)

Gas Turbine

Gas turbine vendor enables secure remote performance monitoring.

Company Overview

Gas turbine manufacturer and vendor, providing products and remote monitoring services to a natural gas power plant.



INDUSTRY:

Critical infrastructure machinery & equipment



CHALLENGE:

Malware breach at power plant destroyed data and incapacitated hundreds of application servers leading to disconnection of OT network from turbine vendor's monitoring facility, and failing to meet SLA with the vendor.



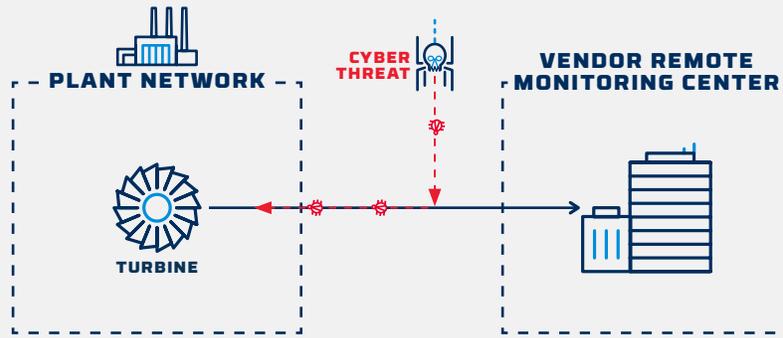
SOLUTION:

OPDS data diodes deployed on plant OT network to secure plant and transfer realtime turbine monitoring data one-way, via UDP stream, to turbine vendor.

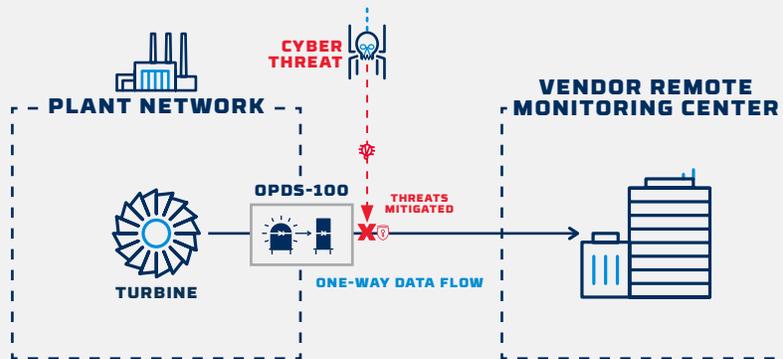


BENEFITS:

Enabled remote monitoring of turbine performance data and alarm data via deterministic one-way data transfer to vendor, while maintaining a disconnected architecture within the OT network, keeping it secure from external threats.



USE CASE (BEFORE)



USE CASE (AFTER)

Water/Wastewater

Water/wastewater company implements DHS defense-in-depth cybersecurity strategies.

Company Overview

Major regional water/waste water authority serving over 800,000 customers.



INDUSTRY:

Water & Wastewater



CHALLENGE:

Company recognized need to proactively improve cybersecurity posture, following guidance from DHS, while retaining business continuity and insight into their operational technology (OT) network, including remote HMI screen views inside the OT network.



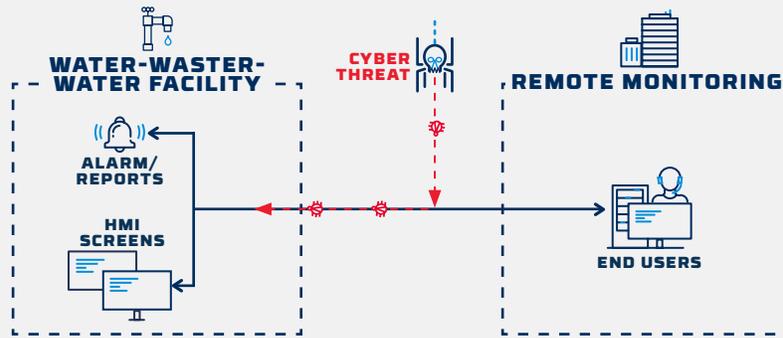
SOLUTION:

OPDS data diodes deployed to secure the OT network, and transfer reporting & alarming information, along with Remote Screen View Module, to provide remote HMI screen replication.

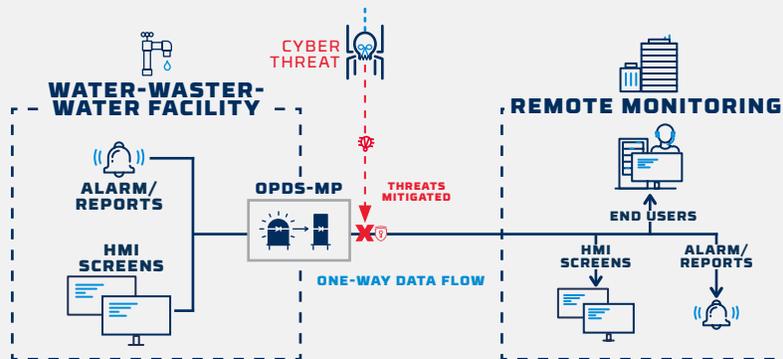


BENEFITS:

Deterministic, one-way data flow secured OT network from external cyberattack, and enabled real-time remote monitoring of alarms and alerts as well as remote HMI screen view at HQ.



USE CASE (BEFORE)



USE CASE (AFTER)

Rail Transportation

National commuter rail transportation co. secures remote monitoring of railcars & tracksensors.

Company Overview

A national commuter rail transportation company operating over 15,000 trains daily.

INDUSTRY:

Mass Transportation - Rail

CHALLENGE:

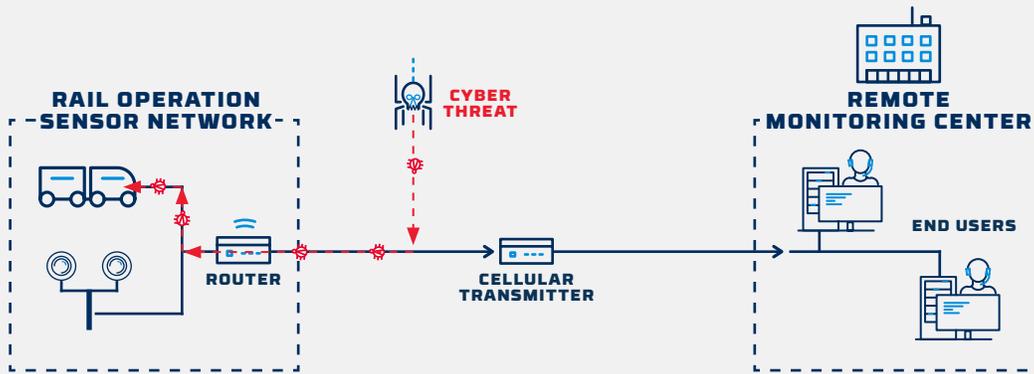
In order to prevent cyberattacks, the rail company required isolation and security of rail sensor network while preserving remote monitoring capabilities.

SOLUTION:

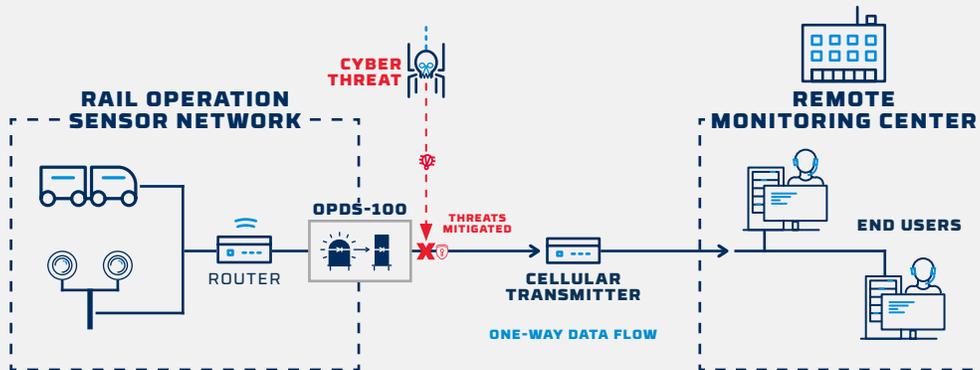
OPDS data diodes deployed to protect rail sensor systems, as well as an interface to a cellular transmitter to transfer sensor data from disparate sensor locations to a central remote monitoring center.

BENEFITS:

One-way data flow from rail sensors ensures rail monitoring network is secure from external cyber threats. Preserved remote monitoring capability from central monitoring operations center.



USE CASE (BEFORE)



USE CASE (AFTER)

Power T&D

Substation operator secures remote command and control.

Company Overview

Regional power transmission & distribution serving millions of customers across multiple states.



INDUSTRY:

Power Transmission & Distribution



CHALLENGE:

A power transmission and distribution company needed to remotely monitor its substations from its control center. Upon receiving an alarm or event message from a substation, the control center needed to be able to securely send commands to the substation to change PLC and sensor settings and receive confirmation of the action.



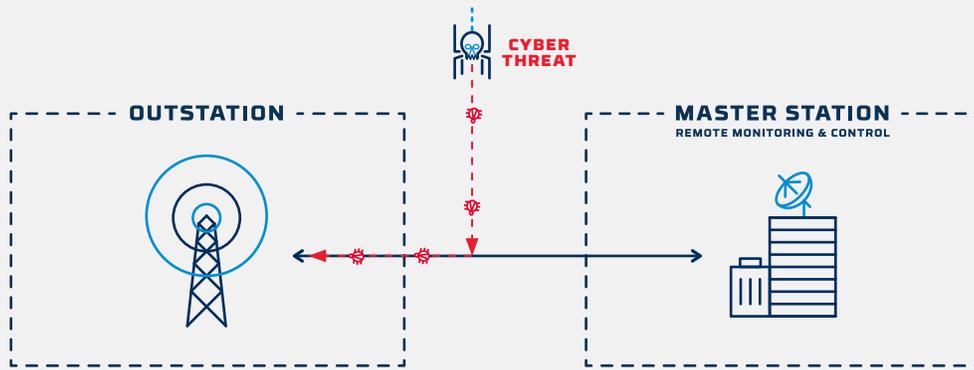
SOLUTION:

Owl ReCon was deployed at the edge of the operational network, enabling bi-directional communication between the substation and control center.

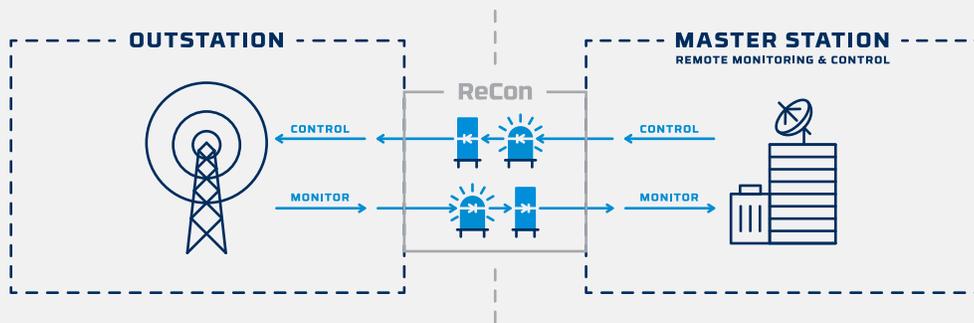


BENEFITS:

The control center can now securely transmit required PLC and sensor commands to the substation, and remote monitoring requirements were met without increasing risk to the substation control network



USE CASE (BEFORE)



USE CASE (AFTER)



OWL ADVANTAGE

THE GOLD STANDARD IN DATA DIODE TECHNOLOGY



Why Owl Data Diodes?

(14 Value Propositions)

As is normal in commercial markets, competition arose and along with it some confusion about what a data diode is, how it works and what distinguishes one from another. This document identifies and clarifies some of the typical points of confusion between an Owl data diode and other products on the market such as a unidirectional gateway.

By way of introduction, the fundamental difference between Owl products and others is the one-way design implemented from the ground up, true single box format, exclusive use of intentional one-way techniques (not disabled or broken two-way methods), hardware based solution, very high reliability, super low latency and very long expected life span (11+ years).

Owl, established in 1999, was the first to market with a data diode and has over 28 patents on the technology with a half dozen more pending. The design of the Owl data diodes was carefully considered to ensure everything was designed to defend against cyberattack and provide a robust and reliable data transfer mechanism.

The various attributes described below provide more detail on how Owl data diodes differ from competing products and why they offer a better value proposition.

1. One-way by Design

- All of the components and circuitry are designed to be one-way. Owl data diodes are not based on inherently two way components or protocols that are subsequently compromised to only work one-way. They are designed to be one-way from the ground up.
- The design includes two one-way diodes working as a pair (one send, one receive) and provides a tested, proven and accredited deterministic one-way only transfer.
- Owl data diodes use an Asynchronous Transfer Mode (ATM) based, one-way protocol to move data. ATM was designed to support high bandwidth, low latency one-way data transfers used in real-time telecommunications.

2. Secure Communication

- Payload only transfer – no original header information is transferred, thwarting any attacks originating in the packet itself.
- Non-routable data transfer – due to the payload only transfer, all routing information (IP address, etc.) associated with the originating network protocol remains secure within the source network and does not cross the data diode. In competing products the full original packets are transferred and the routing information is exposed outside of the protected network.
- Protocol conversion – in a precise sequence, the data payload in the originating protocol (TCP, UDP, etc.) packet is extracted, placed in an ATM packet, sent across the data diode, extracted from the ATM packet and inserted into a new packet that matches the original protocol and routed to the final destination.

3. Physically Secured

- Fully enclosed, single chassis
- No exposed cables or wires
- Tamper-proof screws
- Locking mechanism

4. Complete Separation of Source and Destination Networks

- Physical separation – Two data diodes embedded within the Owl data diode create a physical demarcation point between Source and Destination networks. Connected solely through the single one-way connection, the send and receive sides are otherwise physically separated, creating what is commonly referred to as an “air gap”. This airgap is a requirement of certain power industries (NERC, NRC) and the Owl data diode helps operators meet those regulations.
- Separate power supplies – one for the source side and one for the destination side.
- Separate fans – one for the source side and one for the destination side.
- Separate VGA and USB connectors – one for the source side and one for the destination side.
- Separate admin ports – one for the source side and one for the destination side.

5. Unmatched Performance

- Fastest throughput - Owl solutions range from 5 Mbps up to industry leading 10 Gbps.
- Extremely low latency – packets are transferred across the data diode in less than 9 milliseconds.
- Zero data loss – the system is highly tuned and optimized to operate without packet loss within the specified bandwidth tier. There is no reason why packets would ever be dropped or lost.
- Single packet transmission – the reliability, high bandwidth and low latency of the design leads to single packet transmission. Competitive solutions rely on a strategy of multiple packet transmissions to ensure the data is transferred, lowering throughput, increasing latency and preventing multiple data flows from crossing a single solution.

6. Unparalleled Scalability

- Variable Bandwidth Licensing - Owl offers the exclusive ability to increase bandwidth capacity using a software license. Customers can purchase enough bandwidth to meet today’s needs with the knowledge that bandwidth can be quickly and easily increased at any time to meet future requirements.
- Expandable transfer capabilities - New protocols and interfaces can be added to existing solutions using a simple software license. A single Owl data diode solution can support multiple interfaces without having to add any new hardware.

7. Multiple Form Factors

Exclusive single box solutions:

1. Full functionality embodied in a single device
2. No flanking servers required
3. Physically secured against tampering
4. Low SWaP (Size, Weight and Power) requirements
5. Configurations available for environmental extremes (temperature, smoke, dust)

Available in either:

1. 1.19” 1U rackmount solutions – horizontal rack solutions for enterprise IT environments
2. DIN rail solutions - compact, vertically mounted for industrial environments

PCIe Card Kit solutions:

1. Two server solution: one send card, one receive card
2. Installed in two new or existing servers (one send server, one receive server)
3. No other computing platforms (flanking servers) needed
4. Connected by single strand fiber cable





Proprietary Algorithm

Owl utilizes a proprietary, patent-pending database query algorithm to perform extremely reliable, real-time database replication between source and destination networks. For example, Owl data diodes could replicate data from a high security source database to a read-only (for users) database on a different security domain, thereby protecting the sensitive source network from cyberattack, while still allowing users on the lower security network limited access rights to the data.

8. Tested and Accredited Solution

- Tested & proven technology in use for 17 years
- Common Criteria EAL certified, independent 3rd party testing verified Owl Dual Diodes:
 1. Are hardware enforced one way devices
 2. Maintain network security if a device failure occurs
 3. Cannot be altered through software modifications
 4. Perform a non-routable protocol conversion - maintaining the confidentiality of the protected network domain
- UCDSMO Baseline-listed (Authorized, Accredited and Approved to operate in DOD and Intelligence community networks).
- Recommended by DHS to protect critical infrastructure.



9. Lowest Total Cost of Ownership

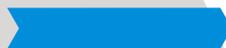
- Range of solutions available to meet different requirements and budgets.
- Variable software and bandwidth licenses allow incremental expansion as needed.
- Shipped pre-configured and ready to install (most customers install it themselves).
- Extremely low on-going operating expenses – Set it and forget it.
- Highly reliable, long lifespan hardware - MTBF > 11 years.
- Supports multiple interfaces, protocols and data types simultaneously on a single box.

10. Multi-Function Solutions

- Hundreds of sources and destinations can be supported by a single solution.
- Support multiple simultaneous data flows.
- Supports the transfer of multiple protocols (TCP, UDP, Files, OPC, Modbus, etc.) simultaneously. Resulting in lower cost per supported application.

11. Defense in Depth Built In

- Secure operating system implemented per US government operating specifications.
- Role based access controls (RBAC) - supports long passwords and passphrases.
- Menu based interface - prevents access to command line when operating.
- Secured against tampering - system check audits system for any file changes, automatically shuts down if tampering occurs.
- Internal logs and alarms - stored on the system to track and audit all activity.
- Supports separation of duties - admin ports separated from data transfer ports.



12. Long-Lasting and Durable

- Industry leading MTBF - full system tested to 11+ years mean time before failure (MTBF) of any component.
- Far exceeds any typical commercial enterprise computing platform lifespan.
- Full support for Active/Standby configurations.
- Specialized solutions designed to operate in environment extremes (high/low temperature, heavy smoke, dust, etc.).
 1. Sealed, fan-less operation
 2. -40oF to +140oF

13. Fast and Easy Deployment

- All single-box solutions come preconfigured and ready-to-install.
- Minimal time to install – typically up and running within a few hours.
- Most customers require no onsite assistance for deployment.
- “Set it and forget it” – once installed solutions require little to no on-going support or maintenance.



14. DualDiode Technology™

Operating as a single data diode solution, Owl’s solutions all utilize the patented DualDiode Technology™ comprised of a pair of diodes. The pair of dedicated diodes (one send, one receive) are Common Criteria EAL tested and proven to provide deterministic, one-way only data transfers. The send diode circuits are designed to only allow data to be sent, with no physical capability to receive data. The circuits of the receive diode are designed to only receive data and are physically prevented from transmitting data.

The DualDiode Technology™ exists in three formats: a pair of PCIe cards, a pair of PC/104 cards and a single, proprietary silicon board with two independent, fully separated sides.

Use:

- PCIe card solutions are installed in separate off-the-shelf servers, creating a send server and receive server as a complete data diode solution.
- PC/104 card solutions are components used within the Owl high-end, single appliance solutions. Provides a single box solution with independent send and receive elements within a single enclosure.
- The patented, single board solution is used in single box solutions that support lower bandwidth requirements and smaller physical size.

For the patented, “World’s Smallest Data Diode”, the printed circuit board is designed with three zones: a send zone on one half of the board where only send components exist, a receive zone on the other half of the board where only receive components exist and a neutral zone in between that separates them. No components exist in the neutral zone and no electrical connections cross the neutral zone. Data is transmitted from the send side to the receive side using a one-way only digital isolator. Only digital differential signals cross from one side to the other, completely isolating the send side from the receive side.

Conclusion

From the world’s fastest, to the world’s smallest, a technical understanding of the design employed by Owl illuminates the differences and benefits of the Owl data diode over other solutions that may seem at first glance to be similar. The intentional use of one-way technology from the ground up allows Owl data diodes to operate at the highest speeds, with the lowest latency and superior reliability. Able to easily handle multiple data flows, data types and protocols simultaneously, while competitive products need one solution per data type, protocol or data flow, in combination with Owl’s long service life and small footprint, provide the best return on investment.

OWL Cyber Defense

Owl Cyber Defense Solutions, LLC leads the world in data diode and cross domain network cybersecurity. With a constant focus on customers in the military, government, critical infrastructure, and commercial communities, Owl develops market-first, one-way data transfer products to meet a variety of operational needs, from entry level to enterprise.

For more information on Owl, or to schedule a demo, visit www.owlcyberdefense.com



@OwlCyberDefense

203-894-9342 | Info@owlcyberdefense.com