Owl PI Transfer Service (OPTS)

Securely Transfer Pi System Data Across Network Boundaries Using Owl Data Diodes & OPTS Software Module

In today's industrial environments, data is critical for operational efficiency, regulatory compliance, and informed decision-making. Organizations depend on AVEVA PI System to collect, store, and analyze real-time operational data, but securely transferring this data across operational technology (OT) and information technology (IT) networks presents significant cybersecurity risks. Traditional security solutions, such as firewalls, are susceptible to misconfigurations, software vulnerabilities, and remote cyber attacks. Data diodes provide a more secure, hardware-enforced solution, ensuring a one-way data flow that eliminates inbound cyber threats challenges head-on, redefining secure data transfer in an era of unprecedented risks.

THE SOLUTION

Securely Transfer PI System™ Data Across Network Boundaries with Owl Data Diodes

Owl Talon protocol filtering diodes, which enforce a physically secured, one-way data transfer, provide organizations with a trusted, low-maintenance solution for securely replicating PI System data across network boundaries. Organizations can leverage operational insights without compromising OT security, making them an essential component for secure OT/IT integration.

Owl Cyber Defense (Owl) and AVEVA (formerly OSIsoft) joined forces in partnership in 2009 to secure the replication and transfer of PI System data across networks. The combined technologies of Owl data diodes and AVEVA's PI System have hundreds of successful implementations around the world, spanning across many industries.

Owl PI Transfer Service (OPTS) software was developed to securely transfer PI System data and other common data transfer use cases across network boundaries. The software interfaces directly with the PI System on the source network of the Owl data diode, replicates the data and utilizes diode technology to securely transfer the data to the destination network. Once data reaches the destination network, OPTS can either build the PI System from scratch or append to an existing one.

Owl's proven data diode solutions running OPTS software allows users to meet strict security requirements for business practices through hardware-enforced network segmentation and one-way data transfer. As an AVEVA technology partner, Owl's data diode cybersecurity solutions are available with validated interface software designed specifically to replicate OSIsoft's PI Systems and transfer the information one-way, across network boundaries.

OPTS Capabilities

→ Native PI API integration with AVEVA

→ PI to PI and PI Data Archive replication options

→ Historical backfill and dynamic updates

SCALABILITY

→ Users must upgrade their Owl hardware to increase the bandwidth capability. A single Owl platform can simultaneously replicate a PI System and other data types (Syslog, files, SMTP, streaming, etc).

→ Ongoing changes in the plant are automatically replicated to the HQ systems

SECURITY

→ Even if a plant network is under attack, PI System data can still be securely and safely transferred due to Owl's unique payload only transfer technique. Owl uses a protocol break to make sure no routable information is transferred.

→ Operations continue without lost time

→ Supports authentication via PI Trust

FAST TIME TO DEPLOYMENT

→ Minimal to no modifications to existing operations required

→ The PI System destination can be rebuilt from scratch, no need to shut down the database and manually synchronize the source with the replicated PI System.

Owl Pi Transfer Service Use Case

Organizations using AVEVA PI System rely on secure and efficient data replication to ensure operational continuity, compliance, and business intelligence.

Data diodes provide a hardware-enforced solution for securely transferring data across networks without introducing cyber risks. The following use case demonstrates how data diodes support safe PI System data replication in industrial environments.

Power Plant

PLC

PLC

PI SYSTEM

OT

AIR GAP

Corporate Network

REPLICATED
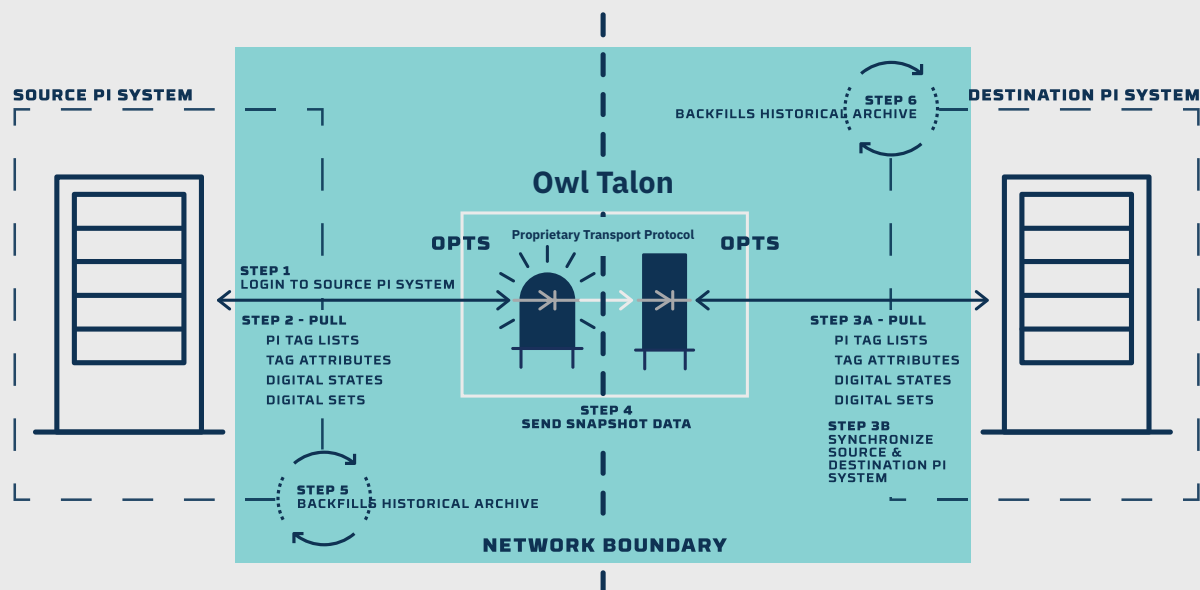PI SYSTEM

END USER

END USER

IT
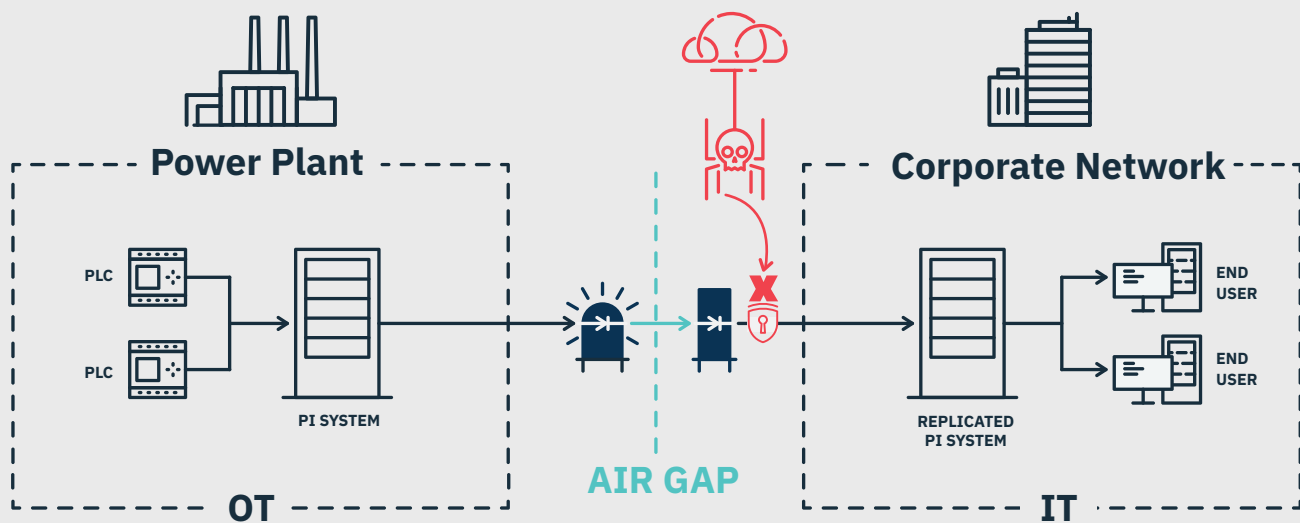
Strengthening OT Security While Enabling Business Success

By segregating operational technology (OT) from information technology (IT), OPTS ensures that PI System data remains securely protected behind the OT network security boundary, mitigating external network threats. Even when PI data is shared with IT, cloud environments, or remote users, data diodes enforce a one-way transfer, preventing unauthorized access or cyber risks to operational systems. This approach allows users to access external data and enable remote monitoring without introducing remote access vulnerabilities, ensuring that OT environments remain secure.

Compliance begins with accurate and reliable reporting, which is essential for meeting industry regulations. By combining Owl's data diode technology with OPTS software, organizations can securely collect and transmit the data needed to comply with NERC-CIP, NRC, and other regulatory standards, all while maintaining a highly secure, air-gapped environment for operators. This seamless and secure data transfer enables organizations to meet compliance requirements without compromising the integrity or security of OT systems.

OWL PI TRANSFER SERVICE (OPTS) & AVEVA PI SYSTEM

SOURCE PI SYSTEM

DESTINATION PI SYSTEM

Owl Talon

STEP 6
BACKFILLS HISTORICAL ARCHIVE

OPTS   Proprietary Transport Protocol   OPTS

STEP 1
LOGIN TO SOURCE PI SYSTEM

STEP 2 - PULL
PI TAG LISTS
TAG ATTRIBUTES
DIGITAL STATES
DIGITAL SETS

STEP 3A - PULL
PI TAG LISTS
TAG ATTRIBUTES
DIGITAL STATES
DIGITAL SETS

STEP 4
SEND SNAPSHOT DATA

STEP 3B
SYNCHRONIZE
SOURCE &
DESTINATION PI
SYSTEM

STEP 5
BACKFILLS HISTORICAL ARCHIVE

NETWORK BOUNDARY

Step 1   OPTS logs into the source PI System via PI Trust authentication

Step 2   OPTS queries source PI System and pulls the PI Tag list, Tag attributes, digital states and digital names

Step 3A OPTS pulls the destination PI System database obtaining PI tag list, tag attributes, digital states and digital names

Step 3B OPTS synchronizes the source and destination PI System by adding/deleting/updating tags

Step 4   Once the destination PI System is built and synchronized, snapshot data begins to flow

Step 5   During run time, the OPTS historical backfill feature continuously cycsles historical data and passes it to the desination PI system

Step 6   The destination PI System replaces data missing from any unplanned network outage or interruption, ensuring data is never lost

Safeguard Your Data with the Owl Talon™ Data Diode Platform: Secure, Flexible, Easy One-Way Transfer

As industrial organizations seek to balance data accessibility with cybersecurity, data diodes provide a trusted, hardware-enforced solution for securely replicating PI System data across network boundaries. By ensuring a physically enforced one-way transfer, data diodes allow organizations to leverage operational data without exposing OT networks to cyber risks.

Building on a quarter decade of one-way networking expertise and customer feedback, Owl Talon™ is the latest, revolutionized iteration of Owl's award-winning data diode platform, designed for fast and easy configuration, unmatched interoperability, and secure, reliable operation. To save you additional time and SWaP, Owl Talon can support multiple, simultaneous data flows and protocols on one device, including our Owl Pi Transfer Service. With an extensible foundation for a broad range of OT and IT protocols and interfaces, Owl Talon enables all your one-way data transfer use cases.

For more information on how Owl Talon secures AVEVA PI System data transfers, contact us today.

OWL Cyber Defense™

Owl Cyber Defense Solutions, LLC, headquartered in Columbia, MD, leads the industry in data diode and cross-domain network cybersecurity solutions for faster, safer and smarter decision making. We create solutions tailored for high-risk sectors including the military, government and critical infrastructure. Our advanced technologies enable secure, near-instantaneous collaboration, bridging network barriers to protect critical missions. With a focus on scalability and interoperability, Owl ensures that organizations can maintain secure, reliable, and compliant communication channels against evolving cyber threats.

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

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