



# White Paper Streaming Full Motion Video & Sensor Applications

## Using Owl Cross Domain Solutions to Enable Secure One-Way Streaming Data Capability

### Introduction

The general category of streaming data continues to grow as enabling applications crucial to military & intelligence planning, analysis and action. Well established video compression standards ITU-T H.264 & ISO MPEG-2/4 are in-place; collection & display technologies are capable of operating in almost any environment. The challenge for information assurance has been how to best satisfy the need to share this video & sensor data -- often with time-critical efficiency -- while maintaining the utmost rigor in network domain security. The secure cross domain transfer of streaming data has become an organizational and operational "must-have."

### Secure One-Way Transfer of Streaming Data – a Business Case

By whatever means video (FMV) and sensor information is collected, it must be securely transported to analysis sites. That has often meant storage on removable media and physical transport. Clearly, the time has long passed for these techniques – costs and delay are too high; the validity of content is questionable at best, plainly wrong at worst. Actionable information demands real-time transfer, with content commonly formatted as streaming UDP connections. While most networks support UDP transfer for the sharing of streaming traffic, how to share securely across boundaries between networks of different security levels (from low-to-high and from higher security level-to-lower) has become the pressing question.

One response has been to implement a single, systemic, security policy at collection point, network, and analysis site. This may resolve the security issue, but at significant costs:

1. Making the entire system SECRET or TOP SECRET builds in much higher **budgetary costs** when compared with keeping SECRET or TOP SECRET enclaves discrete and limited.
2. Building such a system -- which must be accredited by controlling authority for eventual deployment – complicates and prolongs accreditation and builds subsequent **accreditation costs**. This will also affect the replication of the system for other programs, which require their own accreditation paths for re-use.

Constraining the high security element by using secure one-way transfer across security domains:

1. Controls budgetary costs,
2. Lowers accreditation costs, in dollars and in time-to-deployment,
3. Simplifies the deployment of cross domain use replicas through sanctioned CDS re-use.

### Secure One-Way Transfer Supporting Multiple Video Streams

Owl Computing has delivered secure one-way transfer of streaming video since 2005. DualDiode® Technology - proprietary hardware enforced one-way transfer coupled with Owl-designed software – had been the first Owl

vehicle to support video one-way transfer. Intel and DoD clients tested the Owl approach, found its technology satisfactory, and built it into secure video transfer. Owl provided transfer technology; the specific cross domain solution rested with the project organization.

These applications involve the one-way transfer of video streams, delivered to and transmitted from the Owl installation as UDP datagrams, using Owl 155 Communication Card sets. With effective user throughput of 15 MegaBytes per second, Owl 155 deployments supported concurrent transfer of more than 25 individual FMV sessions. With the Owl MUX/DEMUX application active, streams at Owl CDS Receive can be multicast and broadcast, as well.

The Owl 2500 Communication Card set, running at link speed 2.488 Gigabits per second, offers clients a higher order of video support. Clients have transferred up to 40 video streams within each of the four active channels in a single Owl 2500 physical link – a total of 160 discrete streams across one Owl installation. Of course, server processor performance and individual stream data rates affect stream transfer count, but in real-world government agency use, Owl secure transfer of streaming video is an accomplished fact.

### **Streaming Video in Cross Domain Solutions**

Secure one-way transfer addresses the data confidentiality element of a cross domain solution that must receive accreditation from a regulatory body before the system may be deployed operationally. Owl DualDiode Technology fulfills data confidentiality. For video streams that must cross network domain boundaries, the other major elements of a CDS -- data availability and data integrity -- must be enforced.

### **Streaming Video Availability**

CDS availability is built on a hardened operating system and, if the situation demands, varying levels of system redundancy and predetermined failover. Of these the more commonly addressed is the locking down of the OS, with the imposition of mandatory and/or role-based access controls. With expertise in admin and user access clearly defined in security policy, and use cases expressed in "whitelisted" admin and user menus, Owl has developed, delivered, and helped deploy CDSs that meet accreditors' benchmarks.

### **Data Integrity -- Video Stream Content Management & Filtering**

With video transfer, data integrity refers not only to the integrity of the stream itself. The continued integrity of the network into which the stream is transferred must be resolved, and the potential risk for unwanted or unintended release of other information must be prevented. For a low-to-high video transfer scenario, content management & filtering should prevent malware, botnets, & "dirty" words from compromising the high-side receiving network. In a high-to-low security release of video content, the transfer should not permit the unauthorized, uncontrolled distribution of material.

Digital sensor data can be transported via conventional digital means, with appropriate security safeguards. For CDS video transfers, a means of "scrubbing" video for transfer or release has been to process digital video through a digital-to-analog codec/converter. The conversion process eliminates everything but the video signal, for subsequent display or further restoration to digital format. The process may be thorough, but such conversions degrade display resolution and eliminate most, if not all, legitimate metadata accompanying the video. Keeping the video in digital format through the one-way transfer is preferable. The question becomes: how to best perform content management on the digital video stream.

## Video Stream Content Management & Filtering

The Owl Computing approach to video stream content management is:

1. **To authenticate video source** -- Owl DualDiode software proxies for handling data in packet formats have extensive IP filtering mechanisms. For streaming FMV transmitted as UDP datagrams, users apply the IP filter schemes of Owl Secure Network Transfer System *SNTS* or UDP Packet Transfer System *UPTS*. In either case, authenticated Source IP address *and* Source Port at that IP address may be explicitly configured. Only video traffic originating from this logical site (or sites) will be accepted at the CDS as a secure transfer candidate.

For projects with IPv6 functionality, these Owl solutions will support the added features of advanced IP connectivity, for video connection to a CDS for transfer.

2. **To determine datagram integrity** – a checksum on the data stream is calculated at the collection point or as close as possible to it. A second checksum on the stream is determined on the CDS before access to the controlled transfer interface. A positive match releases the traffic for transfer; a mismatch quarantines or discards the traffic element.
3. **To verify data format type** -- In the same configuration, the Owl software application can examine datagram payload content to determine if it conforms to accepted H.264-MPEG 2/4 data structures. Individual packets deemed out-of-specification will be quarantined or discarded before reaching the controlled interface for transfer.

## Conclusion

Owl streaming data applications are used by government and the power generation communities. Video cross domain projects have advanced “the art of the possible” to the creditable, deployable, and operational. Work with the US DoD for video capture from manned & unmanned airborne vehicles; continuing Owl deployments for streaming video within the Intelligence community, energize our efforts to expand already robust video content management capabilities. Owl small form-factor cross domain solutions enable the migration of secure video transfer to the mobile, tactical edge as well. Secure streaming video transfer is one of Owl Computing’s most distinct performance differentiators.

### About Owl Computing Technologies, Inc.

Owl Computing Technologies, Inc. is a privately owned and funded US company. Owl delivers NIAP Common Criteria EAL-4 certified one-way cross domain systems & electronic perimeter defense solutions to transport and protect an organization’s most sensitive data between discrete domains of varying security levels and policies. Information sharing Secured by Owl® is enforced with Owl Computing proprietary DualDiode® technology. DualDiode one-way transfer systems guards against data leakage and protects networks from unauthorized access. Owl systems meet the highest levels of information protection within the US Department of Defense, the Intelligence community, & the Power Generation industry, delivering secure, reliable, information transfer of multiple data sources and types across single DualDiode systems -- any file size or data type. [www.owlcti.com](http://www.owlcti.com)