**OnePager Open Source Data Diode**

*Cyber ​​Innovation Hub Defense*

**Context**

Securing networks is an important point of attention within Cyber. Gaining access to networks by intercepting or modifying network traffic is the basis for many security breeches.

One of the problems with securing networks can be traced back to the organization of the current IP-based network traffic. This is bi-directional (2 way traffic), because guaranteed delivery is requested in the protocol. There are various devices or software for securing networks, such as Firewalls, Intruder Detection Systems, Intruder Prevention Systems and data diodes. They all have specific functionality that increases network security.

A **data diode** is a device that physically enforces uni-directional (one-way) network traffic. This creates an additional layer of security, as the diode enforces that traffic can only flow from network A to network B, thus protecting network A in this case.

**Application of data diodes**

Because a data diode enforces uni-directional traffic, it is applicable in specific use cases. Data diodes are often used in use cases where it is undesirable for network traffic to flow back from or to a network.

This is the case, for example, in situations where **air-gapping** is desirable. Air-gapped means that the network or device must operate in isolation from the Internet or other networks. Integrating data diodes in such networks allows secure (uni-directional) communication and avoids the risk of unwanted traffic back or out of the network being compromised.

**Use cases**

Data diodes are well applicable in air-gapped HGI networks, where there is a need to send messages to other networks without these networks being able to respond. This maximizes the integrity of the transmitting network without sacrificing the capacity to distribute data.

Data diodes are also well applicable in IOT and PLC (industrial networks), where the device may not be approached for security reasons, but where there is a need for monitoring or reading it. This is, for example, the situation in the critical infrastructure (energy networks, water purification plants, locks, etc.).

**Need**

Within the Ministry of Defense, there is a need for data diodes in the HGI domain, but also in domains that behave more like an IoT / PLC network.

For the HGI networks, the need is met by NBV accredited data diodes. However, these data diodes are relatively expensive and are purchased in low volumes.

For the IoT, PLC or operational domain, there is a need for robust data diodes that are deployed in high volumes and can potentially be lost. This makes it impossible to make the business case based on accredited diodes for high-volume deployment in the IoT/PCL or operational domain.

This means: **there is a need for a cheaper yet safe and robust data diode.**

The Open Source Data Diode (OSDD) has been developed to meet this need.

**The OSDD**

The OSDD is a mid-tier, low-cost, open source data diode aimed at use by public and private parties in the Netherlands. The OSDD consists of a hardware device, the physical diode, and a software suite in which additional functionality can be programmed for specific use cases.

The OSDD demonstrator was developed in a collaboration between the Ministry of Defense, The Hague Security Delta and Technolution.

**Accreditation**

On the OSDD, the NBV indicated in an initial assessment that a security value of Dep-V should be feasible on the basis of the current design.

**Situation**

A demonstrator of both the physical diode and the software stack is currently available and experiments are underway to further develop both. An experiment is underway for the physical diode with the application of an improved design, further protected chips and the physical size of the box. The software is currently being experimented on with industry protocols, increasing throughputs and deploying diodes in a dual unidirectional design.

The OSDD has now successfully passed a field test in an Enexis high-voltage substation. Enexis has become an active partner and has expressed its wish to contribute to the further development of the OSDD and to also purchase it as soon as the diode goes into production (in high volumes).

Research is being conducted with a number of Dutch companies