Science and Technology

## INFRASTRUCTURE RESILIENCE & SECURITY

# TIME-BASED SERVER MANAGEMENT SYSTEM FOR NETWORKED ENDPOINTS

### SOFTWARE INNOVATION THAT INITIATES AND MANAGES SYSTEM DOWNTIME TO PREVENT HACKING.

Operating systems have vulnerabilities at every entry and exit point – including applications, ports, physical connectors, etc. – making them susceptible to attacks by hackers during off-hours or when systems are left unattended. These vulnerabilities are especially common when endpoints require intermittent communication with a central system but can remain offline for extended periods.

Researchers at the Transportation Security Administration have created a Time-Based Server Management System for Networked Endpoints (TBSMS) that prevents hackers from probing operating systems during off-hours. TBSMS disables network interfaces according to a predefined schedule, reducing the endpoints' vulnerability windows. The system also randomizes future connection parameters, offering an additional layer of protection and making it difficult for hackers to predict vulnerable periods. The innovation seamlessly integrates with a wide range of existing networking systems, including firewalls, VPNs, and identity authentication systems.

## KEY BENEFITS

+ Reduces endpoint and server vulnerability
+ Prevents hacking incidents by minimizing vulnerable system windows
+ Low-cost integration with existing network systems

## STAGE OF DEVELOPMENT

Conceptual

## PARTNERSHIP SOUGHT

License

## INVENTORS

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## DHS COMPONENT

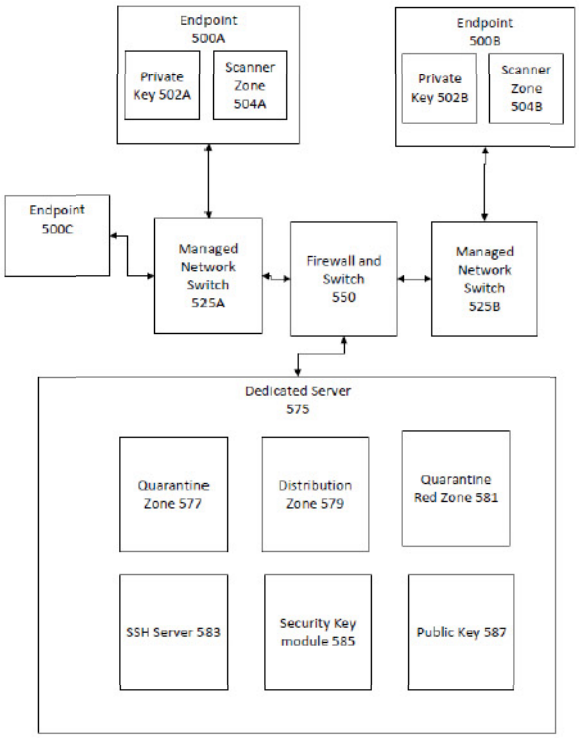
Transportation Security Administration

The Technology Transfer and Commercialization Branch (T2C) within the Office of Industry Partnerships (OIP) of the Department of Homeland Security (DHS) Science and Technology Directorate (S&T) serves as the centralized point to manage technology transfer activities throughout DHS and the DHS laboratory network. **T2C@hq.dhs.gov**

# THE TECHNOLOGY

The software innovation comprises a system with timing circuits controlling network endpoint interfaces. The endpoint-network interface timing circuits are configured to automatically turn off after the network interface has transmitted or received information, limiting access to the endpoint. The system contains reservations for users expected to enter or leave a system within a certain time window, network entrance, or network exit. A setup controller can design the endpoint timing circuit, manage the reservation system, establish a second endpoint connection to the secure network, and restore connectivity to endpoints that lost connection to the secured network. The system can also be configured to run during random windows of time in which the server is online and available to transfer files between individual endpoints.

The notional system includes antivirus software configured to protect the server from viruses transmitted by the endpoints in case a malicious actor gains access to the network. In addition, the system contains a firewall to conduct deep packet inspection, a VPN client, and additional software to facilitate secure transmissions between the endpoints and server. The system can also scan transmitted records and run statistical analysis on data from multiple servers to bolster network monitoring and performance.




*A scheduled operational technology data exchange and device setup view. A managed network switch is connected to endpoints 500A and 500C, while endpoint 500B is connected by a second managed network switch, 525 B. The operating system of the endpoint can be configured to only allow network traffic to and from the IP address of the server and specified server ports.*

TECHNOLOGY SOLUTION

## APPLICATIONS

**The technology has several potential end users:**

+ **Security equipment systems**
+ **Medical equipment systems**
+ **Manufacturing equipment and systems**

## PATENT INFORMATION

**US Patent Application number: 18/383,395**

**US Issued Patent numbers: 12,095,738 and 12,095,739**

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**FOR MORE INFORMATION ABOUT THE DHS TECHNOLOGY TRANSFER & COMMERCIALIZATION BRANCH:**

https://www.dhs.gov/science-and-technology/technology-transfer-program