



Flash Memory Summit

Moving Target Defenses for Data Storage Devices

Donald E. Matthews
Founder and CEO
NexiTech, Inc.



Flash Memory Summit

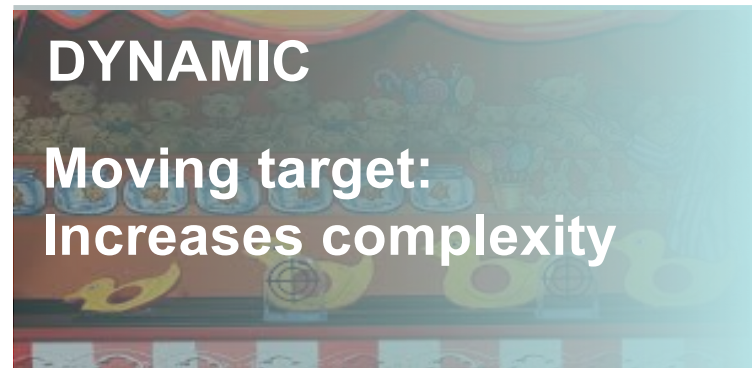
Moving Target Defenses for Data Storage Devices

- **What** we do
 - Layers and fit
 - Foundational work
- **How** we do it
 - Technical attributes
 - Reference architecture
- **Why** does it matter to you?



Flash Memory Summit

What is Moving Target Defense?



- ✓ Increases the cost of the attacker's efforts
- ✓ Reduces the attacker's window of opportunity



Flash Memory Summit

Changing Multiple Dimensions of the Attack Surface

**MOVING
TARGET
DEFENSE**



Flash Memory Summit

Storage Threat Layering

Multiple attack vectors are available

Multiple vendors protect most layers

NexiTech stands alone
with comprehensive
Moving Target Defense
at the Data Storage Layer

Identity Management
VPN, SSO, Authentication

Web Application Security/
Content Filtering

Application Memory

Operating System

Server Hardware

↑ reads

↓ writes

DATA STORAGE SYSTEMS

Enclosures
power, cooling

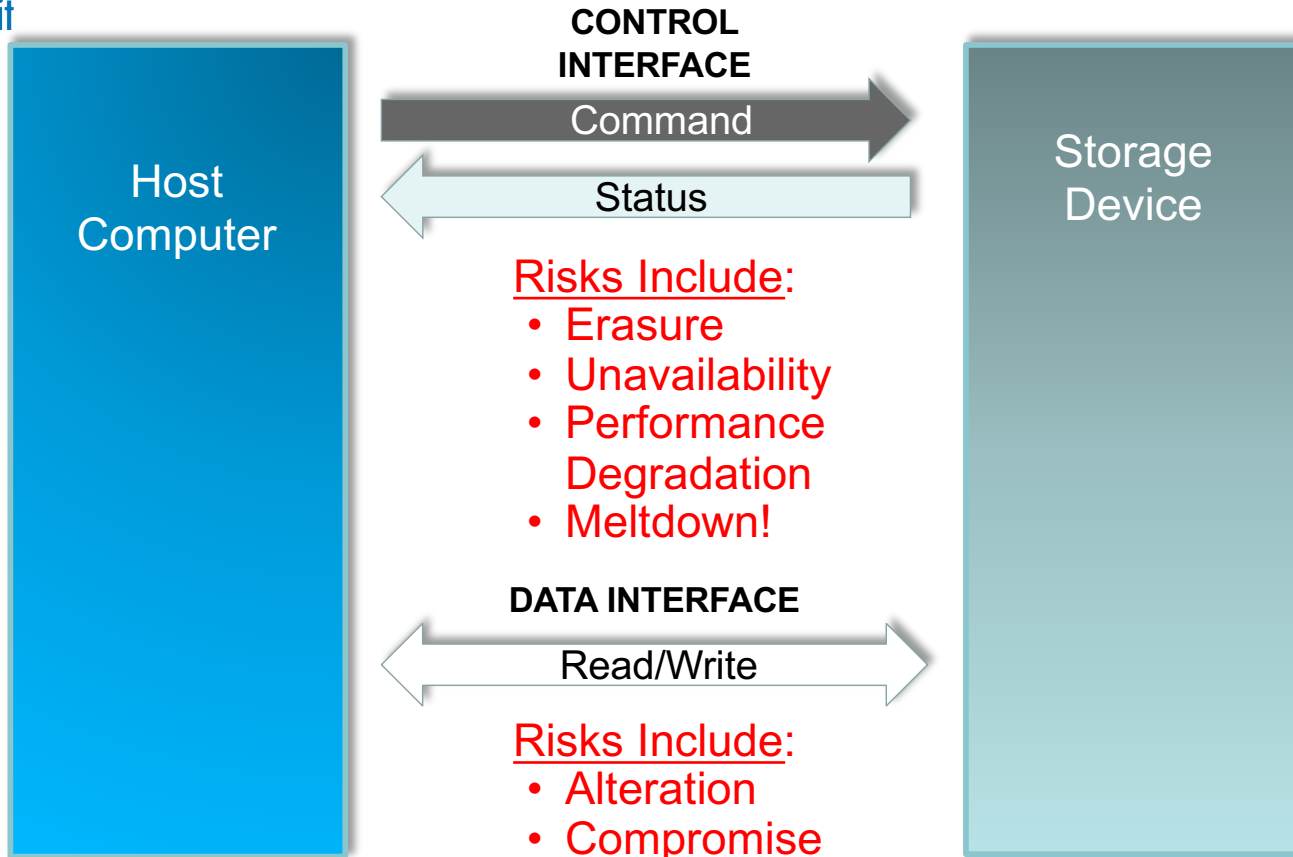
Data in Motion

Solid State Drives

Data at Rest

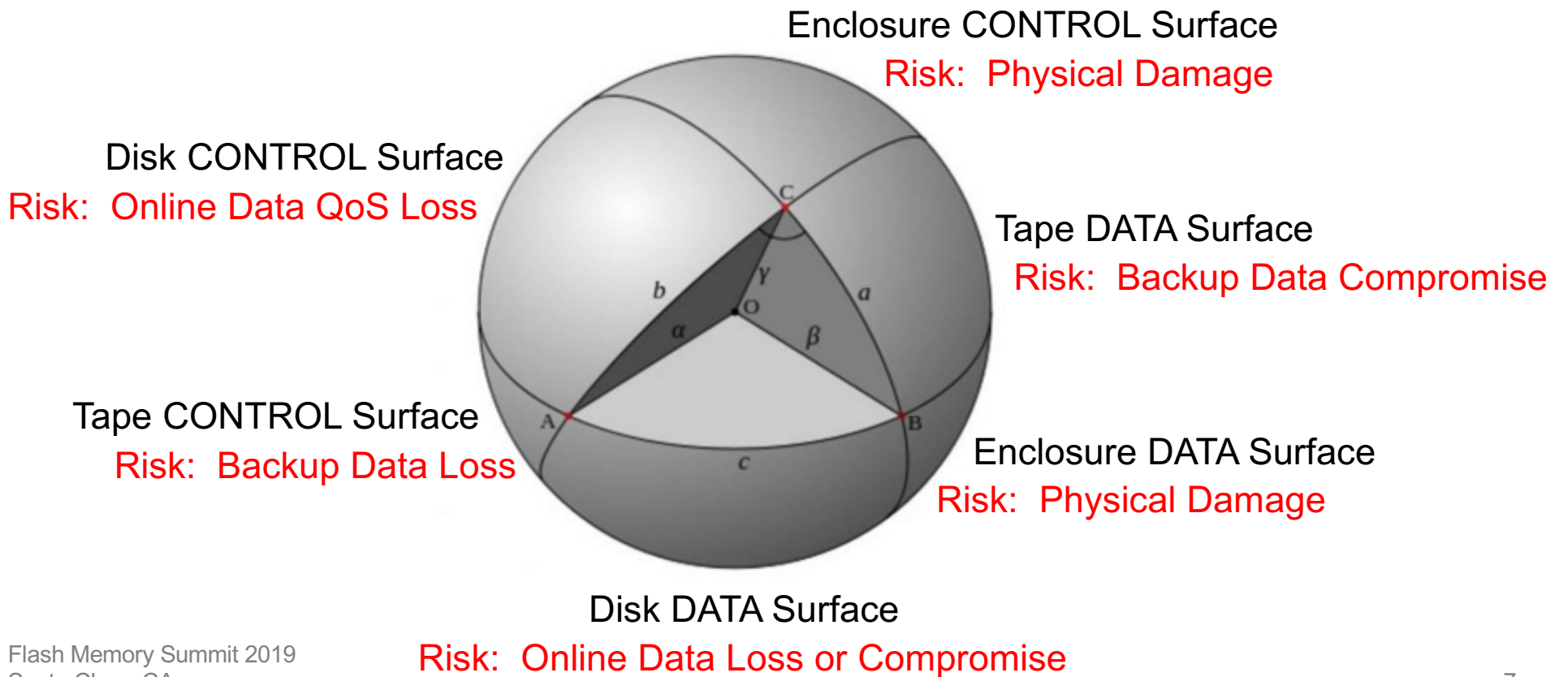


Storage Attack Surfaces





Storage Attack Surfaces





Flash Memory Summit

Market Landscape

Cyber Security Domain

Data Storage Domain





Flash Memory Summit

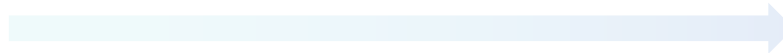
Successful Customer Examples

Mission
Planning
Environments



2009

Flash Memory Summit 2019
Santa Clara, CA



Silicon Valley
Innovation Program



2019



How It Works



An autonomous system that randomly changes multiple dimensions of the attack surface, making it unpredictable to adversaries.

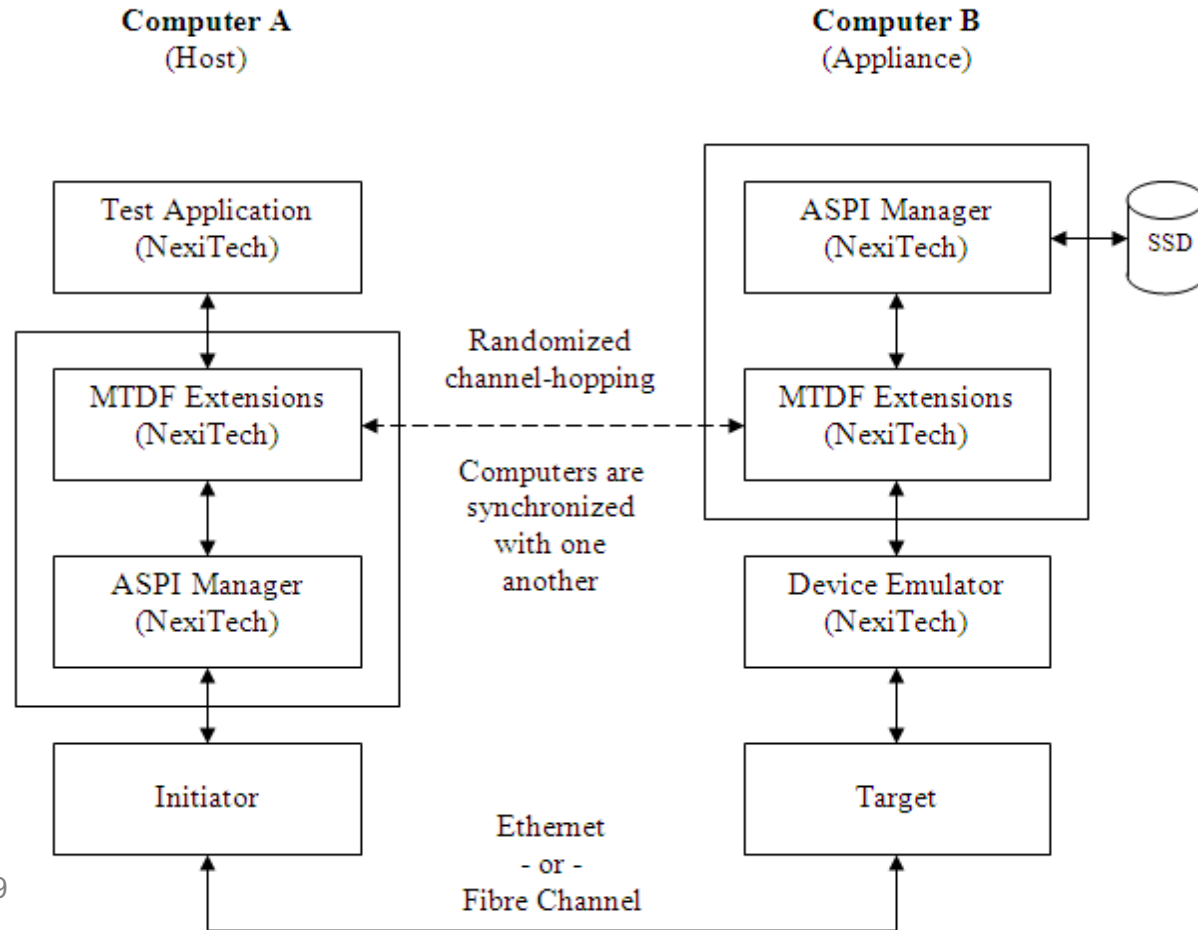


Technical Solution

- **Isolate the device**
 - Change the device type from "disk" to "unknown" inside a storage appliance.
 - Create multiple abstractions of the device using storage virtualization.
- **Obfuscate the command set**
 - Change the command set for the device inside the appliance.
 - Makes it more difficult for an attacker to access the device, but not impossible.
- **Now introduce a Moving Target Defense (MTD)**
 - Change the communications channel from one command to the next.
 - Change the command set itself from one command to the next.
- **Statically link the interface library (optional)**



Reference Architecture





Technical Attributes

Flash Memory Summit

- Autonomous
- Multi-dimensional
- Uses randomization
- Unpredictable by adversaries
- Dynamic network configuration
- Gathers metrics and reports breaches
- Optionally may use a Honeypot (i.e. Decoy)
- Address Space Layout Randomization (ASLR)
for DATA STORAGE



Flash Memory Summit

Technical Capabilities

- **Dynamic Networks**
 - Protocol Obfuscation
 - Network Address Space Randomization
 - End Point Route Mutation
- **Protection of Legacy Systems and Devices**
 - Obsolete/Unsupported OS (including Windows XP)
 - Embedded Systems Firmware
 - Real-time Embedded Systems
 - Kernel-mode device drivers for both Windows and Linux



Flash Memory Summit

Where Are We Headed?

- Evolving the technology (Patent Pending)
- Expanding market opportunities
- Forming a network of partnerships
- Exploring a broad range of additional use cases, including NVMe-oF





Flash Memory Summit

The Last Line Of Defense





Flash Memory Summit

Conclusion

- The core technology is adaptable
- It uniquely protects data-in-flight for the storage DATA surface and also the storage CONTROL surface
- Can exist in an appliance ...
- Or can be embedded in the device itself



Flash Memory Summit

Let's Start a Conversation!

Donald E. Matthews
Founder and CEO
matthews@nexitech.com
719-687-3225
www.nexitech.com