Toward Protecting Internet-Accessible Legacy Systems

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Legacy Systems

What are they? Outdated technologies still in active use.

The Problem: Cannot integrate with current technologies/functionality AND large structurally embedded security issue in critical sectors.

Key Driver: "Technical Obsolescence" – growing gap between a system's original design and its current use.

Why do organizations keep them?

- Stable, predictable, well-understood, & operational
- High replacement cost including transition risks
- Operational dependency

Characteristics of Legacy Systems

Beyond End-of-Life Support:

No more updates or maintenance from the vendor.

No Longer Available for Purchase:

Relies on obsolete technology.

Shrinking Workforce:

Requires developers with expertise in outdated languages.

High Maintenance:

Frequent and time-intensive repairs.

Vulnerability Exploitation:

Exposed to cybersecurity vulnerabilities without patches.

Case Study: Scientific Instruments

High-value, sensitive scientific instruments shared globally.

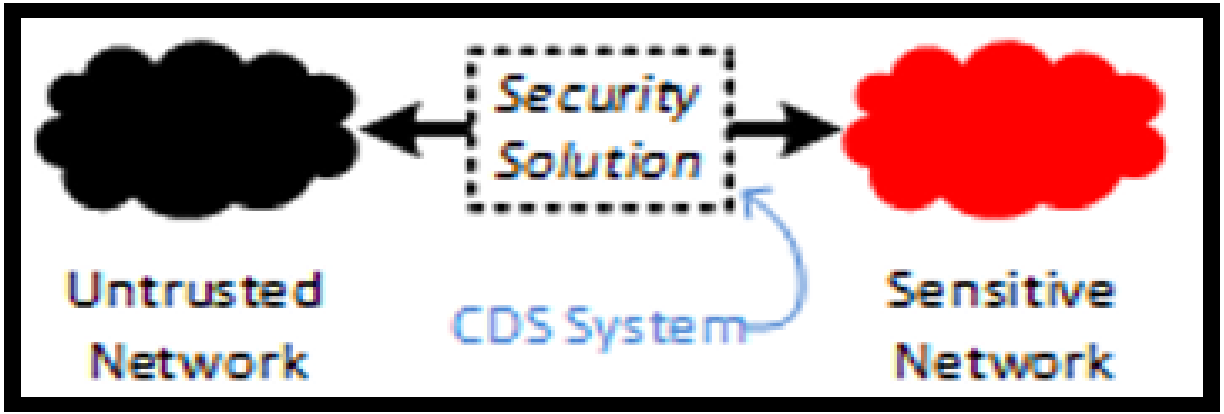
Key Challenges:

- Instruments outlast software/OS lifecycles.
  (20-30 years vs 2-8 years)
- Embedded software tied to outdated OS.
- Security patches and upgrades are difficult.

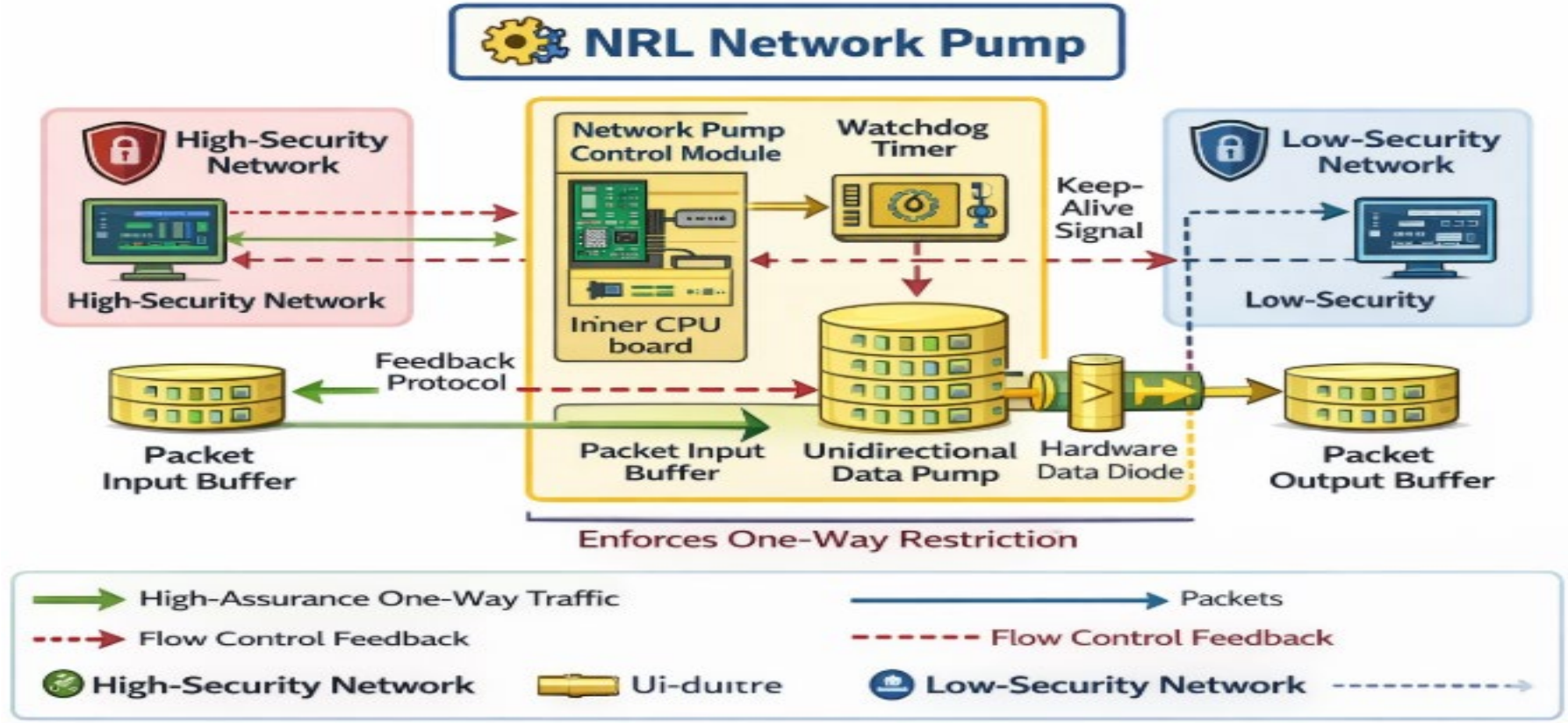
Potential Solutions

- Cross-Domain Solutions
- NRL Network Pump
- Network Data Diode
- Cloudlet Edge Computing

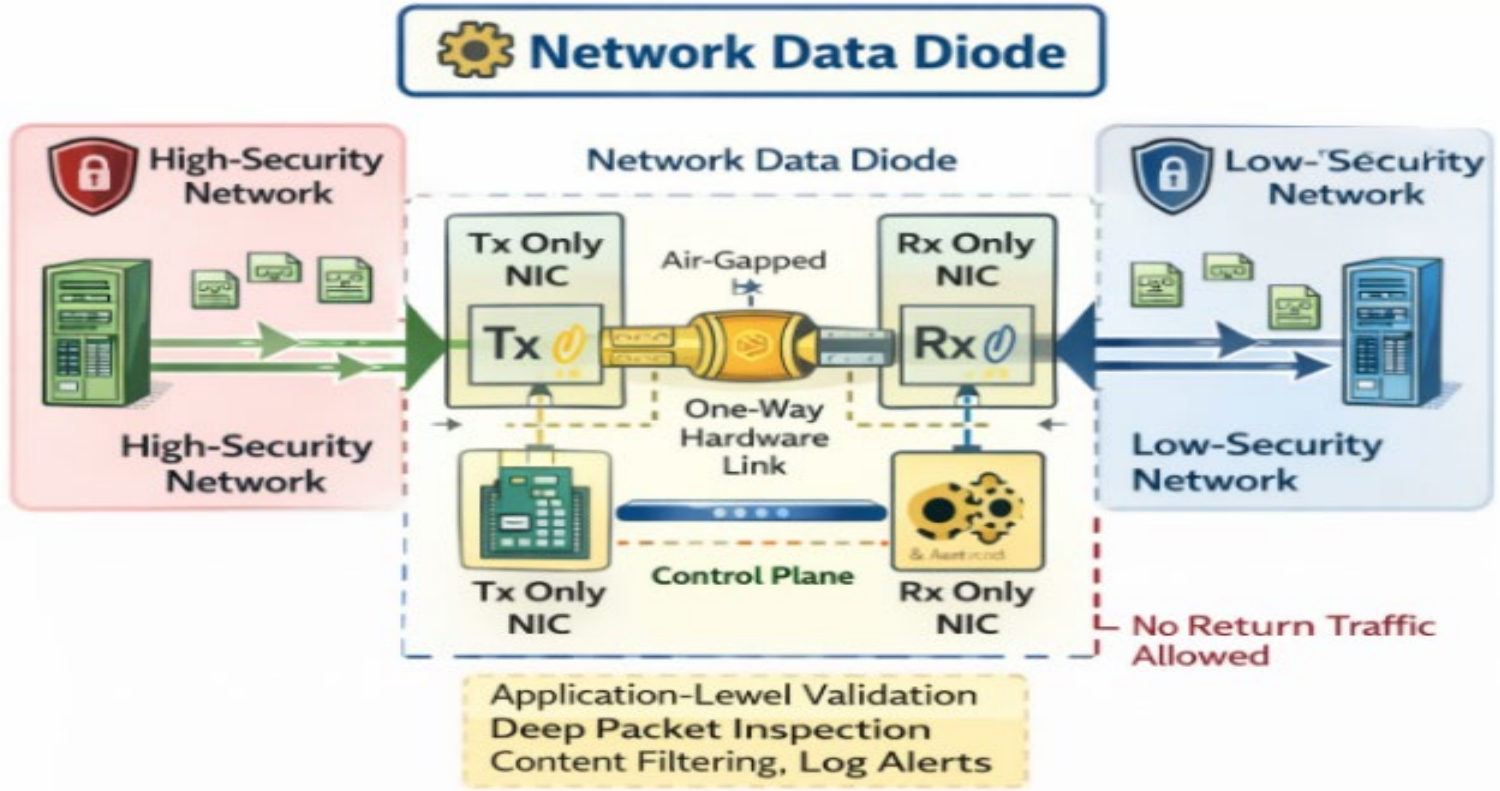
Cross-Domain Solutions



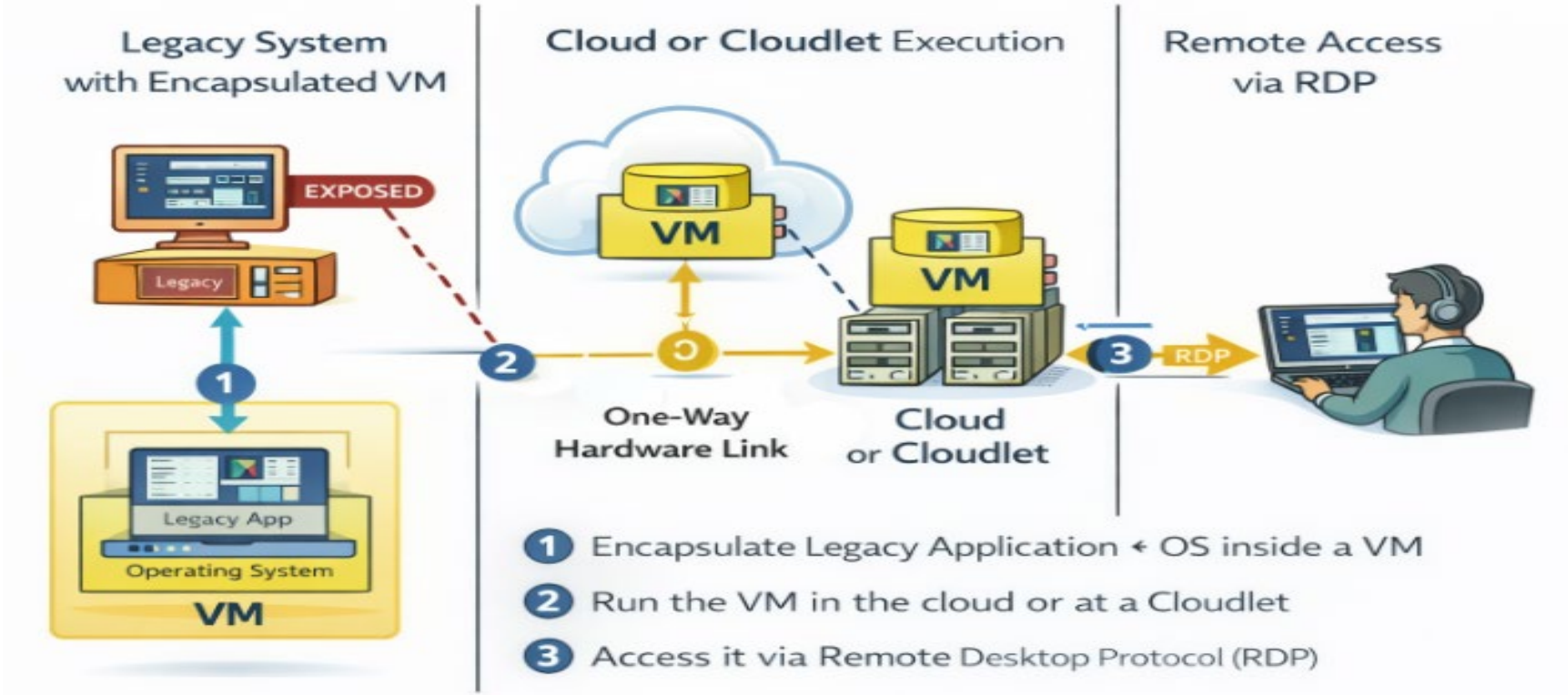
NRL Network Pump



Network Data Diode



Cloudlet Edge Computing



Conclusions & Future Work

The security problem with legacy systems is critical, widespread, and economically entrenched.

Potential Solutions Presented:

1. Controlled Sharing Between Trust Zones (Cross-Domain Solutions)
2. Highly-Controlled SW Mapping Data Transfer (NRL Network Pump)
3. Hardware One-Way Air Gap Data Transfer (Data Diodes)
4. Architectural Relocation of Systems to Virtual Cloudlets (EdgeVDI)

Future Work: Experiment, test, and share empirical research results for these potential solutions!