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COLD CHAIN CYBERSECURITY IN INDIA

Lessons from Europe's Supermarket Fridge Hacks

1. Latest News

Overnight on October 11–12, 2026, hackers seized control of refrigeration systems at approximately 700 retail sites in France, spiking temperatures to melt ice off cooling coils, spoiling food, and triggering at least 15 fires, as per France's cybersecurity agency ANSSI.

A second wave in early November hit stores across eight European countries. Separately, an attack on a refrigeration equipment supplier affected three sites of France's national blood service — though alarms allowed staff to save blood products in time.

These incidents expose a critical vulnerability: as refrigeration goes digital, it becomes a cybersecurity target, with direct implications for India's own cold-chain infrastructure.

2. Who's Behind the Attacks?

Recently, France accused Shahid Kaveh, a unit linked to Iran's Revolutionary Guard Corps (IRGC), of orchestrating the October attacks — a charge Iran has denied.

Authorities have not confirmed the same group carried out the subsequent attacks.

Separately, cybersecurity firm Lupovis detected suspicious activity against simulated refrigeration controllers (honeypots) between October 20–30, with 250+ login attempts from 91 sources, possibly linked to a Russian state-sponsored group (which Russia denies), though attribution remains unconfirmed.

3. How Cold Storage Systems Actually Work

A cold-storage facility is essentially a large, insulated refrigerator, often divided into rooms at different temperatures.

Cooling relies on a refrigerant that absorbs heat as it circulates through coils, with a compressor releasing that heat outside the cooled space.

Sensors continuously monitor temperature, sending data to an electronic controller — often a Programmable Logic Controller (PLC), an industrial computer managing compressors, fans, and pumps.

The controller also manages defrost cycles — periodically melting ice buildup on coils, which otherwise obstructs airflow and reduces efficiency.

4. Why Connect Refrigerators to the Internet?

Traditionally, staff manually checked and recorded temperatures. Internet connectivity — part of the Internet of Things (IoT) — allows businesses to:

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- Monitor temperatures and performance remotely, in real time.
- Receive alerts before stock spoils.
- Diagnose faults and manage multiple sites from a single system.
- Allow authorised staff/vendors to adjust settings remotely (temperature, alarms, defrost cycles).

Trade-off: Improved efficiency and response times, but increased cyber risk if controllers are poorly secured.

5. How Attackers Exploit Refrigeration Systems

Controllers become vulnerable when directly exposed to the internet or accessed via poorly secured remote connections.

Attackers exploit weak/default passwords or outdated software vulnerabilities.

Critical risk: Attackers can pivot from corporate IT networks into Operational Technology (OT) systems controlling physical equipment — a pattern seen repeatedly in past security incidents.

Equipment lifespan problem: Unlike laptops (replaced every 3–5 years), refrigeration equipment can run for 15–20 years — often well past the point manufacturers stop providing security updates, even though it remains mechanically functional.

6. Potential Impact on Food Supply Chains

- Farmers risk income loss if produce spoils or cannot be collected.
- Food processors, retailers, and logistics companies face stock losses and supply delays.
- Consumers could face shortages or price hikes.

Expert assessment: A single facility attack is unlikely to cause a nationwide food crisis, but disruption to a major distribution hub could affect multiple cities/regions — especially if several facilities share the same refrigeration vendor/platform, turning one vulnerability into a wider cascading failure.

7. What This Means for India's Cold Chain

As per a February 2026 Rajya Sabha response, India has 8,831 cold-storage facilities with combined capacity of approximately 40.3 million metric tonnes.

Risk Concentration

Facilities using internet-connected refrigeration, remote monitoring, and external vendor access are most exposed — including:

- Organised retail chains.
- Dairy chilling facilities.

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- Pharmaceutical warehouses and vaccine storage centres.
- Large distribution hubs.
- Refrigerated transport using connected fleet-management systems.

Lower-risk segment: Traditional potato cold-storage facilities are less exposed, as their equipment is mostly locally controlled, not internet-connected.

8. Who's Responsible for Securing These Systems?

Security is a shared responsibility across equipment manufacturers, software providers, system integrators, maintenance contractors, and operating businesses.

- Manufacturers: Responsible for secure equipment and timely software updates.
- Operators: Must monitor connected devices and control access.

For older equipment without updates, experts recommend restricting access rather than mandatory replacement.

Global regulatory reference points: UK/EU network and information security rules, and the EU Cyber Resilience Act's requirements for product suppliers.

9. India's Current Policy Framework — and Its Gaps

The National Centre for Cold-chain Development (NCCD)'s Engineering Guidelines & Minimum System Standards (2025) encourage IoT-based monitoring and unified control systems for government-funded facilities.

Key gap: These guidelines do not specify detailed cybersecurity requirements — such as secure remote access, network separation, authentication, or update protocols.

Separately, CERT-In's May 2026 cybersecurity blueprint identifies Operational Technology (OT) and cyber-physical systems as priority protection areas, recommending restricted remote access, third-party vendor monitoring, and supply-chain risk management.

10. Recommended Safeguards

- Strong passwords and multi-factor authentication.
- Keep critical controllers off the public internet.
- Deploy independent temperature sensors and alarms (as proved vital in the French blood-service case).
- Maintain manual monitoring procedures as backup if automated controls fail.

Policy-level recommendation: Incorporate cybersecurity requirements into cold-chain infrastructure standards and government funding conditions, with regular security assessments for facilities storing essential food and medical products.

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11. Conclusion

The European fridge hacks reveal how digitising critical infrastructure, without matching cybersecurity investment, creates new vulnerabilities with real-world consequences — spoiled food, fires, and endangered medical supplies.

As India expands IoT-based cold-chain automation, embedding robust cybersecurity standards into infrastructure guidelines and funding conditions is essential to prevent similar disruptions to its food and healthcare supply chains.

