

# Beyond bug hunting:

## How Trail of Bits helped Turnkey build better systems

When building secure infrastructure, organizations need consultants who dig deeper beyond just finding bugs. They need experts who understand their systems, testing, and methodology to identify patterns and help their team improve their secure development lifecycle.


When Turnkey needed to secure their TEE and AWS Nitro Enclaves infrastructure, they chose Trail of Bits for their holistic approach that helped them improve across three key areas:


**Architecture**  
Standardizing key hierarchy and improving enclave-to-enclave verification


**Protocol Selection**  
Implementing HPKE for encryption needs


**Documentation**  
Enhancing processes and code clarity

**Cross-disciplinary technical depth**  
Our engineers combine specialized knowledge across multiple security domains to solve complex technical challenges. For Turnkey, this meant having experts in **AppSec**, **Blockchain**, and **Cryptography** collaborate on their TEE and secure enclave infrastructure.

  
AI/ML

  
Application Security

  
Blockchain

  
Cryptography

### Research that matters

Security teams rely on our research to understand emerging technologies and complex security challenges. These publications directly supported Turnkey's work with TEEs, secure enclaves, and cryptographic protocols:

- [A few notes on AWS Nitro Enclaves: Attack surface](#)
- [A few notes on AWS Nitro Enclaves: Images and attestation](#)
- [A trail of flipping bits](#) • [Enhancing trust for SGX enclaves](#)

### Strong communication and collaboration

From kick-off meetings through implementation, we maintain active technical discussions that help teams address findings promptly and make informed decisions. This collaboration extends beyond the audit, with Turnkey highlighting, "Having an open line of communication with the team has been very valuable to us and we hope to keep this dialog open going forward!"

### Trail of Bits works with innovative and industry-leading projects like Turnkey

Turnkey secures the open internet by making crypto security accessible to developers. Their innovative use of TEEs and AWS Nitro Enclaves enables verifiable computation and remote attestation in the blockchain space. As the first company to leverage this technology for securing crypto private keys, their infrastructure creates a trustless bridge between traditional web APIs and crypto authentication.

**Building a system with end-to-end cryptographic attestations means getting the details right across reproducible builds, TEEs, and verification protocols. Trail of Bits' expertise with Nitro Enclaves provided valuable technical recommendations on our security architecture in ways that went beyond typical security reviews."**

Turnkey on working with Trail of Bits