Modware: Secure Modbus Communication For Devices Without Complex Networking Stacks

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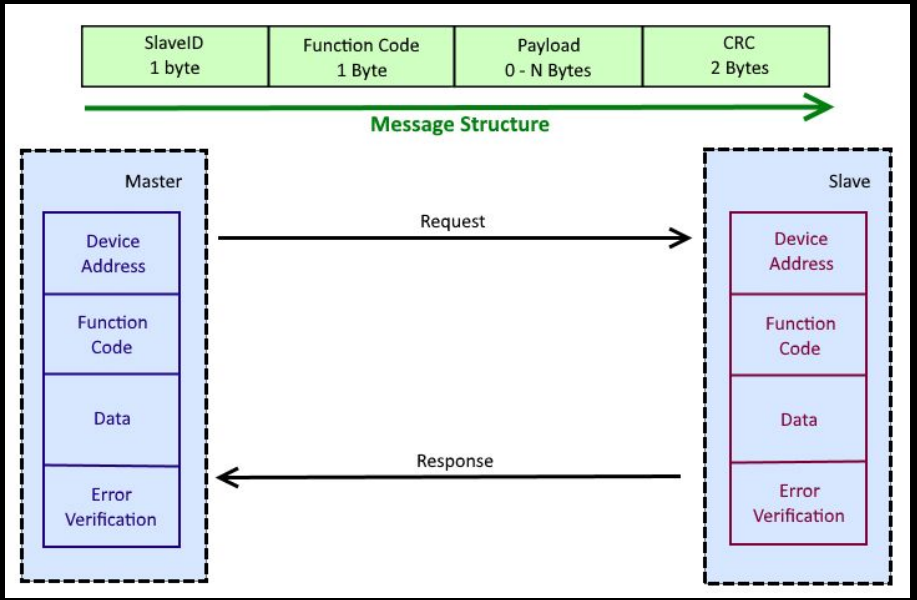
What is Modbus?

- Communication Protocol
- Connects Industrial Devices
- Master-Slave Architecture
- Developed in 1979



Why Secure Modbus?

- Developed in 1979
  - Security wasn't invented back then
- "Don't speak unless spoken to" protocol
- Susceptible to MITM, gratuitous server requests, etc
  - Ask me about my Capstone Project
- Some devices don't have complex networks stacks

What has already been done?

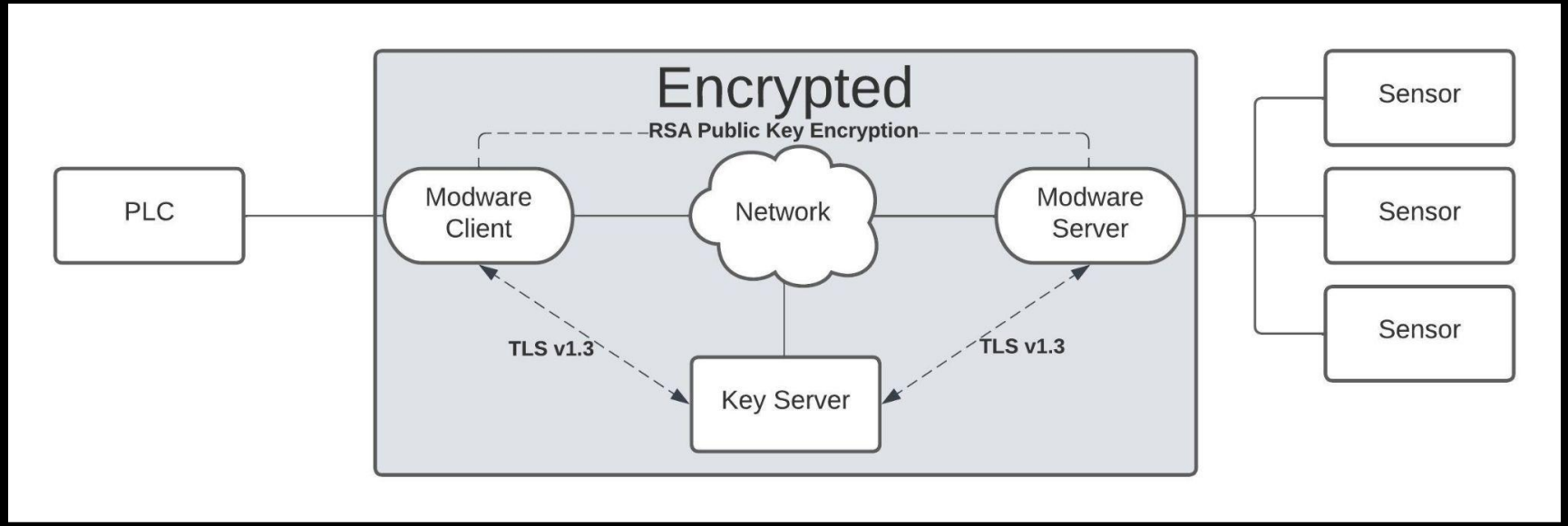
- Inherently Insecure
- Security Add-ons and Extensions
  - Modbus/TCP Security (IEC 62443)
  - Secure Authentication (RFC 6347)
- Encapsulation in Secure Protocols
  - VPNs, TLS, IPsec
- Network Segmentation and Firewalls

Why our solution?

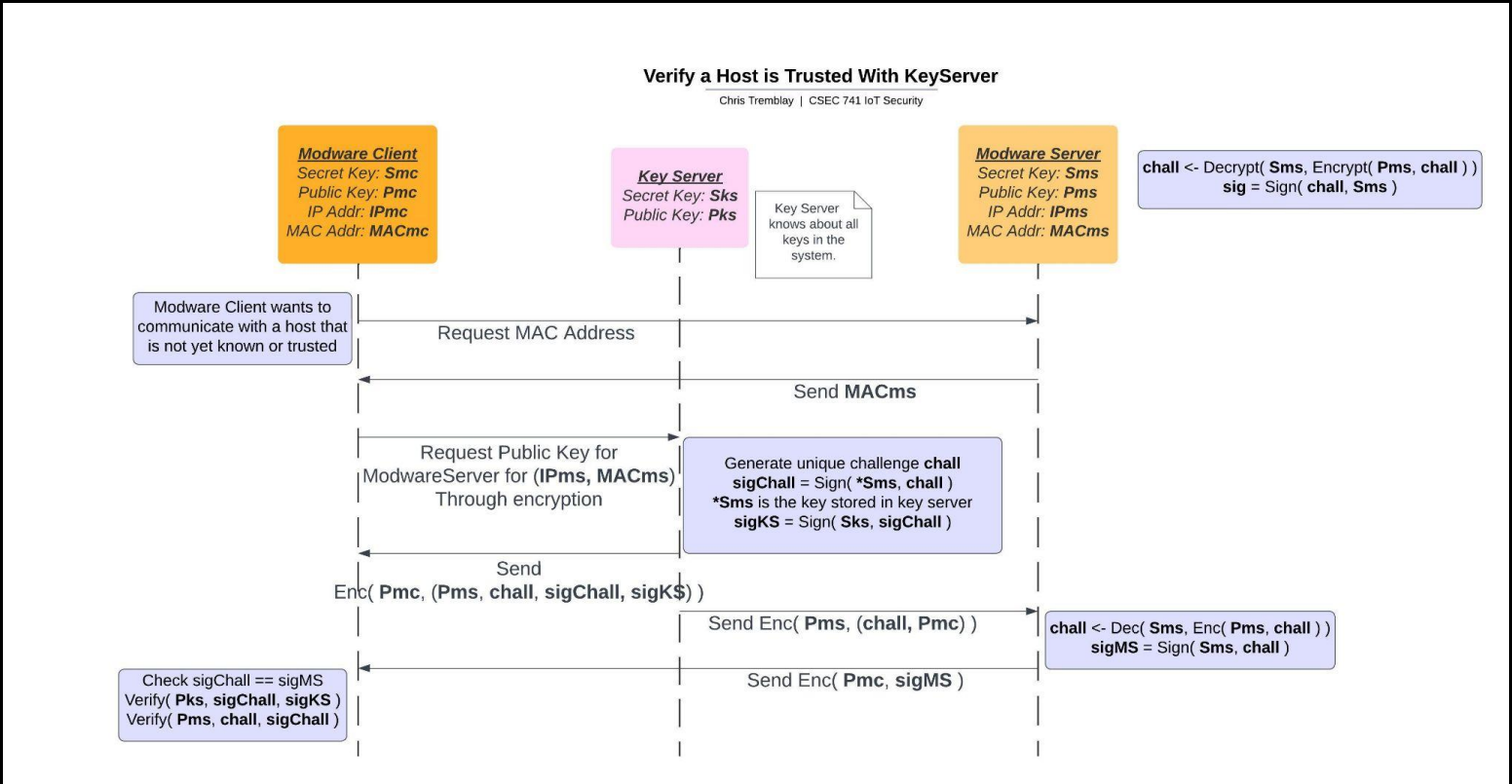
- Support for legacy hardware
- Minimal Integration with existing architecture
- Confidentiality, Integrity, and Non-Repudiation

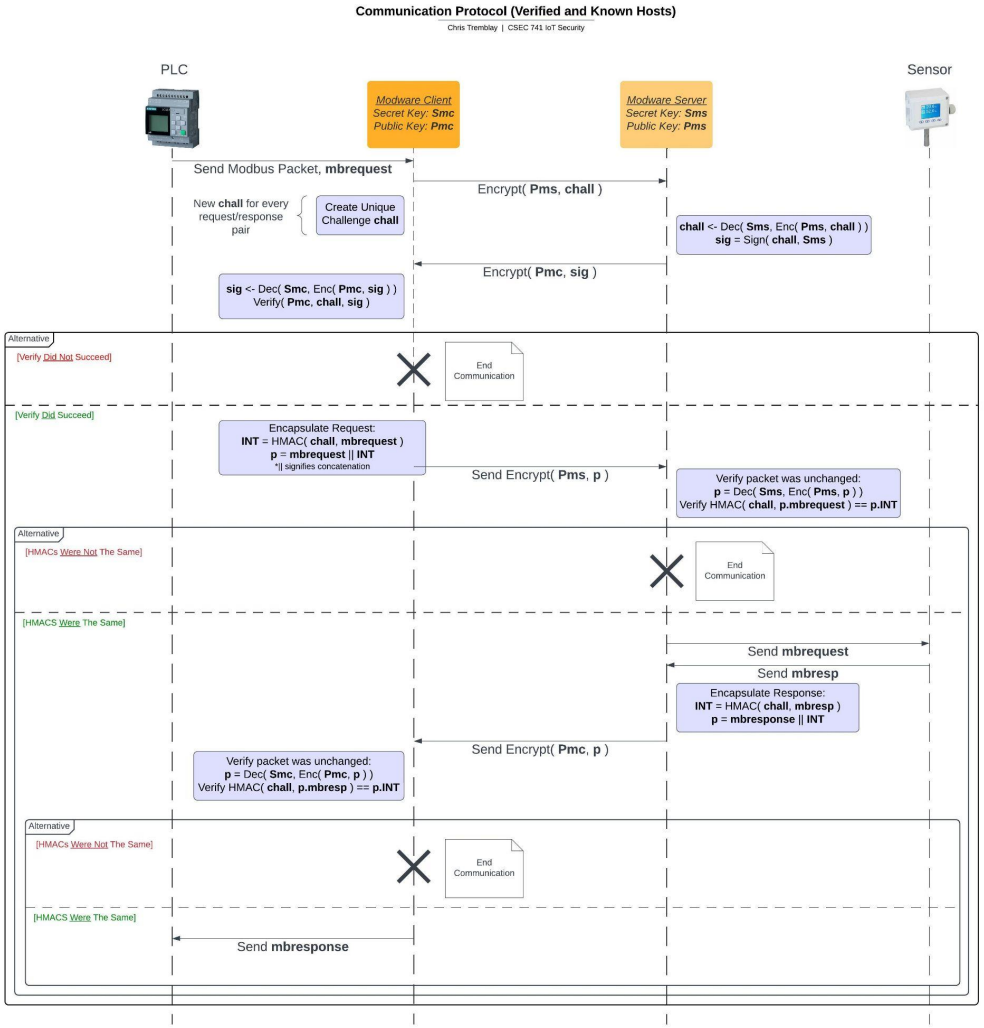
Basic Architecture

Middleware inline after client devices, and before server devices



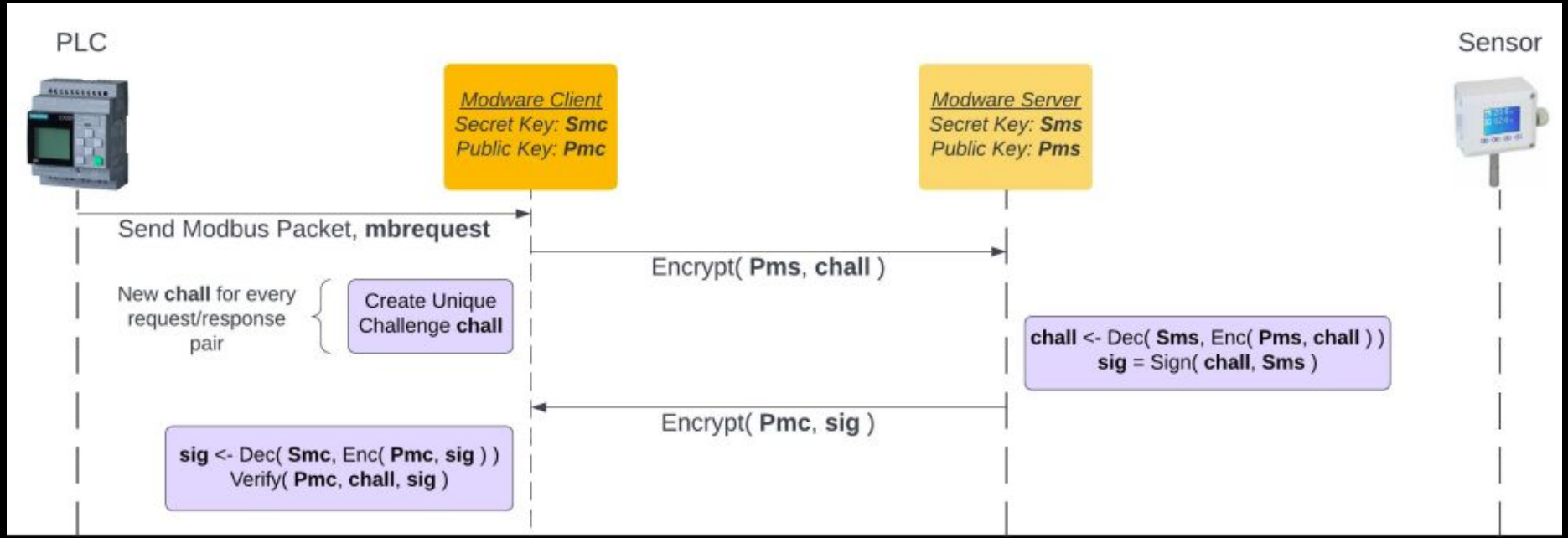
Verify Server Identity Before Communication



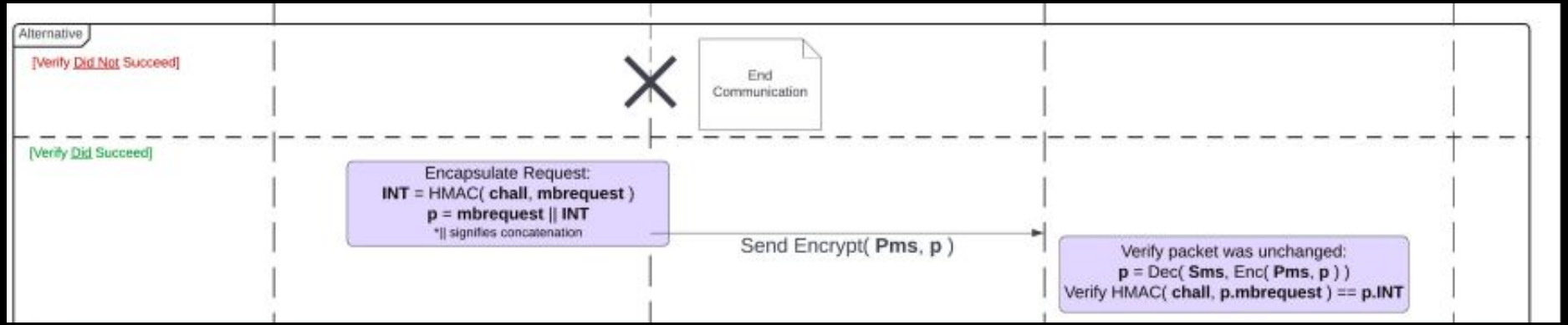


Communication Between Verified Hosts

Send Server a Challenge For Liveliness

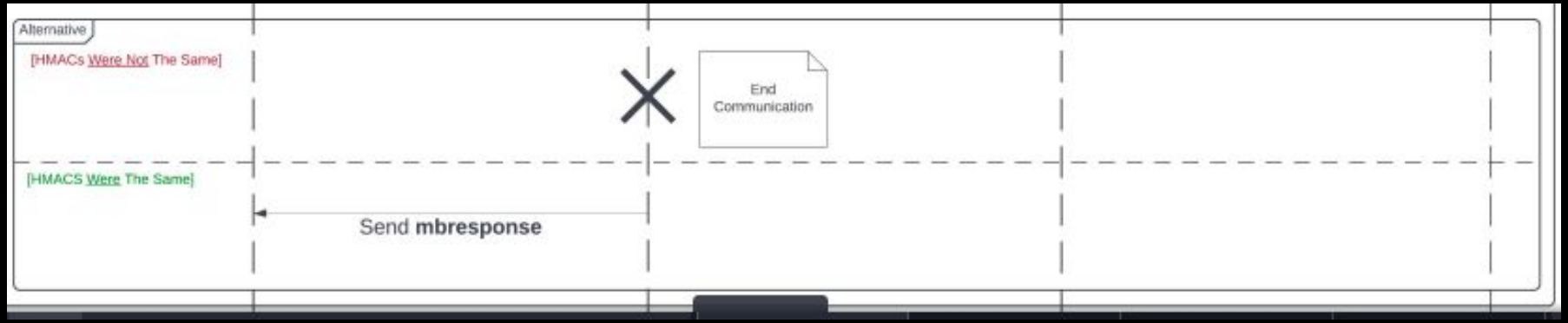


If Server Passes Challenge, Then Send Packet



De-Encapsulate Request → Encapsulate Response

De-Encapsulate Response



References

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Thank you!