Abstract
Since early civilizations, humans have always been interested in transportation. Modern vehicles have navigation systems, driver assisted devices, and a whole lot of safety features. Vehicular Ad hoc Networks (VANET) employ wireless technologies to enable communications among vehicles, communication infrastructures among road sides, and other devices such as smartphones to improve traffic efficiently and road safety. VANET inherit the intrinsic security problems associated with wireless networks. A fundamental security requirement in VANETs is message authentication. Message authentication ensures messages received in the same condition as being sent. This work develops an integrated environment with simulation packages of vehicle traffic in the physical world and communication data in the cyber space and with modeling tools of authentication schemes. The user-friendly environment facilitates collaboration among domain experts, information technologists, policy makers, and workforce trainers. The work studies the tradeoffs between security level, performance, and usability to evaluate proposed message authentication schemes for VANET.

Problem
- VANET’s high mobility and ad hoc feature render conventional message authentication methods inapplicable
- Symmetric cryptography, though efficient, is unsuitable in VANET because the dynamic nature prohibits key distribution
- Need for strong authentication in cyber-physical systems where vehicles are among the largest things in the Internet of Things (IoTs)

Impact
Ensure the integrity of communication messages for future autonomous vehicles

Future Work
- Evaluate the authentication protocols in drones
- Design more efficient message authentication schemes
- Integrate vehicle traffic, data communication, and security scheme simulations into a cohesive, easy to use, extensible system

Approach
Design and develop a framework that integrates transportation traffic and communication data simulators with security modeling to study the effectiveness of various message authentication schemes to secure VANET

VANET Overview
Vehicular Ad hoc Networks (VANET) typically consist of vehicles equipped with on-board units (OBU) and some roadside units (RSUs)

Technical Highlights

Key References

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