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UNIVERSITY OF DSCHANG

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DSCHANG SCHOOL OF SCIENCES AND TECHNOLOGY
Unité de Recherche en Informatique Fondamentale, Ingénierie et Application (URIFIA)

Secure Distributed Cluster Formation in Wireless Sensor Networks

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Context

Dans les réseaux de capteur les attaques malicieuses sont un problème réel Et plusieurs protocoles proposés ne résistent pas à l'attaque malicieuse dans des environnements hostiles



Problématique générale

Problématique générale

détection des noeuds malicieux dans les réseaux de capteur.



SECURE DISTRIBUTED CLUSTER FORMATION IN WIRELESS SENSOR NETWORKS



propriétés

Our secure distributed cluster formation protocol has the following properties even if there are external and insider attackers

- ☞ The protocol is fully distributed. Each node computes its clique only using the information from its 1-hop neighbors ;
- ☞ The protocol is guaranteed to terminate. Participating nodes that do not follow the protocol specification (e.g., send conflicting messages) will be identified and removed from all cliques ;
- ☞ After the protocol terminates, all normal nodes are divided into mutually disjoint cliques. All normal nodes are guaranteed to have consistent views on their clique memberships even in hostile environment ;



propriétés

Our secure distributed cluster formation protocol has the following properties even if there are external and insider attackers

- ➡ normal nodes are divided into mutually disjoint cliques ;
- ➡ all the normal nodes in each clique agree on the same clique memberships ;
- ➡ while external attackers can be prevented from participating in the cluster formation process, inside attackers that do not follow the protocol semantics can be identified and removed from the network ;
- ➡ the communication overhead is moderate ;



Assertion

- ➡ We assume each node knows its 1-hop neighbors
- ➡ We assume the sensor nodes can perform public key based digital signature operations.
- ➡ We assume the clocks of the normal nodes are loosely synchronized, as required by TESLA.
- ➡ We also assume the public keys used by the sensor nodes are properly authenticated



Protocol Specification

The protocol is summarized below :

- ➡ Step 1 : Each node exchanges its neighbor lists with its neighbors, and computes its local maximum clique.
- ➡ Step 2 : Each node exchanges its local maximum clique with its neighbors, and updates its maximum clique according to its neighbor nodes' local maximum cliques.
- ➡ Step 3 : Each node exchanges the updated clique with its neighbors, and derives its final clique.



Protocol Specification

The protocol is summarized below :

- ☞ Step 4 : Each node exchanges the final clique with its neighbors.
 - ▶ If no clique inconsistency is detected, it terminates successfully.
 - ▶ Otherwise, it enters Step 5.
- ☞ Step 5 : Each node performs conformity checking.
 - ▶ If it identifies malicious (neighbor) nodes, it removes them from the network, and restarts the protocol from Step 1.
 - ▶ Otherwise, it enforces the clique agreement and terminates.



Limite

👉 Currently, our protocol is suitable for static sensor networks, in which nodes do not move frequently



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