Refrigerated Transportation Sample Application for Azure Blockchain Workbench¶

Overview¶

The refrigerated transportation smart contract covers a provenance scenario with IoT monitoring. You can think of it as a supply chain transport scenario where certain compliance rules must be met throughout the duration of the transportation process. The initiating counterparty specifies the humidity and temperature range the measurement must fall in to be compliant. At any point, if the device takes a temperature or humidity measurement that is out of range, the contract state will be updated to indicate that it is out of compliance.

All participants can view the state and details of the contract at any point in time. The counterparty doing the transportation will specify the next counterparty responsible, and the device will ingest temperature and humidity data, which gets written to the chain. This allows the Supply Chain Owner and Supply Chain Observer to pinpoint which counterparty did not fulfill the compliance regulations if at any point in the process either the temperature or humidity requirements were not met.

Application Roles¶

Name Description InitiatingCounterParty The first participant in the supply chain. Counterparty A party to whom responsibility for a product has been assigned. For example, a shipper Device A device used to monitor the temperature and humidity of the environment the good(s) are being shipped in. Owner The organization that owns the product being transported. For example, a manufacturer Observer The individual or organization monitoring the supply chain. For example, a government agency

States¶

Name Description Created Indicates that the contract has initiated and tracking is in progress. InTransit Indicates that a Counterparty currently is in possession and responsible for goods being transported. Completed Indicates the product has reached it's intended destination. OutOfCompliance Indicates that the agreed upon terms for temperature and humidity conditions were not met.

Workflow Details¶

The following state transition diagram articulates the possible flows, and the various transition functions at each state. Each user is only allowed to take certain actions depending on the application role. Instance roles indicate that only the user with the application role assigned to the specific contract is able to take actions on the contract.

This contract demonstrates how to collect telemetry information and enforce contract specifics related to conditions during transport. Specifically, receiving and evaluating temperature and humidity data against an agreed upon acceptable range. If the IoT device identifies that the telemetry is out of the acceptable range, the contract will shift into an out of compliance state and appropriate remedies can be sought. In the highlighted happy path, the device ingests readings, which are in compliance throughout the transportation process, while the involved counterparties transfer responsibility until the transportation is completed.

Application Files¶

RefrigeratedTransportation.json

RefrigeratedTransportation.sol