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|----- MODULE SupplyChain -----|

EXTENDS Integers, Sequences
VARIABLES users, txns
CONSTANTS AddrRange, UIntRange, IntRange

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Last(s)  $\triangleq$  s[Len(s) - 1]
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DefaultDelegatedRp[addresss  $\in$  AddrRange]  $\triangleq$  FALSE
DefaultUser  $\triangleq$  [reputation  $\mapsto$  0, delegatedRp  $\mapsto$  DefaultDelegatedRp]
DefaultItemMeta  $\triangleq$  [id  $\mapsto$  0, name  $\mapsto$  ""]
DefaultPoint  $\triangleq$  [addr  $\mapsto$  0, latitude  $\mapsto$  0, longitude  $\mapsto$  0]
DefaultTxn  $\triangleq$  [source  $\mapsto$  DefaultPoint,
                destination  $\mapsto$  DefaultPoint,
                item  $\mapsto$  DefaultItemMeta,
                amount  $\mapsto$  0,
                expirationTimestamp  $\mapsto$  0,
                completed  $\mapsto$  FALSE]

|-----|
Point(addr, latitude, longitude)  $\triangleq$  [addr  $\mapsto$  addr,
                                       latitude  $\mapsto$  latitude,
                                       longitude  $\mapsto$  longitude]
DelegateUserRp(user, addr)  $\triangleq$  [user EXCEPT !.delegatedRp =
                                   [user EXCEPT ![addr] = TRUE]]
DelegateUsersRp(s, userAddr, votableAddr)  $\triangleq$  [s EXCEPT ![userAddr] =
                                                    DelegateUserRp(users[userAddr], votableAddr)]

|-----|
Init  $\triangleq$   $\wedge$  users = [address  $\in$  AddrRange  $\mapsto$  DefaultUser]
            $\wedge$  txns = [id  $\in$  UIntRange  $\mapsto$   $\langle \rangle$ ]

Pay(msg, block,
    sourceLatitude, sourceLongitude,
    destinationLatitude, destinationLongitude,
    item, completionTime, destination)  $\triangleq$ 
IF  $\wedge$  msg.value > 0
   $\wedge$  Len(txns) > 0  $\Rightarrow$   $\neg$  txns[Len(txns) - 1].completed
THEN
   $\wedge$  users' = users
   $\wedge$  txns' = [txns EXCEPT ![item.id] = txns  $\circ$  [
    source  $\mapsto$  Point(msg.sender,
                      sourceLatitude,
                      sourceLongitude),
    destination  $\mapsto$  Point(destination,
                          destinationLatitude,
                          destinationLongitude),

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    item  $\mapsto$  item,
    amount  $\mapsto$  msg.value,
    expirationTimestamp  $\mapsto$  block.timestamp + completionTime,
    completed  $\mapsto$  FALSE]]
ELSE
     $\wedge$  users' = users
     $\wedge$  txns' = txns

Acknowledge(msg, block, id)  $\triangleq$  IF  $\wedge$  Len(txns[id]) > 0
     $\wedge$  Last(txns[id]).completed
    THEN
         $\wedge$  users' = users
         $\wedge$  txns' = [txns EXCEPT ![id] =
            [txns[id] EXCEPT !.completed = TRUE]]
    ELSE
         $\wedge$  users' = users
         $\wedge$  txns' = txns

Cancel(msg, block, id)  $\triangleq$  IF  $\wedge$  block.timestamp > txns[id].expirationTimestamp
     $\wedge$  Len(txns[id]) > 0
     $\wedge$   $\neg$ Last(txns[id]).completed
     $\wedge$  msg.sender = Last(txns[id]).source.addr
    THEN
         $\wedge$  users' = DelegateUsersRp(
            DelegateUsersRp(users,
                Last(txns[id]).source.addr,
                Last(txns[id]).destination.addr,
                Last(txns[id]).destination.addr,
                Last(txns[id]).source.addr)
             $\wedge$  txns' = Head(txns)
    ELSE
         $\wedge$  users' = users
         $\wedge$  txns' = txns

Vote(msg, block, person, positive)  $\triangleq$  IF  $\wedge$  users[msg.sender].delegatedRp[person]
    THEN
         $\wedge$  txns' = txns
         $\wedge$  IF positive
            THEN users' =
                [users EXCEPT ![person] =
                [users[person] EXCEPT !.reputation =
                users[person].reputation + 1]]
            ELSE users' =
                [users EXCEPT ![person] =
                [users[person] EXCEPT !.reputation =
                users[person].reputation - 1]]

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ELSE
   $\wedge$  users' = users
   $\wedge$  txns' = txns
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\ * Modification History
\ * Last modified Thu Sep 25 02:12:30 IST 2025 by SyedShaazibTanvir
\ * Created Thu Sep 25 00:28:26 IST 2025 by SyedShaazibTanvir
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