```
┌──────────────────────────── MODULE telephone ────────────────────────────┐
EXTENDS TLC, Sequences

VARIABLES
    to_send,
    received,
    in_transit,
    can_send,
    pc

vars ≜ ⟨to_send, received, in_transit, pc, can_send⟩

Init ≜
    ∧ to_send = ⟨1, 2, 3⟩
    ∧ received = ⟨⟩
    ∧ in_transit = {}
    ∧ can_send = TRUE
    ∧ pc = "init"

Send ≜
    Sends a message from to_send
    ∧ IF can_send ∧ to_send ≠ ⟨⟩
        THEN ∧ in_transit′ = in_transit ∪ {Head(to_send)}
             ∧ to_send′ = Tail(to_send)
             ∧ can_send′ = FALSE
             ∧ UNCHANGED ⟨pc, received⟩
        ELSE ∧ UNCHANGED vars


Receive ≜
    Receives a message from in_transit. Note: uncomment can_send′ = FALSE for enabling ACK
    loss. This will cause
      temporal properties to fail
    ∧ ∃ m ∈ in_transit :
        ∧ received′ = Append(received, m)
        ∧ in_transit′ = in_transit \ {m}
        ∧ ∨ can_send′ = TRUE
          ∨ can_send′ = FALSE
        ∧ UNCHANGED ⟨to_send, pc⟩

Process ≜
    Send or receive messages until all arrive at received
    ∧ pc = "init"
    ∧ IF Len(received) = 3
        THEN ∧ pc′ = "done"
             ∧ UNCHANGED ⟨to_send, received, in_transit, can_send⟩
        ELSE ∨ Send
```

$$\qquad\qquad \lor \mathit{Receive}$$

$$\mathit{Done} \triangleq pc = \text{“}\mathsf{done}\text{”} \land \textsc{unchanged}\ \mathit{vars}$$

$$\mathit{Next} \triangleq \mathit{Process} \lor \mathit{Done}$$

$$\mathit{Spec} \triangleq \mathit{Init} \land \Box[\mathit{Next}]_{\mathit{vars}} \land \mathrm{WF}_{\mathit{vars}}(\mathit{Next})$$

$$\mathit{MessagesInOrder} \triangleq \Diamond\Box(\mathit{received} = \langle 1,\ 2,\ 3 \rangle)$$