Remote Implementation Example

for RWC5020A FW V1.172 or later
and RWC5020B

For Testing in Production Lines with “MFG” Function

RedwoodComm

V1.0

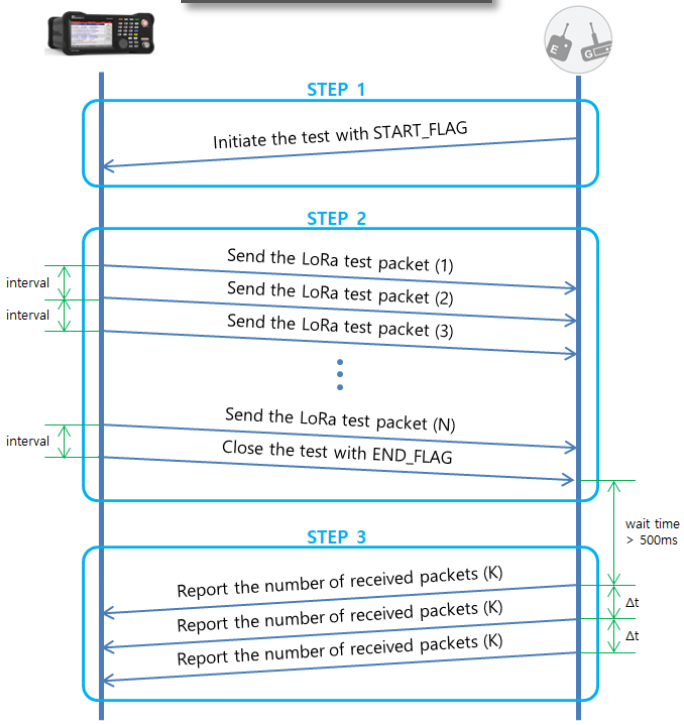
RedwoodComm

Test Setup Example for Production Lines

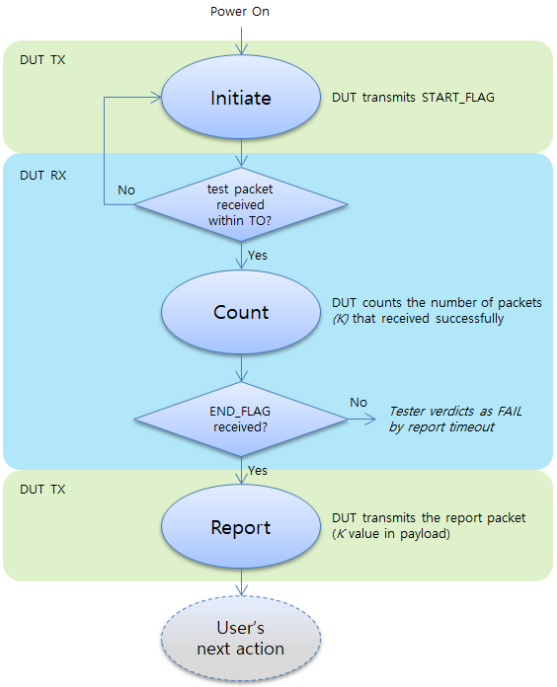
- *The tester shall be controlled by the user application software via Ethernet.*

- *DUT's firmware needs to be modified to adopt the MFG test method.*
- *It is recommended the DUT is put into RF enclosure(s) to minimize the effect of interferences.*
- *Any available or efficient method can be adopted for RF connection; either radiated or conducted.*

Test Procedure



State Transition Diagram

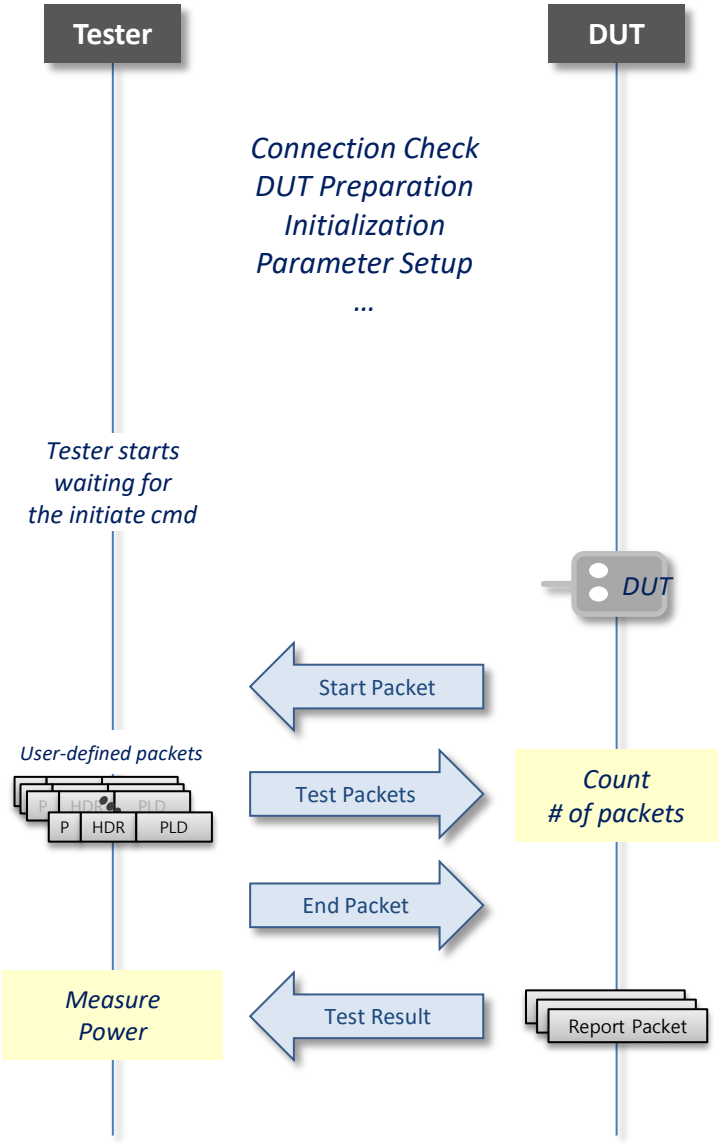


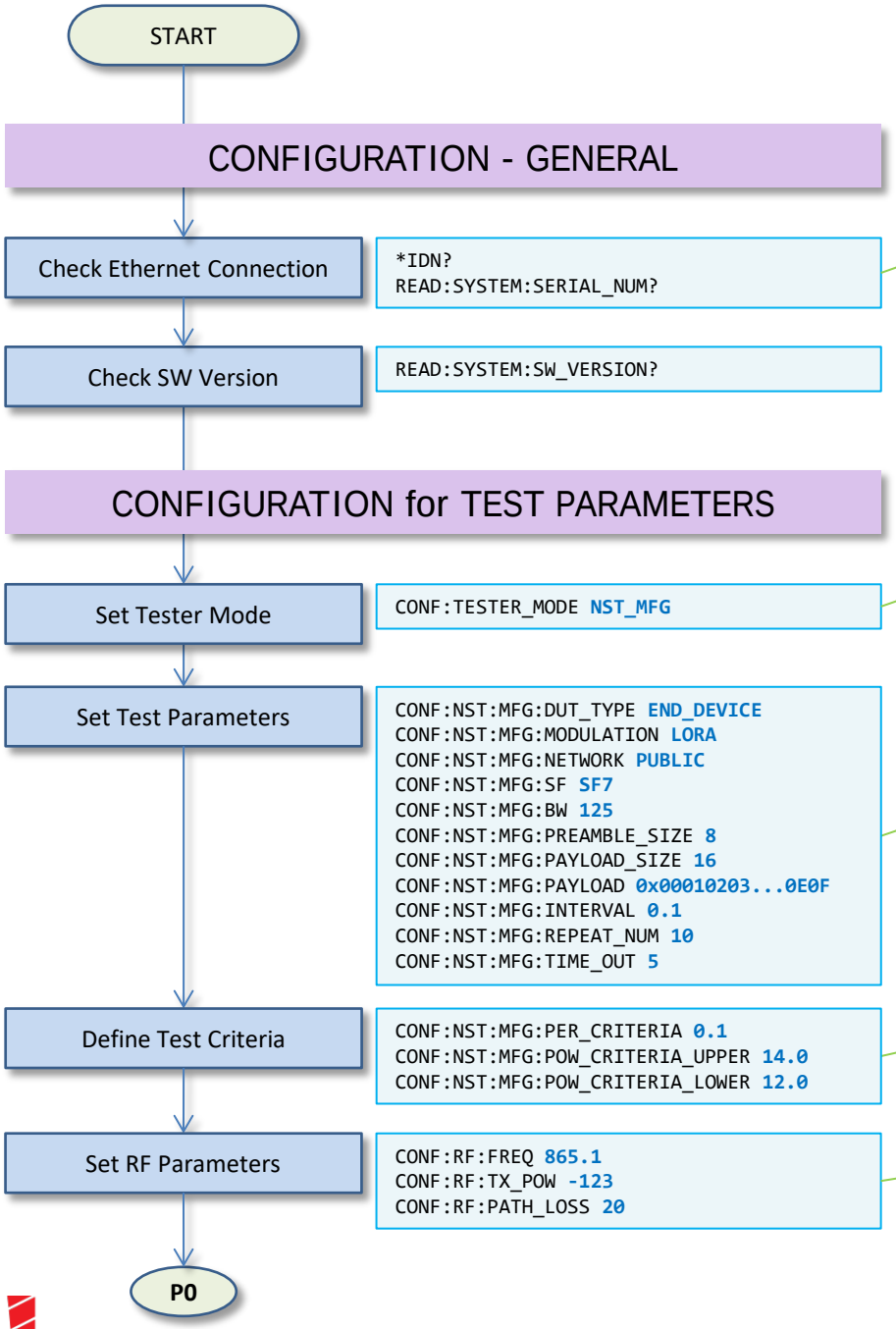
Initialization

- CONFIGURATION - GENERAL
- CONFIGURATION for TEST PARAMETERS

MFG Test

- START MFG TEST
- PREPARATION of DUT
- TEST INITIATION
- RX SENSITIVITY MEASUREMENT
- RX TEST CLOSE
- TX POWER MEASUREMENT





Please be sure that the Ethernet setup with IP configuration has been completed prior to starting this example. You may refer to the User Manual or Application Note of RWC5020A for further information.

Check the connection to the tester via Ethernet.

Set the tester's operation mode to NST_MFG.

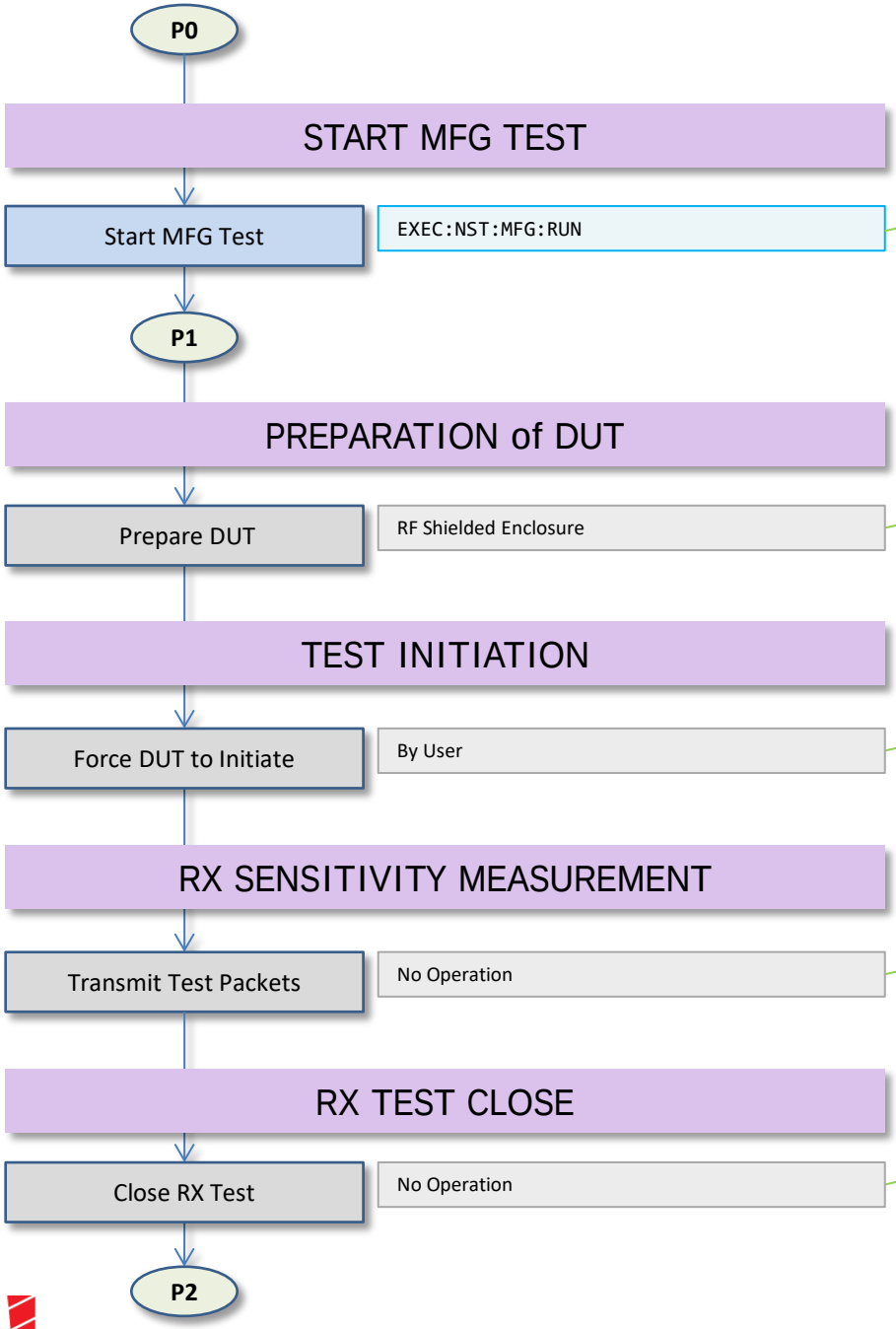
Set the parameters required for TX and RX Test of DUT.

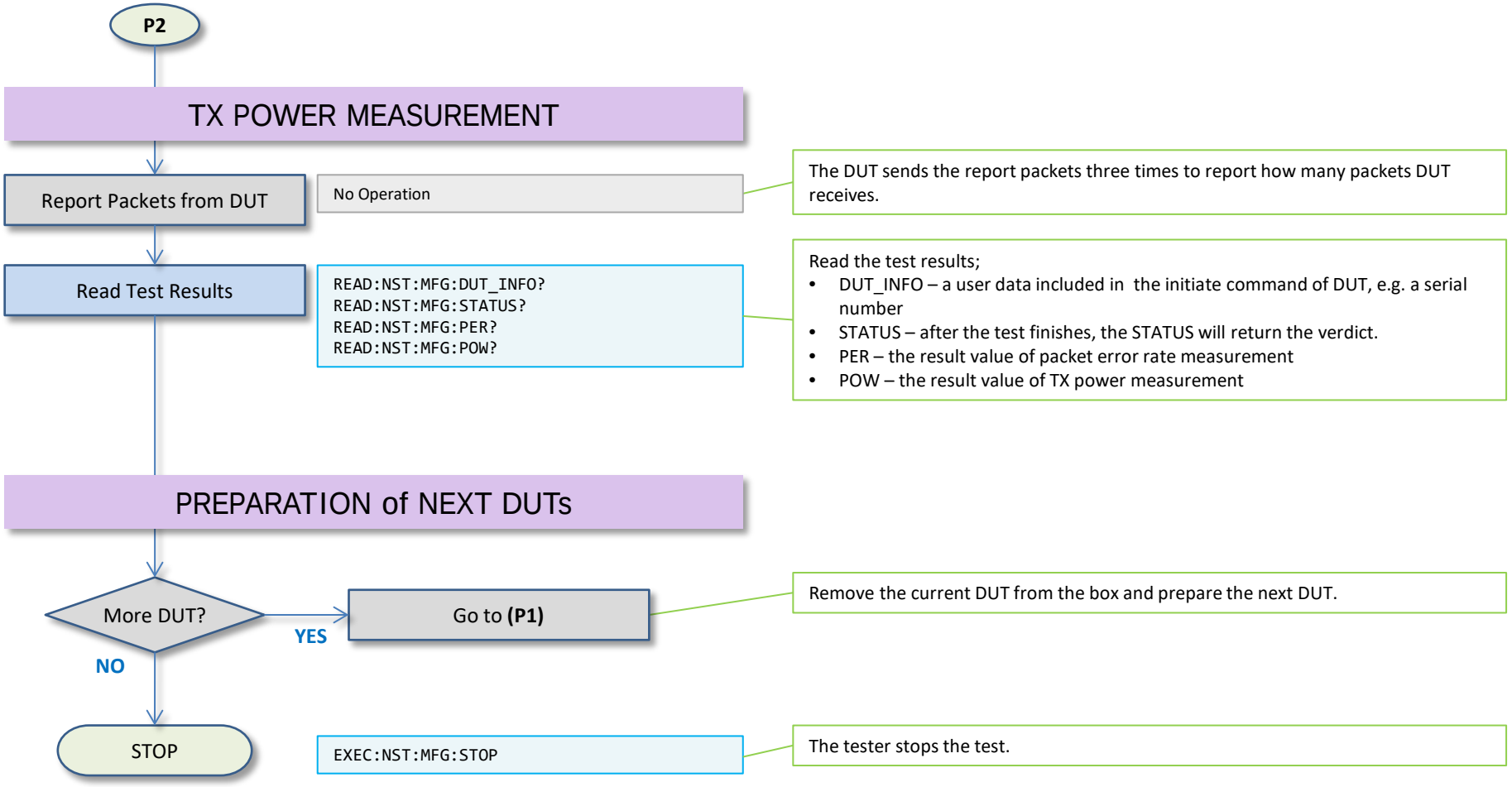
- TX Polarity, RX Polarity and CR depends on DUT_TYPE.
- INTERVAL defines the time delay between two consecutive TX packets
- Set the REPEAT_NUM properly for efficiency.
- Set the TIME_OUT long enough to wait until receiving the report packets at the end of the test.

Define the test criteria for production test

- PER_CRITERIA is for RX sensitivity test.
- POW_CRITERIA_UPPER and _LOWER are for TX power measurement.

Set the RF parameters. Any parameter can be changed according to users' test purpose.


P0
START MFG TEST
Start MFG Test
EXEC:NST:MFG:RUN
The tester will wait until it gets the initiate command from DUT.
P1
PREPARATION of DUT
Prepare DUT
RF Shielded Enclosure
Prepare DUT to be tested.
• Put DUT into a proper position inside the test boxes like RF shielded enclosures.
• For conduction test, connect the RF port of each DUT using an RF cable.
TEST INITIATION
Force DUT to Initiate
By User
Turn on DUT or trigger DUT to transmit the initiate command to the tester.
• It may include START_FLAG, e.g. 0xFFFF, and
• a user data, e.g. the serial number of DUT.
RX SENSITIVITY MEASUREMENT
Transmit Test Packets
No Operation
Immediately after receiving the initiate command from DUT, the tester starts transmitting test packets and stops when it reaches the number of packets (REPEAT_NUM).
RX TEST CLOSE
Close RX Test
No Operation
The tester closes the RX test so that DUT prepare to send the test result how many packets DUT receives.
• It may include STOP_FLAG, e.g. 0xFFFF.
P2


P2
TX POWER MEASUREMENT
Report Packets from DUT
No Operation
The DUT sends the report packets three times to report how many packets DUT receives.
Read Test Results
READ:NST:MFG:DUT_INFO?
READ:NST:MFG:STATUS?
READ:NST:MFG:PER?
READ:NST:MFG:POW?
Read the test results;
• DUT_INFO – a user data included in the initiate command of DUT, e.g. a serial number
• STATUS – after the test finishes, the STATUS will return the verdict.
• PER – the result value of packet error rate measurement
• POW – the result value of TX power measurement
PREPARATION of NEXT DUTs
More DUT?
YES
Go to (P1)
Remove the current DUT from the box and prepare the next DUT.
NO
STOP
EXEC:NST:MFG:STOP
The tester stops the test.

Test Time Estimation

MFG TEST

Key Factors in RWC5020A

- Packet
  - SF — SF7~SF12
  - PREAMBLE_SIZE — 2~12 symbols
  - PAYLOAD_SIZE — 0~250 bytes
- REPEAT_NUM — 1~10000
- INTERVAL — 0.01~1000 sec

Examples of Elapsed Test Time [sec]

REPEAT_NUM	10	50	100	200
SF7	1.4	3.8	6.9	13.0
SF8	2.0	6.1	11.2	21.4
SF9	3.1	10.1	18.8	36.2
SF10	5.6	19.1	36.1	70.0
SF11	10.5	37.3	70.7	137.6
SF12	20.4	73.5	139.9	272.7

Example :

SF7, PAYLOAD_SIZE=16, REPEAT_NUM=10, INTERVAL=0.01

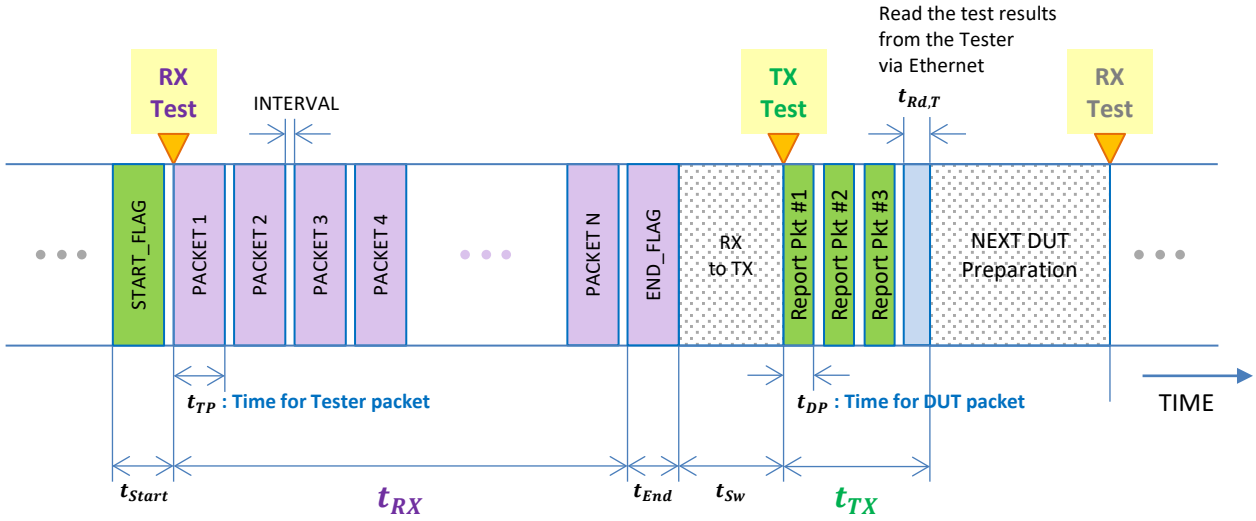
$$t_{MFG} \approx t_{Start} + t_{RX} + t_{End} + t_{Sw} + t_{TX}$$

$$\approx (0.051+0.01) + (0.051^{*}+0.01)\times 10 + 0.051 + 0.5 + (0.051^{*}+0.01)\times 3$$

$$\approx \mathbf{1.4}\ (\text{sec})$$

For making calculation simpler, it is assumed that START_FLAG, STOP_FLAG, and the Report Packets have the same length.

* *Dependent on SF & size*



$$t_{RX} = (t_{TP} + INTERVAL) \times REPEAT\_NUM \qquad t_{TX} = (t_{DP} + INTERVAL) \times 3 + t_{Rd,T}^{\dagger}$$

† *The read time $t_{Rd,D}$ and $t_{Rd,T}$ are negligible.*