



Rev100.1

SOLUTION FOR OPERATOR TEST LAB

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I. Overview

The test laboratory has several test kit and measurement for RF communication test. The system of 3G /4G and 5G shall be needed to use the number of attenuators or terminators corresponding to multiple RF ports of Radio equipment. Several type of equipment for RF communication are used in the telecom base station nowadays. When the engineers test several cases between antenna and Radio equipment makes huge working for setting us from scratch. They have to prepare cables, RF components, adaptors, equipment's and other materials to build up the test bed and it takes a long time to build up everything. The troubles are occurred by the lack of material synchronization or right connections, and the spaces are occupied in the laboratory room .

Our solution is offering easy connection between RF equipment and Antenna and saving space, and being proactive test plan.

II. Technical Proposal

This Proposal is included an integrated solution and 19-inch rack-mount POI modules. These modules will be integrated in 2 options.

Applicability: the option can be applied to all vendors who are using 2G/3G/4G technology

With this option, the frequency will be divided into different frequency bands, including:

- Module 4G : band 1800 and 2600Mhz MIMO 4x4, 4TRX
- Module 2G and 3G : band 900 and 2100Mhz, 4TRX

Application range

- ✓ Test lab
- ✓ COW
- ✓ Inbuilding
- ✓ Sharing same telecom infrastructure

II.1 Option 1: Test voice and service over Omni or directional antennas.

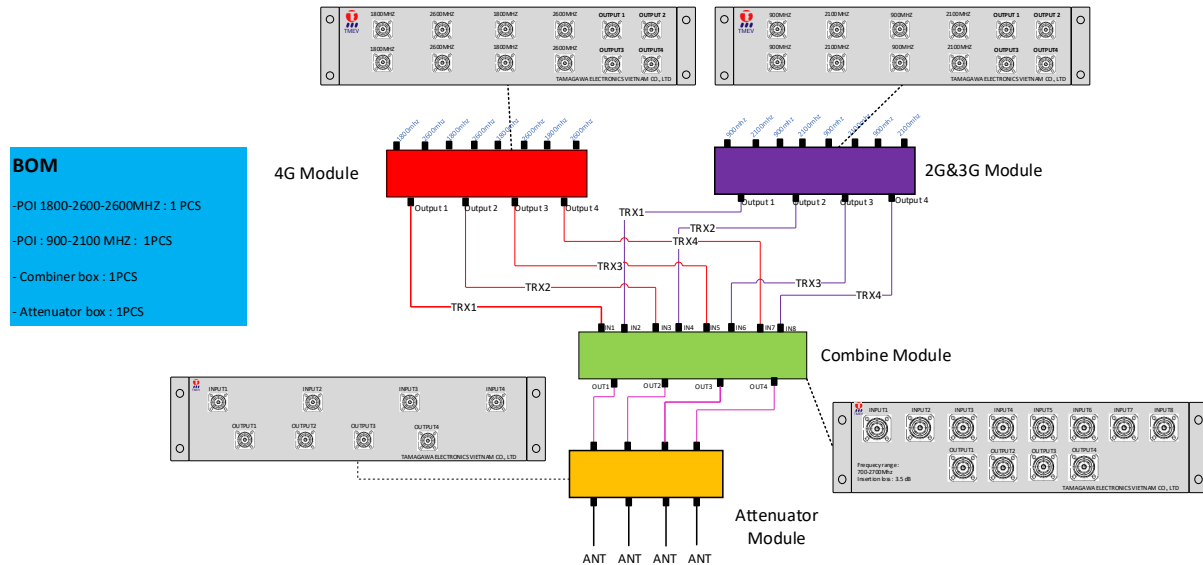


Figure 1. Block diagram of testing service

Ports RF of RU 4G band 1800Mhz and 2600Mhz configured 4x4 will be connected to module 4G.

Each port will be 1 TRX of RU. Signal after through this module will be mixed within low loss.

In the same way to 2G and 3G band 900 and 2100Mhz, each port corresponds to 1 TRX, so 4 cells can be tested simultaneously.

The output signal of each module will be connected to the Combiner Module.

Combiner is responsible for mixing all 2G/3G and 4G signals according to each TRX. Engineers need to match in the correct order according to the manufacturer's instructions to avoid wrong connection. At this time, each Combiner output will include 2/3G and 4G signals for each TRX or each Cell.

The signal after leaving the Combiner Module is still very high Power, so in case the user wants to test as a service, the signal after passed the combiner module will be connected to the attenuator module to reduce RF power.

The final signal to the antenna is very small, so at this time, it is possible to use the Omni antenna for inbuilding or the Yagi antenna to test voice or data services without affecting the health of the engineers.

With this topology, engineers can also test the parameters required by the RFP such as CPICH, OBW, POWER, Frequency error, phase... By connecting test equipment directly such as power meter, Spectrum analyzer, Base station analyzer after the attenuation module without having to go through any other extra accessories.

II.2. Option 2: Continuous testing for 4-8 hours

The devices are mostly the same, but in the case of continuous load testing, the attenuating module will be replaced by a dummy module with high isolation and high power, This module will absorb the RF signals emitted from the RU reduces the risk of affecting the engineer's health.

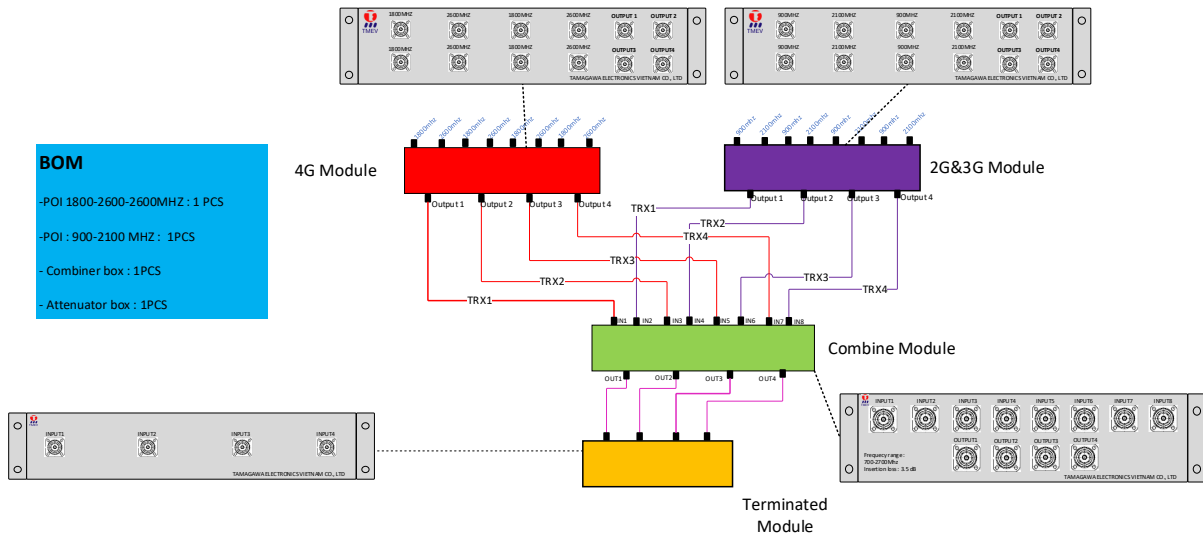


Figure 2. Block diagram of continuity test plan.

III. Connection diagrams

A system consisting of 4-5 modules for 2/3/4G is mounted on a 19" rack. The RUs will be pre-connected via jumpers and do not need to be removed during testing. When replacing another RU just remove the jumper and put in a new RF module

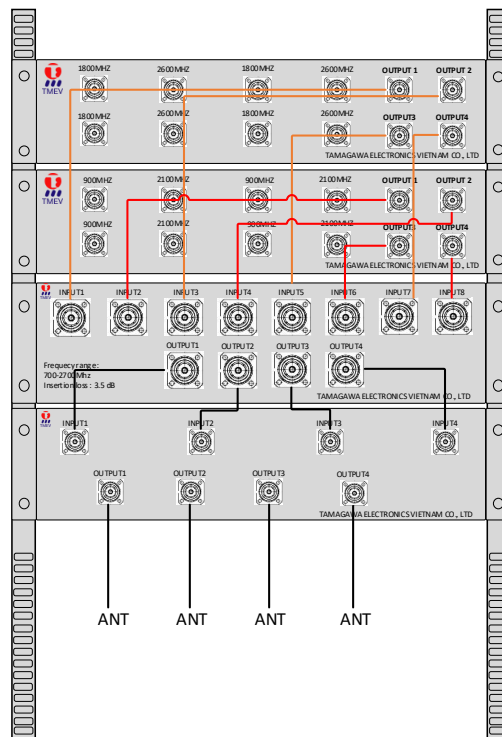


Figure 3. Simulation of POI Modules after connection including 2G/3G and 4G when testing the service.

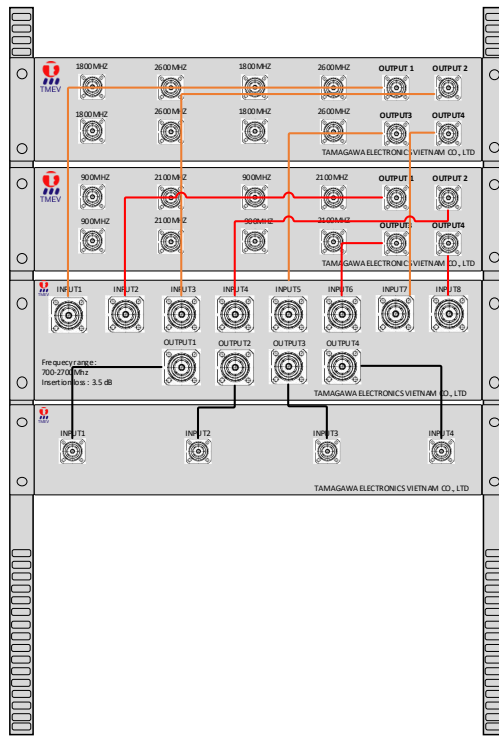


Figure 4. Simulation of POI Modules after being connected including 2G/3G and 4G under continuous testing.

IV. Specification

IV.1 Module POI 4G : 1800/2600Mhz

Items	Parameter	
Frequency	1800/2600Mhz	
Impedance	50Ohm	
Input power	80W	
No of port	8 in – 4 out	
Type	Female	

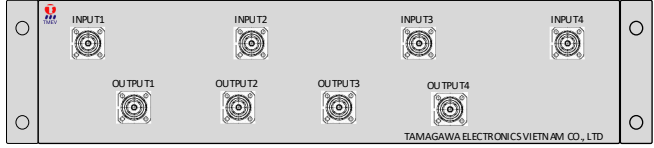
IV.2 Module 2G/3G: 900/2100Mhz

Items	Parameter	
Frequency	900/2100Mhz	
Impedance	50Ohm	
Input power	80W	
No of port	8 in – 4 out	
Type	4.3-10 Female	


IV.3 Module combiner

Items	Parameter	
Frequency	700-2600Mhz	
Impedance	50Ohm	
Input power	100W	
No of port	8 in – 4 out	
Type	4.3-10 Female	

IV.4 Module Attenuator

Items	Parameter	
Frequency	DC 3Ghz	
Suy hao	30/40 dB	
Impedance	50Ohm	
Input power	150W	
No of port	4 in – 4 out	
Type	4.3-10 Female	

IV.5 Module LOAD

Items	Parameter	
Frequency	DC 3Ghz	
Impedance	50Ohm	
Input power	150W	
No of port	4 in	
Type	4.3-10 Female	

The manufacturer recommends that operators should invest in both options to reduce connection time and increase the ability to test equipment.