

# BTS-114 Femto-Cell Manufacturing Test System

## Introduction

Mobile operators pay to transmit RF energy to their mobile users. Unfortunately walls absorb most of this precious energy to the extent that it can take up to 40 times the power for a domestic subscriber to have an equivalent service to out-door performance. Worse still 3G users share the available power in a cell to the extent that service quality for all users drops dramatically when a few indoor users are present. 3G operators must find a better way to get spectrum into the home without further enhancement to the macro network.

Femtocells are small low cost cellular access points for the home which enhance domestic 3G coverage and remove the indoor user from the macro network. The femtocell access point is connected to the mobile network via a broadband connection so that the subscriber's domestic 3G experience is enhanced and operator spectrum efficiency is improved.

Femtocells are becoming available for a range of cellular standards. Today Benetel's test solution supports CDMA2000, UMTS & HSDPA, while HSDPA+ and LTE are on our roadmap.



## Product Features

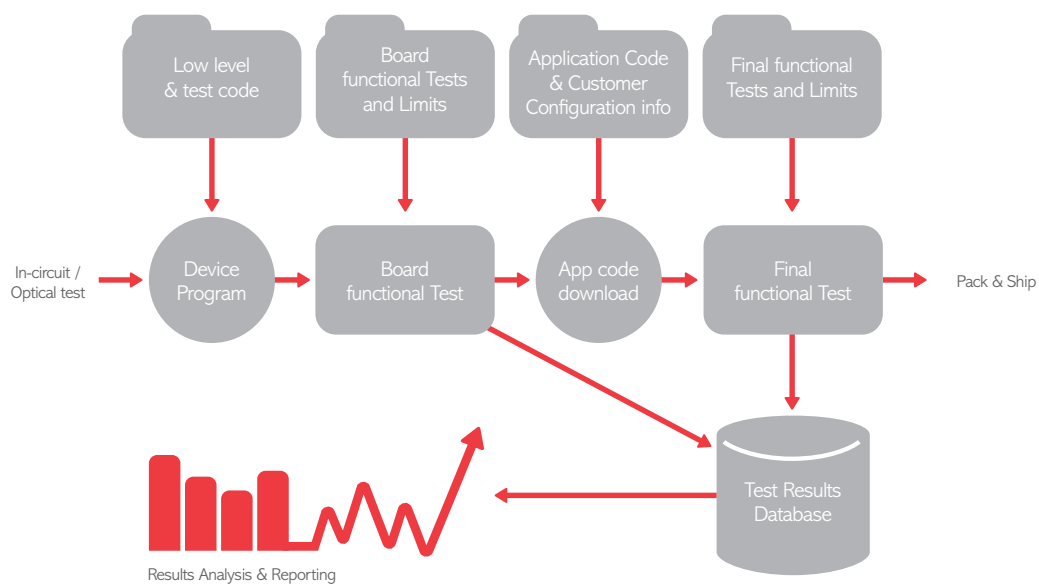
BTS-114 is a mass production functional test system utilized for RF calibration, RF test, application download and board functional test. The system is a self contained solution which provides the OEM with a low cost of entry to wireless production test.

Some of the key product features are:-

- Throughput maximised by utilising automated test fixtures and parallel test plans
- Various femto-cell test profiles available

- Software already deployed and utilised in mass production
- Over the air testing (OTA) in mass production
- High isolation test enclosures
- Remote log-in support
- Compact design which minimises floor area usage
- Simple installation, typical commissioning time of less than 24 hours
- Auto calibration
- Database with analysis tools
- Easy upgradeable in parallel to product lifecycle path
- Platform approach to hardware selection and software development enables deployment of the same system to future standards such as LTE
- Pack & Ship system available for minimal field returns

### Femto Test Platform



### Test Hardware

The standard form factor of BTS-114 utilises the R&S®SMBV100A vector signal generator and R&S®FSV signal and spectrum analyser. Both units meet the requirements of volume production and offer an excellent price/ performance ratio. Alternative ATE suppliers can be utilised if required.

Versatile and accurate R&S®NRP-Z11 power sensors are utilised for TX testing. One sensor is employed per enclosure with up to 4 test fixtures attached to a single test rack.



R&S®SMBV100A Vector Signal Generator



R&S®FSV signal and spectrum analyzer

## Enclosures

Benetel have a range of pneumatic controlled test enclosures the selection of which is determined by the size of your product, isolation requirements and test interface. A significant advantage of Benetel's enclosure portfolio is our Over The Air (OTA) test feature. OTA testing eliminates intermittent connection problems associated with RF connector wear and tear. Benetel/R&S can provide standard test enclosures or customised enclosures customised around your product I/O requirements. We can provide test enclosures with >80dB isolation which is often required if testing is conducted in an environment with radio interference.



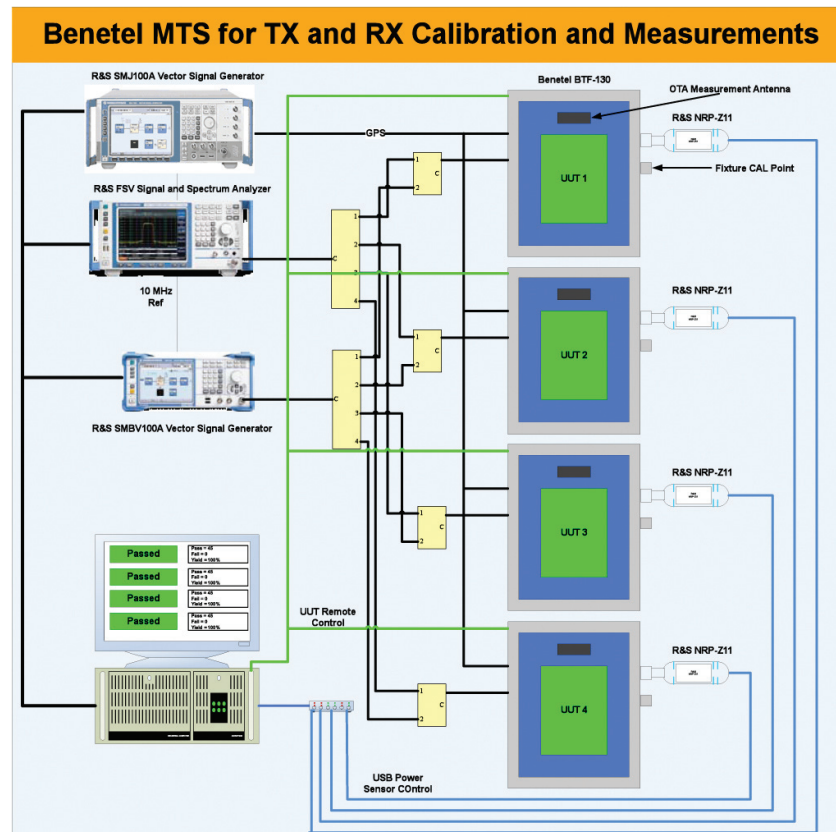
Benetel High Isolation Test Enclosure



R&S®NRP-Z11 power sensor

## System Configuration

The Benetel FTP architecture is illustrated below for the recommended configuration utilizing 4 enclosures per test rack. GPS testing is an optional extra to the standard configuration shown.



## Test Functionality

The BTS-114 solution has been configured to perform the following set of standard tests for your femtocell product:

### User Management

Graphical user interface  
Test limit management  
Test sequencer

### Basic Functionality Tests

Record software version  
Record calibration parameters  
Record configuration version  
Record board ID  
Record UUT serial number  
Date and time stamp  
Power on self test  
Current consumption  
Voltage  
Tests functionality of all I/Os

### Diagnostic Tests

FPGA & DSP download  
UUT FPGA version  
Test IP, server & gateways  
Record MAC addresses

### TX

PA Calibration  
Output Power  
LO Leakage  
OTA Test  
EVM/ Rho  
ACPR/ ACLR

### RX

RX Calibration  
NF  
RSSI  
Sensitivity

### Other

TCXO Frequency calibration  
Frequency Error  
DC Offset Calibration  
GPS test  
Sniff mode

## About Benetel

Benetel are wireless test experts with in-house RF and wireless design expertise. We follow emerging wireless standards and team up with technology innovators in order to supply test expertise for all stages of the product life cycle, from R&D to mass production. We aim to provide world beating RF test times in all that we do. Benetel has developed innovative test solutions in a variety of wireless application areas including:

- 3G Basestation
- 3G Mobile
- GPS Receivers
- 802.11
- Short Range Devices
- GSM
- Bluetooth
- UWB
- Automotive Radar
- Keyless Entry Systems

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