Home

Aeroflex

6413A

Base Station Test System

User Guide


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6413A Base Station Test System: User Guide. Document Number 80-0052

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Amendment Record Items To Be Defined (TBD) Glossary Contents

Issue	Date	Remarks
1.0	31/05/05	Original Release
1.1	29/06/05	Added to/Amended Error Messages. Amended RF Connection Mode from Duplex/Simplex to Duplex/RF Out.
1.2	30/08/05	Manual updated to support Node B Manufacturer variations
1.3	29/11/05	Troubleshooting sections extended, images changed in line with GUI changes, explanation of test parameters added.
1.4	31/07/06	Added Iub Connector Wiring, Added Test Descriptions, Added Remote Access Procedures, Amended Error Messaging, Updated Nokia Section
2.0	10/08/06	Added Band IV, minor editorial changes

View Software Release Notes ...

Items To Be Defined (TBD) ...

Section	Remarks
Home > Contents > Using the 6413A > Sequences > Remote Access > User API	Detailed API document to be supplied

Glossary ...

Acronyms (1 to A)
Acronyms (B to Cp)
Acronyms (Cr to D)
Acronyms (E to H)
Acronyms (I to L)
Acronyms (M to P)
Acronyms (Q to R)
Acronyms (S to T)
Acronyms (U to Z)

Contents ...

#

1G	First Generation (Mobile Communications)
16QAM	16 Quadrature Amplitude Modulation
2G	Second Generation (Mobile Communications)
3G	Third Generation (Mobile Communications)
3GPP	Third Generation Partnership Project (of ETSI)
8PSK	Eight phase Shift Keying

A

AAL	ATM Adaptive Layer
AAL2	ATM Adaptive Layer Type 2
AAL5	ATM Adaptive Layer Type 5
ACLR	Adjacent Channel Leakage Power Ratio
AESA	ATM End System Address
AS	Absolute Sensitivity
ALCAP	Access Link Control Application Part
ASN.1	Abstract Syntax Notation 1
ATM	Asynchronous Transfer Mode
AWGN	Additive White Gaussian Noise

More...

B

BCH	Broadcast Channel
BER	Bit Error Rate
BLER	Block Error Rate
BNC	Bayonnet-Neil-Concelman connector, a type of coaxial connector

C

CCCH	Common Control Channel
CCH	Control Channel
CCITT	Comité Consultatif International Télégraphique et Téléphonique
CCPCH	Common Control Physical Channel
CCTrCH	Coded Composite Transport Channel
CDMA	Code Division Multiple Access
CDMA2000	Third Generation Code Division Multiple Access
CE	Conformite Europeene
CN	Core Network
CPICH	Common Pilot Channel

More...

C (Continued)

CRC	Cyclic Redundancy Check
CRNC	Controlling Radio Network Controller
CS	Circuit Switched
CTCH	Common Traffic Channel

D

dB	Decibel
dBm	Decibel refer to 1 milliwatt (mW)
DCCH	Dedicated Control Channel
DCH	Dedicated Channel
DHCP	Dynamic Host Configuration Protocol
DL	Downlink
DPCCH	Dedicated Physical Control Channel
DPCH	Dedicated Physical Channel
DPDCH	Dedicated Physical Data Channel
DRNC	Drifting Radio Network Controller
DSCH	Downlink Shared Channel


More...

E

EMC	Electro Magnetic Compatibility
EPC	Embedded Personal Computer
ETSI	European Telecommunication Standards Institute
EVM	Error Vector Magnitude

F

FACH	Forward Access Channel
FDD	Frequency Division Duplex
FE	Frequency Error
FEC	Forward Error Correction
FER	Frame Error Rate

G

GUI	Graphic User Interface

H

HO/HoV	Handover
HTML	Hypertext Markup Language

More...

I

ID	Identifier
IMC	International Electro-technical Commission
IMA	Inverse Multiplexing on ATM
IMT-2000	International Mobile Telecommunications 2000
IP	Internet Protocol
ITU	International Telecommunication Union
Iub	UTRAN interface between Node B and RNC
IUT	Implementation Under Test

J

VOID	

K

kbps	kilobits per second

L

LCD	Liquid Crystal Display
LED	Light Emitting Diode


More...

M

MAC	Medium Access Control
MOP	Maximum Output Power

N

NBAP	Node B Access Protocol
Node B	UMTS Base Station
NSAP	Network Service Access Point

O

O&M	Operation and maintenance
OB	Occupied Bandwidth

P

PCDE	Peak Code Domain Error
PCH	Paging Channel
PDF	Portable Document Format
ppm	Part per million
PS	Packet Switched


More...

Q

QoS	Quality of Service (ATM network channels)
QPSK	Quadrature Phase Shift Keying
QSAAL	Q series Signalling ATM Adaptation Layer

R

R99	Release 1999
RAB	Radio Access Bearer
RACH	Random Access Channel
Rel-4	Release 4
Rel-5	Release 5
RF	Radio Frequency
RLC	Radio Link Control
RMS	Root Mean Square
RNC	Radio Network Controller
RRC	Radio Resource Control
RTM	Rear Transition Module
RX	Receiver

More...

S

SAAL	Signalling ATM Adaptation Layer
SCCP	Signalling Connection Control Part
SCTP	Simple Control Transmission Protocol
SRNC	Serving Radio Network Controller
SSCOP	Service Specific Connection Orientated Protocol
STM-1	Synchronous Transport Module – level 1
SUT	System Under Test

T

TCH	Traffic Channel
TD-CDMA	Time Division-Code Division Multiple Access
TDD	Time Division Duplex
TD-SCDMA	Time Division-Synchronous CDMA
TFT	Thin Film Transistor
TIA	Telecommunications Industry Association
TNC	Type of coaxial connector
TrCH	Transport Channel
TS	Technical Specification
TTA	Telecommunication Technology Association
TX	Transmitter


More...

U

UARFCN	UTRA Absolute Radio Frequency Channel Number
UE	User Equipment
UL	Uplink
UMTS	Universal Mobile Telecommunication System
UNI	User-Network Interface
USB	Universal Serial Bus
UTRA	UMTS Terrestrial Radio Access
UTRAN	UMTS Terrestrial Radio Access Network
Uu	UMTS Air interface
UUT	Utility Under Test

V

VCI	Virtual Channel Identifier (in ATM network)
VPI	Virtual Path Identifier (in ATM network)

W

W-CDMA	Wide band CDMA

X to Z

XGA	Extended Graphic Array

Contents...

This section provides contact details for Aeroflex

For Technical Support please contact the Aeroflex Helpdesk:

Americas :
Tel : 1 800 835 2350 (US only)
[+1] 316 529 5511
E-mail : americas.service@aeroflex.com

Hong Kong/APAC :
Tel: +852 2834 5364
Phone: +852 2832 7988
E-Mail: apac.service@aeroflex.com

Rest of World :
Tel: [+44] (0) 8706 080134
E-mail : europe.service@aeroflex.com

Service Support Centres

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For Repair and Calibration Support please contact your local Aeroflex service centre. These can be found at www.aeroflex.com/support

EUROPE:

Aeroflex
Longacres House
Six Hills Way
Stevenage
SG1 2AN
UK
Service - Telephone: [+44] (0) 8706 080134
Fax: [+44] (1438) 772203

Americas and APAC ...

Previous

AMERICAS
10200 West York Street
Wichita, Kansas 67215-8935 USA
Phone: [+1] 316 529 5511 or 1 800 835 2350 (US Only)
FAX: [+1] 316 529 5330 or 1 866 325 1180 (US Only)

APAC
Room 2810 China Resources Bldg.
26 Harbour Road
Wanchai, Hong Kong
Phone: [+852] 2832 7988
Fax: [+852] 2834 5364

Contents ...

The Racal Instruments Wireless Solutions 6413A base station test system is designed to meet the conflicting needs of keeping roll-out and maintenance costs low whilst ensuring that Quality of Service goals are met. Comprehensive RF transmitter and receiver test coverage improves the effectiveness of testing, detection of faults and reduces the likelihood of return visits to a site for the same problem. Its ease of use and speed of test help to boost field technician productivity.

Transmitter and receiver tests are defined by the Technical Specifications of the 3GPP (3rd Generation Partnership Project) work group for the Digital Cellular Radio Access Network. To enable control and measurement of the Node B under the test, the 6413A has the ability to perform limited emulation of:

- the 3rd generation Radio Network controller (RNC), which allows it to control the Node B over the Iub Interface
- the 3rd generation User Equipment (UE) connected directly to the Node B's RF interface to perform a range of transceiver measurements.

The 6413A also includes an RF transmitter and receiver to both provide input signals to the Node B under test and measure signals received from the Node B under test.

More Contents ...

Previous

The 6413A Test System can also be used for other purposes, in the following modes:

- RF Spectrum Analyser

  This mode allows the 6413A Test System to operate as an RF Radio Frequency spectrum analyser. This is of limited functionality and shows the RF spectrum of a selected radio channel.

- Code Domain Analyser

  This mode allows the 6413A to display received UMTS signals in the Code Domain

The 6413A Test System is primarily intended for use by Engineers and technicians involved in the installation and commissioning or routine maintenance of 3rd Generation Base Stations (Node B).

All users and responsible bodies should read the sections entitled General Safety Precautions and Node B Related Safety Precautions before using the equipment.

Next Section ...

Safety and Other Precautions Overview

This section contains the following information:

Safety Symbols and Headings

General Safety Precautions

Node B Related Safety Precautions

Software and IT Precautions

Electrostatic Discharge (ESD)

Electromagnetic Compatibility (EMC)

CE Conformity

Contents ...

The following symbols and headings are used in this user guide to indicate Safety Hazards. Users of this equipment must read this handbook and familiarise themselves with each safety requirement before operating the equipment.

WARNING: A WARNING indicates a hazard that affects users. The instructions in a WARNING must be observed; if the WARNING is ignored, injury or loss of life may result.

CAUTION: A CAUTION indicates a hazard that affects the equipment. The instructions in a CAUTION must be observed; if the CAUTION is ignored, damage may be caused to the equipment.

 This symbol is used on the equipment to indicate that it is necessary to refer to, and comply with, all instructions in this User Guide regarding the use of such marked facilities.

 This symbol is used on the equipment to indicate that surface may become hot in use, and that it is necessary to refer to, and comply with, all instructions in this User Guide regarding the surface.

Next ...

Always operate the product in accordance with the instructions in this user guide. Use of the equipment in a manner not specified may impair the protection provided.

It is mandatory that all users of the 6413A Base Station Test System read carefully and comply with the requirements under the headings Warning and Caution.

WARNING:

THIS IS A SAFETY CLASS 1 PRODUCT PROVIDED WITH A PROTECTIVE EARTHING CONDUCTOR INCORPORATED IN THE POWER CABLE. THE MAINS PLUG MUST ONLY BE INSERTED INTO A MAINS SOCKET OUTLET PROVIDED WITH A MATCHING EARTH CONTACT. ANY INTERRUPTION OF THE EARTH CONDUCTOR, INSIDE OR OUTSIDE THE TEST SYSTEM, MAY CAUSE THE TEST SYSTEM TO BECOME DANGEROUS TO USERS. DELIBERATE INTERRUPTION OF THE EARTH CONDUCTOR IS FORBIDDEN.

General Safety Precautions (Continued)...

General Safety Precautions (Previous)

THE ENVIRONMENTAL OPERATING CONDITIONS SPECIFIED FOR THE EQUIPMENT MUST BE OBSERVED. THE TEST SYSTEM IS DESIGNED FOR INDOOR USE ONLY. DO NOT ALLOW THE EQUIPMENT TO BECOME WET, AND DO NOT ALLOW WATER TO ENTER THE EQUIPMENT. DO NOT OPERATE THE EQUIPMENT WHEN WET BECAUSE IN THIS CONDITION THE SAFETY OF THE EQUIPMENT MAY BE DEGRADED.

IF THE EQUIPMENT HAS BEEN STORED AT LOW TEMPERATURES, TIME SHOULD BE ALLOWED FOR RECOVERY TO THE LOCAL AMBIENT TEMPERATURE BEFORE USE. WHERE CONDENSATION OF WATER VAPOUR IS EITHER PRESENT OR LIKELY TO BE PRESENT, ALLOW THE EQUIPMENT TO DRY OUT BEFORE USE. CONDENSATION IS LIKELY TO OCCUR WHEN A COLD OBJECT ENCOUNTERS A WARMER, HUMID, ENVIRONMENT.

THIS EQUIPMENT CONTAINS LETHAL VOLTAGES. DO NOT REMOVE THE COVERS. RETURN THE EQUIPMENT TO AEROFLEX OR APPROVED SERVICE AGENT FOR SERVICING.

General Safety Precautions (Continued) ...

General Safety Precautions (Previous)

THIS EQUIPMENT MUST BE KEPT CLEAN AND FREE FROM CONTAMINATION. IF NECESSARY, CLEAN THE EQUIPMENT AS DESCRIBED BELOW. IF THE EQUIPMENT IS SEVERELY CONTAMINATED, IT SHOULD BE RETURNED TO AEROFLEX OR APPROVED SERVICE AGENT.

- DISCONNECT THE EQUIPMENT FROM THE MAINS SUPPLY. DAMPEN A CLEAN LINT-FREE CLOTH WITH CLEAN WATER AND WRING OUT ALL SURPLUS WATER TO LEAVE THE CLOTH BARELY DAMP. CAREFULLY WIPE AWAY DUST OR LIGHT SOILING FROM THE OUTSIDE OF THE CABINET AND INSIDE THE NACELLE. ALLOW THE EQUIPMENT TO DRY THOROUGHLY BEFORE RECONNECTING TO THE MAINS SUPPLY.

ANY DEVIATION FROM THE INSTRUCTIONS PROVIDED IN THIS HANDBOOK MAY CAUSE THE PROTECTION PROVIDED BY THE EQUIPMENT TO BE IMPAIRED.

General Safety Precautions (Continued) ...

General Safety Precautions (Previous)

DAMAGED MAINS LEADS ARE DANGEROUS. REGULARLY INSPECT THE MAINS LEAD FOR DAMAGE AND DO NOT USE IF DAMAGE IS EVIDENT OR SUSPECTED.

EQUIPMENT WITH DAMAGED MAINS CARRYING COMPONENTS (INLET, MAINS LEAD, ETC.) IS DANGEROUS. DO NOT USE EQUIPMENT WHERE DAMAGE TO THE MAINS CARRYING COMPONENTS IS EVIDENT OR SUSPECTED.

DURING INSTALLATION THE EQUIPMENT SHOULD BE POSITIONED SO THAT THE MAINS POWER LEAD CAN BE EASILY DISCONNECTED IN AN EMERGENCY.

THE 6413A TEST SYSTEM OPTIONALLY CONTAINS LASER CLASS 1 PRODUCTS. DO NOT OPEN THE CASE. RETURN THE TEST SYSTEM TO AEROFLEX FOR REPAIR.

General Safety Precautions (Continued) ...

General Safety Precautions (Previous)

CAUTION:

DO NOT OBSTRUCT THE AIR INLET TO THE FAN, OR THE AIR OUTLETS IN THE SIDE PANELS, IN ANY WAY. RESTRICTING THE FLOW OF AIR COULD CAUSE THE TEST SYSTEM TO OVERHEAT AND MAY CAUSE DAMAGE.

See also:

Node B Related Safety Precautions

Software and IT Precautions

Next ...

The 6413A is used to test Node Bs, manufactured by third parties. Node Bs have specific risks related to their construction and design (power supplies, RF transmitters, etc.). Users must be fully trained in the operation and service of Node Bs, and must read carefully and comply with the requirements of any safety warnings and cautions specified by the Node B Manufacturer, and/or Network Operator.

This section identifies Safety considerations related to the use of the 6413A Base Station Test System with the Node B. It is mandatory that all users of the 6413A Base Station Test System read carefully and comply with the requirements under the headings Warning and Caution.

WARNING:

SOME TYPES OF NODE B GENERATE LEVELS OF ELECTROMAGNETIC ENERGY THAT MAY CAUSE INJURY TO USERS. ALWAYS ENSURE THAT THE RF OUTPUT IS DISABLED BEFORE CONNECTING OR DISCONNECTING RF CABLES. NEVER USE RF CABLES THAT ARE DAMAGED OR ARE SUSPECTED OF HAVING BEEN DAMAGED.

IN CERTAIN TESTS, THE NODE B CAN BE LEFT IN A STATE IN WHICH IT WILL CONTINUE TO TRANSMIT UNTIL THE TEST IS ABORTED BY THE USER. ALL DUE ATTENTION MUST BE PAID TO ENSURING THAT THE TEST IS STOPPED AT AN APPROPRIATE TIME AND THAT THE NODE B HAS STOPPED TRANSMITTING.

Node B Related Warnings (Continued) ...

Node B Related Warnings (Previous)

6413A 'RF IN/DUPLEX' PORT

Power applied to this port is dissipated within the unit. In normal operation the unit's cooling system acts to minimise the temperature rise at the connector. If mains power is lost, or the unit is switched off, this cooling means is lost and the port temperature will rise. It is important therefore to ensure that RF power is only applied to the 'RF IN/DUPLEX' port with the unit switched on. If power has been applied with the unit switched off, or if in doubt, switch the unit on and wait 10 minutes for the port to cool down.

WARNING:

DO NOT APPLY RF POWER TO THE 6413A 'RF IN/DUPLEX' PORT WITH THE UNIT SWITCHED OFF.

THE 'RF IN/DUPLEX' CONNECTOR ON THE FRONT PANEL MAY BECOME HOT DURING USE. EXERCISE DUE CARE WHEN CONNECTING/DISCONNECTING CABLES AND ADAPTORS.

See Also:

General Safety Precautions

Next ...

Installation of PCs, installation of software on PCs, and setting up network connections for the PCs are usually carried out by the corporate IT departments within a company, and must be performed in accordance with any existing company procedures and guidelines. This is especially true for assigning IP addresses to PCs and Test Systems.

If you cannot obtain adequate help from your corporate IT department, you should contact Aeroflex for assistance.

Next ...

Electrostatic discharge may damage or degrade the performance of the Test System if proper precautions are not taken:

1. Where they are provided, protective covers must always be fitted on any rear or side panel connectors that are not in use (that have no cable connected). Replacement protective covers are available from Aeroflex or approved Service Agents.
2. Remove static build up on free cables (i.e. cables that are not connected at either end) by momentarily placing the connector pins in contact with the equipment's metal enclosure.


Next ...

Always follow good EMC practice. In particular:

1. Use good quality coaxial cables for RF connections and ensure that the level of screening is commensurate with the signal levels being handled.
2. Use good quality screened data or control cables and connectors. Ensure that the level of screening is commensurate with the signal levels being handled.
3. Ensure that cable screens are properly terminated (360°) within the connectors. Do not use cables if the terminations are loose or frayed.
4. Ensure that the screening is continuous through to the chassis of the equipment.
5. Ensure that any associated equipment is CE marked or is of good EMC design and performance.
6 Where ferrite clamps are required, ensure that they are securely fitted to the appropriate cables, in the correct positions.

Next ...

CE

The 6413A meets the requirements of the EMC and Low Voltage Directives and has been tested against the following standards:

Conducted and Radiated Emissions: EN 61326-1:1997+A1:1998+A2:2001+A3:2003, Class A (Radiated), Class B (Conducted)

Conducted and Radiated Immunity: EN 61326-1:1997+A1:1998+A2:2001+A3:2003 (table 1)

Safety: EN 61010-1:2001, Overvoltage Category II, Pollution Degree 2,

for use in accordance with these instructions.

Contents

All users should read the section entitled Safety and Other Precautions before using the equipment.

The installation process comprises the following tasks:

 Unpacking the 6413A Test System

 Performing the Pre-installation Hardware Checks

 Preparing the 6413A Test System

 Initialising the 6413A Test System

 Post-installation Checks

 Precautions when Using the Test System

 Contents ...

1. Unpack the 6413A Test System carefully, avoiding unnecessary damage to the factory packaging, which may be required to return the equipment to the supplier.
2. Check that the following accessories are all present in the delivered package:

Description	Quantity
Power lead (2 m) with plug for country of use (may be supplied without plug to certain destinations)	1
6413A Base Station Test System Installation Manual	1
Software installation CD	1
Software Release Note (See the following Note)	1
Ferrite Clamps	8

Note: The Software Release Note contains up-to-date information on new features and possible restrictions.

3. If any damage is visible, or suspected, it is recommended that you consult the supplier before proceeding further.

Next ...

Before starting the installation, carry out the following pre-installation checks:

1. Connect the Power Cable from the mains AC power supply to the 6413A Test System and set the Test System Power On/Off switch (adjacent to the inlet) to On (I).
2. Check that the Power LED on the Test System front panel is lit green.
3. Check that the Test System internal fan is running.
4. If the fan does not run, or the Power LED is lit red, check that the circuit breaker (adjacent to the mains connector) has not tripped, or remove mains power and consult the Aeroflex Helpdesk or your local Aeroflex agent.
5. Set the Power On/Off switch to Off (O).

Next ...

To prepare the 6413A Test System, follow the steps below:

1. Position the 6413A Test System on a suitable level surface that can support its weight (up to 20kg).

Note: The 6413A Test System is designed for use at weather protected locations.

2. Connect the supplied power cable from the mains AC power supply to the 6413A Test System.

WARNING: POSITION THE EQUIPMENT SO THAT THE MAINS POWER LEAD CAN BE EASILY DISCONNECTED IN AN EMERGENCY.

3. Set the Power On/Off switch (adjacent to the mains inlet) to On (**|**).


Next ...

The procedures in this section involve the use of IP Addresses.

CAUTION: ASSIGNING IP ADDRESSES MAY HAVE SEVERE IMPLICATIONS IF CARRIED OUT INCORRECTLY. CONSULT YOUR IT DEPARTMENT BEFORE ATTEMPTING TO ASSIGN IP ADDRESSES.

For further information and guidance regarding IP Addresses, contact the Aeroflex Helpdesk or your Aeroflex representative.

There are three stages to the Initialisation process:

1. Set up the 6413Admin password
2. Set up the Ethernet Port IP addresses
3. Set the 6413A internal network addresses

More ...

Passwords:

The following accounts are set up on the 6413A:

Username	Default Password	Comment
6413Admin	password	Required for User administration of the 6413A
AeroflexAdmin	Not Published	Used by Aeroflex service centres - should not be changed
FieldUser	password	Used by field users - should not be changed
SystemAccount	Not Published	Used by Test System software - should not be changed

WARNING: Do not change the AeroflexAdmin or SystemAccount passwords or account details as this will prevent access by Aeroflex personnel during service, and could prevent correct system operation. Changing these passwords may necessitate re-installation of the Operating System, and could result in loss of user settings.

More ...

Previous

Changing Passwords:

The 6413Admin password should be changed on receipt to ensure that users cannot change settings, etc. To change the password: start the unit; at the launch screen select Logout; login to the 6413Admin account using the default (or current password; click Start, Control Panel, User Accounts; select Change the Password and enter the new password.

If the FieldUser password is changed the new password must be set in the Default Login Settings:

- Click Start, Run and type CONTROL USERPASSWORDS2, and click Ok
- Select the FieldUser account from the list (the account you want to automatically logon)
- Uncheck 'Users must enter a user name and password to use this computer' option, and click Ok.
- Type the user account password and complete the process.

More ...

Previous

Configure the IP addresses for the two Ethernet ports: Ethernet 1 and Ethernet 2. These correspond to the two Gigabit ports on the Embedded PC Connection Panel. These are set up by default to use DHCP. The User should check with their IT department that this is suitable. [Internal Ethernet port - this is used by the test system and should not be re-configured].

Configure the IP address for the internal network (Local Area Connection 4). The default address for this is 192.168.1.129/24 (192.168.1.129, subnet mask 255.255.255.0). The customer should check with their IT department that this is suitable and does not clash with addresses in use on their corporate network. If there is a clash then a suitable alternative should be used. The only restriction is that the final octet must be .129.

If the internal network address has been changed then run the System Configuration and Management Application (C:\Program Files\RIWS\6400\SCMA\RILSysConfig.exe) to set up the system configuration database:

- Set the ftp host to match the Local Area Connection 4 address
- Set the SCM Backplane IP address to match the Local Area Connection 4 address.
- Set the Gateway IP address to match the Local Area Connection 4 address.

Note: Any change to IP addresses will require the system to be rebooted.

Next ...

The complete 6413A Test System is now installed and initialised. To ensure that the complete 6413A Test System is ready for use, carry out the following checks.

1. Switch the system off and on
2. Check that the Power LED in front of the Test System lights green.
3. Once the system has initialised check that Startup screen is displayed and press Launch 6413A..
4. Once the application has initialised check that the Ref indication shows that the Ref Source is in lock.
5. If all the indications are correct, the Test System is ready for use. If any indication is incorrect, the problem may be covered in the Troubleshooting section. Alternatively, consult the Aeroflex Helpdesk or your local Aeroflex agent.

See also:

Contacting Aeroflex for support

Next ...

You should be aware of the following precautions before connecting the 6413A Test System to a UE (User Equipment) device.

- The Test System power supply is auto-ranging and will automatically adjust itself to the power supply input voltage, but only the specified range of power input supply must be used (85 to 264V AC).
- A warm-up time of at least five minutes should be allowed before the unit is operational. After this time, the Test System reference oscillator will have stabilised. To make frequency or power measurements to the specified accuracy, a warm-up time of 30 minutes is recommended. Alternatively, an external frequency standard that meets the required accuracy may be used.

WARNING: IF THE EQUIPMENT HAS BEEN STORED AT LOW TEMPERATURES, TIME SHOULD BE ALLOWED FOR RECOVERY TO THE LOCAL AMBIENT TEMPERATURE BEFORE USE. WHERE CONDENSATION OF WATER VAPOUR IS EITHER PRESENT OR LIKELY TO BE PRESENT, ALLOW THE EQUIPMENT TO DRY OUT BEFORE USE. CONDENSATION IS LIKELY TO OCCUR WHEN A COLD OBJECT ENCOUNTERS A WARMER, HUMID, ENVIRONMENT.

CAUTION: RF Connectors

- To prevent damage to the Test System, the maximum power of the Node B applied to the RF Radio Frequency In connector should be limited to +47 dBm by using an external attenuator.
- Damage to the Test System will result if the Node B transmitter output is connected to the RF Out connector on the Test System.

 Contents ...

This section contains the following information:

GUI Overview

Menu Pages

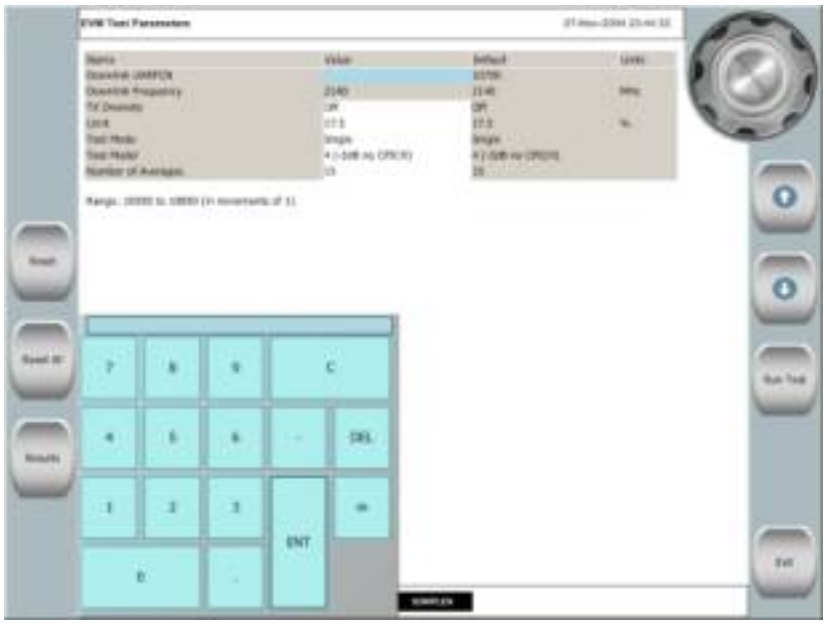
Parameter Selection

Touch Screen

Keyboard & Mouse

Contents ...

The 6413A GUI is designed for use in the field, making best use of the Touch Screen. The Display is a XGA resolution LCD and is divided into two sections: Side panels with Soft Keys which are used navigation and Function selection; Centre section which is used for parameter selection, test progress and results, and display of reports, etc.



To select functionality via a Side Panel Button press the button with the finger. To select or vary a parameter see Menu Pages. To vary a parameter see Parameter Pages.

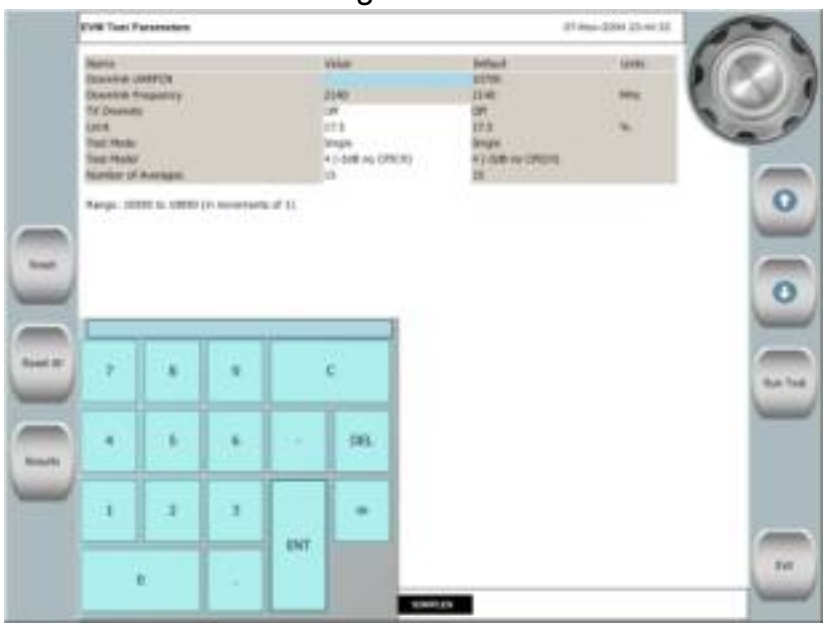
 Next ...

Menu Pages are used to navigate through the 6413A functionality. The initial page offers four test categories (Functional tests, Tx tests, Rx tests, and Special Functions), operational functions (Test Results, Global Parameters, Sequence Tests, etc.), and Help.

Pressing a Menu Page button on one of the side panels will access other screens, with either further options (e.g. Tx Tests) or Parameter Entry (e.g. Global Parameters). To exit a screen without accessing further functionality press the Exit button. To exit the application press the Quit button on the main screen.

Next ...

Parameter Selection Pages are used to set variables for 6413A or test setup.



Parameters are listed at the top of the screen with the current value and the default values. The parameter is selected with the Up and Down arrows, and a touch screen keyboard appropriate to the parameter type is displayed. The parameter is entered by pressing the appropriate button, or entering a value and pressing the 'Enter' key.

To run the test press 'Run Test' or return to the previous menu by pressing exit.

Next ...

The 6413A is equipped with a Touch Screen for field use. The screen functions as a mouse and allows selection of buttons, etc., on the screen by 'clicking' and 'double-clicking' with the finger.

The touch screen is also suitable for use when wearing suitable gloves, although the sensitivity can be reduced.

The Touch Screen sensitivity and alignment are set up in the factory, but can be adjusted by an administrator (see Touch Screen adjustment).


Next ...

The 6413A can be controlled by a USB Keyboard and Mouse, in addition to the Touch Screen. The Keyboard and Mouse can be used to select buttons, enter parameters, and control operation of the 6413A in the same way as the Touch Screen.

The Keyboard and Mouse are required for Administrator use of the 6413A.

To connect a USB Keyboard and Mouse, plug into the USB ports on the Control PC RTM.

Next ...

This section contains the following information:

Front Panel Components

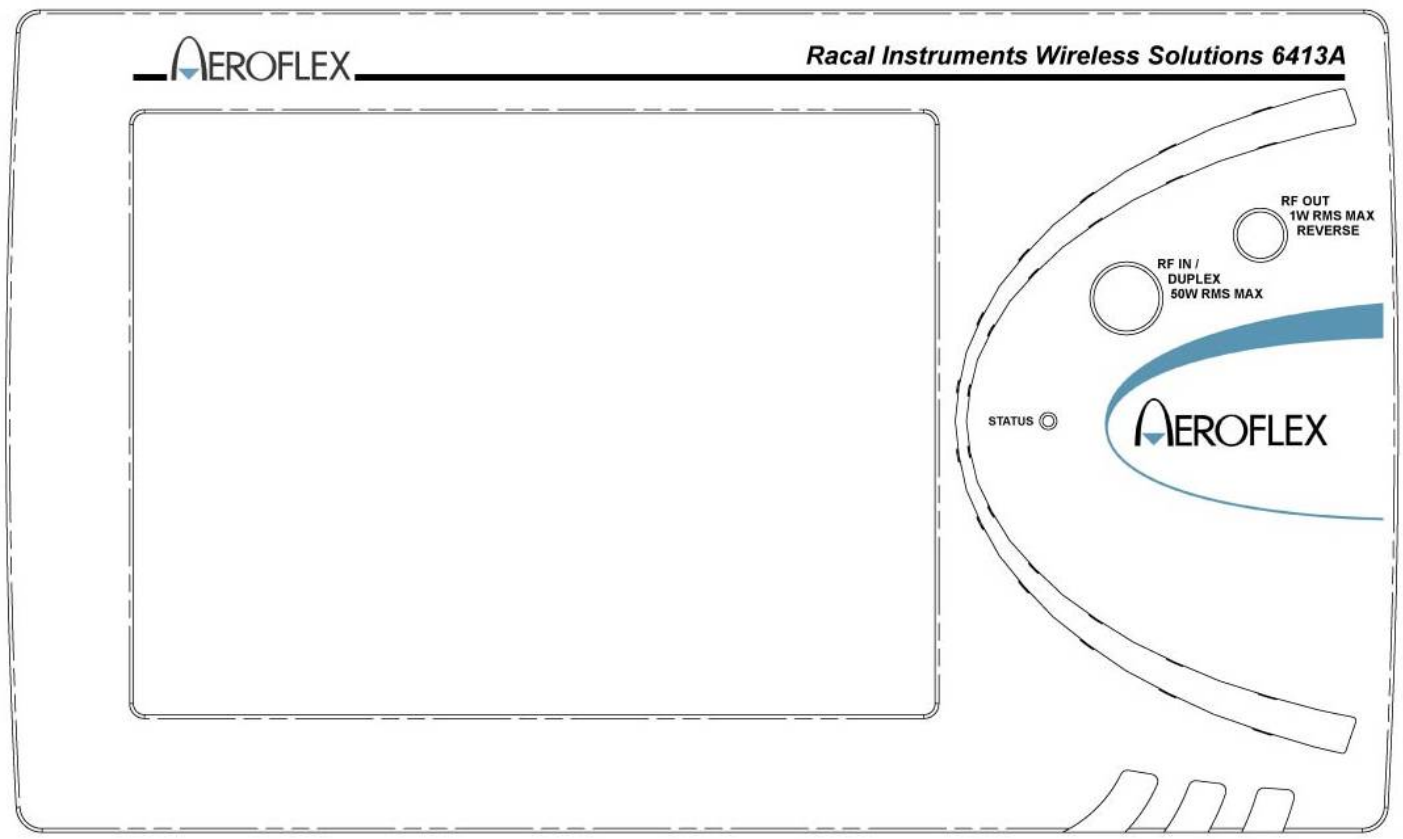
Rear Panel Components

Right Panel Components

Indicator LEDs

Iub Connector Wiring

Contents ...



The front panel consists of a display and touch screen, RF connections, and a status LED

More ...

Previous

Display:

The display is a 10.4" TFT LCD module. It is driven by the Windows Operating system in 1024 × 768 mode. The bottom of the display shows the status of the reference frequency standard, and whether the calibrated RF port is the Duplex or the RF Out.

Touch Screen:

The 6413A is equipped with a Touch Screen for field use. The screen functions as a mouse and allows selection of buttons, etc., on the screen by 'clicking' and 'double-clicking' with the finger. The touch screen is also suitable for use when wearing suitable gloves, although the sensitivity will be reduced.

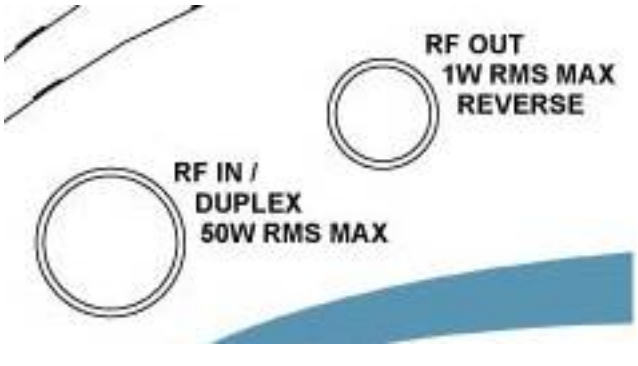
Status LED:

- The Status LED provides bi-colour indication of the system power supply status.
- Green: Power supply active and unit operational
- Red: Power Supply in standby and Windows shut down. To restart the system the mains switch should be recycled.
- Off: Mains Power disconnected or switched off.

More ...

Previous

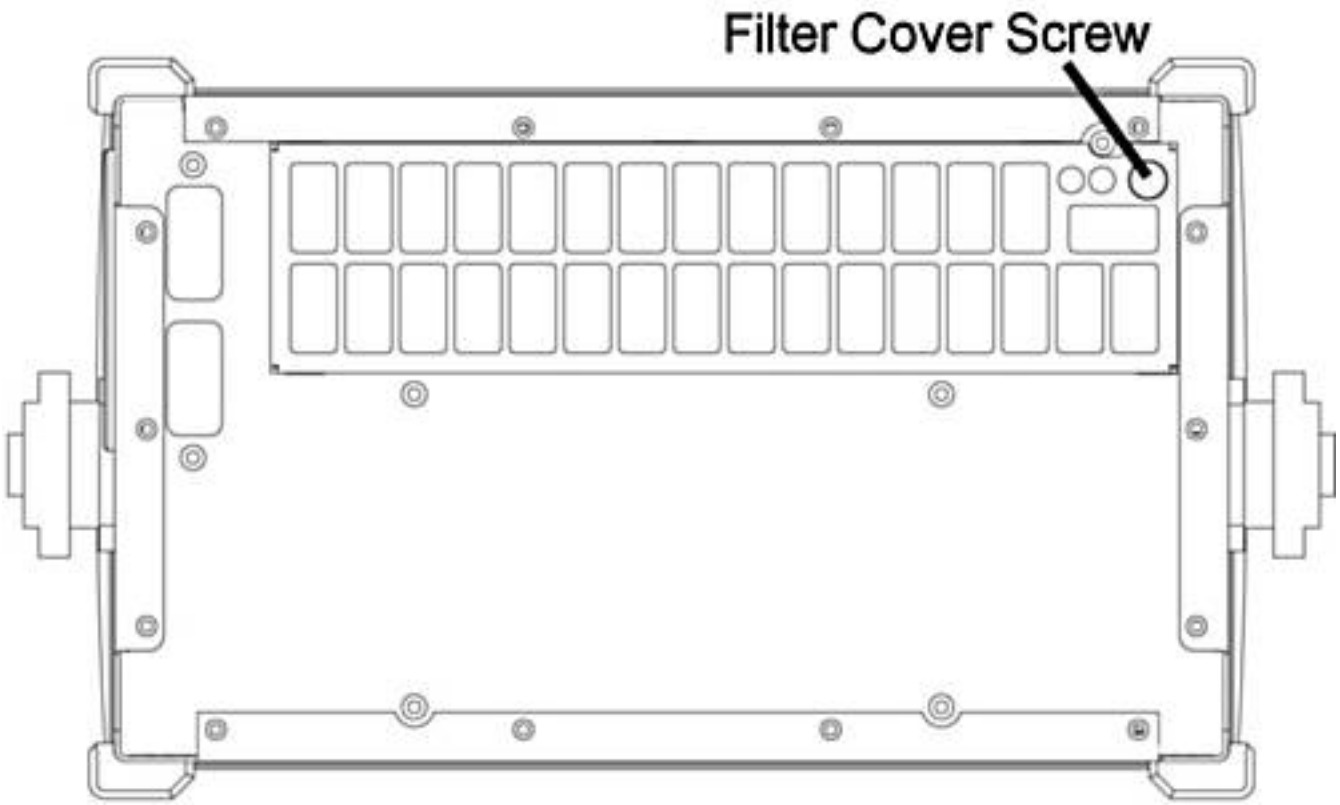
RF Connectors:



RF IN / DUPLEX: N-type connector for connection to Node B transmitter output (RF Out Mode) or Node B Tx/Rx antenna port (Duplex Mode).
CAUTION: Applying power levels in excess of 50W will damage the test system.

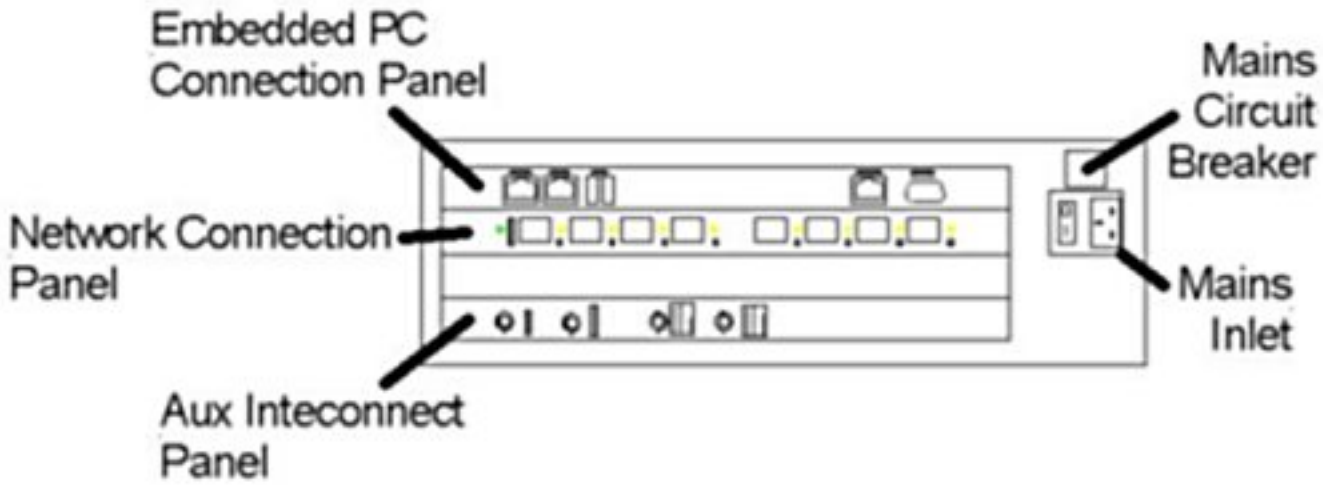
RF OUT: TNC connector for connection to the Node B receiver input (RF Out Mode)
CAUTION: Applying power levels in excess of 1W will damage the test system.

Next ...



The Rear Panel carries the cooling Air Inlet Filter. The filter is removed by unscrewing the screw indicated and sliding the filter cover to the left (See Maintenance - changing the air filter).

Next ...



Mains Inlet: IEC Mains Inlet Connector and combined Mains Switch. Switch controls mains to the 6413A unit.

Mains Circuit Breaker: Over-current mains circuit breaker. Button pops out in the event of an over-current situation. Press button to reset. If the fault persists contact your local Aeroflex Service Centre

More ...

Previous

Auxiliary Interconnect Panel:

- Frequency Standard Input: BNC input for connection of external standard
- Frequency Standard Output: BNC output for connection of internal standard output
- Timing Marker Input: BNC input for connection of Trigger output
- Timing Marker Output: BNC output for connection of Trigger output

See also:

6413A specification

More ...

Previous

Iub Interconnect Panel:

- E1 connections 0-7
- Power LED - on when power is applied to the Network Interface module (NIM)
- Individual E1 connection LEDs - on when connection is active

See also:

6413A specification

More ...

Previous

Embedded PC Interconnect Panel:

- Qty 2 USB 2.0 ports for connection of Keyboard, Mouse, Memory devices, etc.
- Qty 2 RJ-45 10/100/1000 Base TX Ethernet ports for connection to network and Node B Ethernet port
- COM2 RJ-45 RS-232 Serial port for diagnostics and connection to Node B serial port
- Video - VGA video connector - not supported

See also:

6413A specification

Next ...

Front Panel:

Status: Green - Power supply active and unit operational; Red - Power Supply in standby; Off: Mains Power disconnected or switched off.

Iub Connection Panel:

Power: Green - Power supply active and unit operational; Off - Mains Power disconnected or switched off, or unit in standby

Connector LEDs: Yellow - connector selected and active; Off - connector inactive

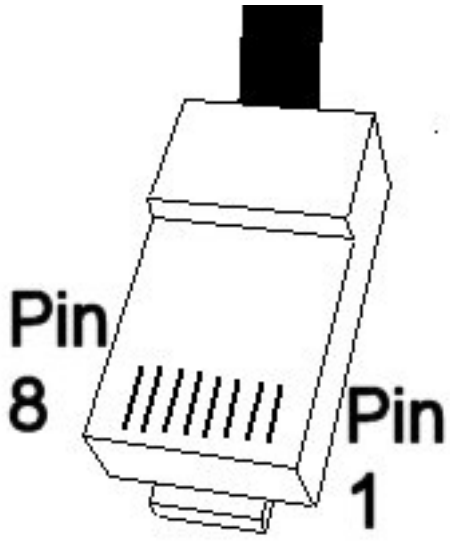

Next ...

The Iub connections on the Network Connection Panel are Balance E1/T1/J1 using RJ48C connectors:

Pin Number	Function
1	In+
2	In-
3	N/C
4	Out+
5	Out-
6	N/C
7	N/C
8	N/C

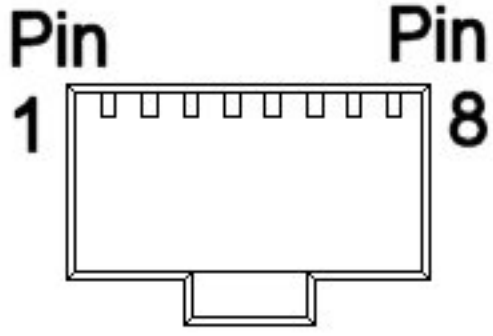
RJ48C

Plug



RJ48C

Socket



Note: The use of screened cable and proper screen termination to the outer shell of a screened connector is recommended to preserve EMC compliance

Various interface cables are available for different manufacturers - contact Aeroflex for details

Contents ...

This section contains the following information:

- How to prepare the 6413A for use
- How to connect the 6413A to the Node B
- How to select Options and Global Parameters
- How to carry out tests
- How to view/store results
- The 6413A Menus
- Sequences & Remote Operation
- Disconnecting and switching off

Contents ...

- The 6413A should be placed on a firm surface, capable of supporting the weight (up to 20kg). Ensure that mains filter (located on the rear panel of the unit) is not obstructed.
- Connect the mains lead to the mains inlet and to a suitable mains supply
- Switch the 6413A mains switch (adjacent to the mains inlet) to on
- The Front Panel Status LED should be green, the fan will be running, and the unit will start to boot the Embedded PC.

More ...

Previous

- On completion of the Embedded PC boot sequence the screen will show the Launch Screen:

- Start the 6413A application by clicking on the "Launch 6413A" button

Next ...

- Connect the Iub Interface cable to Port 0 on the Network Connection Panel, and to the network connection on the Node B (see link for Iub connector wiring).
- Connect further Iub connections to Ports 2, 3, and 4, as required, and to the further network connections on the Node B
- Fit the supplied ferrite clamps to the Interface cables, adjacent to the Network Connection Panel, to ensure EMC conformance.
- Determine whether the connection is Simplex or Duplex
- For Duplex mode connect the RF In/Out N-type connector to the Node B antenna port
- For RF Out mode connect the RF In/Out N-type connector to the Node B transmitter port and the RF Out TNC connector to the Node B receiver input port


Iub Connector Wiring


Next ...

Options relate to unit settings, and are accessed via the 'Options' button on the Main menu. Options will normally be set once for any particular User, and include Frequency Reference selection, whether the spinwheel is displayed, the language for the GUI, the RF Connector Mode (Duplex or RF Out), and the display contrast.

Global Parameters relate to the Node B to be tested, and are accessed via the 'Global Parameters' button on the Main menu. Global Parameters will normally be set for each type of Node B. Selection of the Node B type will set up the appropriate Default Parameters for test and test limits.

See Also:

6413A Menus

Next ...

Tests are broken down into 4 categories:

- Functional tests, relating to the Iub interface, and including Iub configuration, and Node B reset.
- Transmitter tests, relating to parametric tests of the Node B transmit functionality. These tests are derived from 25.141 and include power accuracy tests, dynamic power tests, modulation error tests, and spectrum tests
- Receiver tests, relating to parametric tests of the Node B receiver functionality. These tests are derived from 25.141 and include sensitivity and BER tests.
- Special functions. These include discrete instrument functions, such as a Spectrum Analyser, Code Domain Analyser, and Multi-Mode which displays a number of important Node B transmitter test results on one screen


More ...

Previous

Configuring the Iub and Node B - before running tests the user must configure the Iub and enter the Node B parameters:

- Select Global Parameters and select/enter the Node B details and parameters. Also enter the cable losses for Uplink and Downlink cables.
- Select Functional Tests and Configure Iub Interface, and edit test parameters. Enter/verify the parameters and then run the test to configure the interface, selecting the Local Cell ID of the sector to be tested, on completion of the test. If selection of the Local Cell ID is omitted the user will need to rerun the Configure Iub Test and select the Local Cell ID or select Lucent Mode before attempting to run a performance test.

More ...

Previous

To run a test:

- Select the test category from the main menu (Functional tests, Transmitter tests, Receiver tests, Special functions).
- Select the test from the list in the middle of the screen by using the Up/Down buttons, spinwheel, or by clicking on the test with the finger. Note that if you 'double click' on the test, or press the 'Run Test' button', it will run immediately using the parameters set the last time the test was run.
- Press the 'Edit Test Parameters' button and a menu screen with the test parameters will be displayed. Initially the parameters displayed will be the default parameters for the Node B selected in the Global Parameters screen, in subsequent tests they will be the last saved parameters.

More ...

Previous

- Edit the parameters by selecting the parameter to be changed (Up/Down buttons or click on the parameter).

  Each parameter can be entered by the presented keyboard within the limits shown. Individual parameters can be reset to the default by the 'Reset' button, or all parameters reset by the 'Reset All' button.

- Press the 'Run Test' button.

- The screen will show test progress, and a graphical representation of the RF connections to the Node B for Duplex or RF Out.

- The results will be displayed by means of a bar graph. Out-of-Limit results are shown on the screen by a red arrow, and the Out-of-Limit regions are greyed on the bar graph.

- Results of tests run are also stored in the test log.

Next ...

Test Results are accessed via the 'Test Results' button on the Main menu. The Test Results menu gives the option to display results gathered during the current session, save gathered results, and load results stored previously.

The main display shows a summary of the results available. To store results gathered, press the Save button.

To load previously stored results press the Load button. To display the test results press the Test Report button.

The header printed with the results can be specified by selecting Results Header from the main screen.

Viewing Test Results off-line

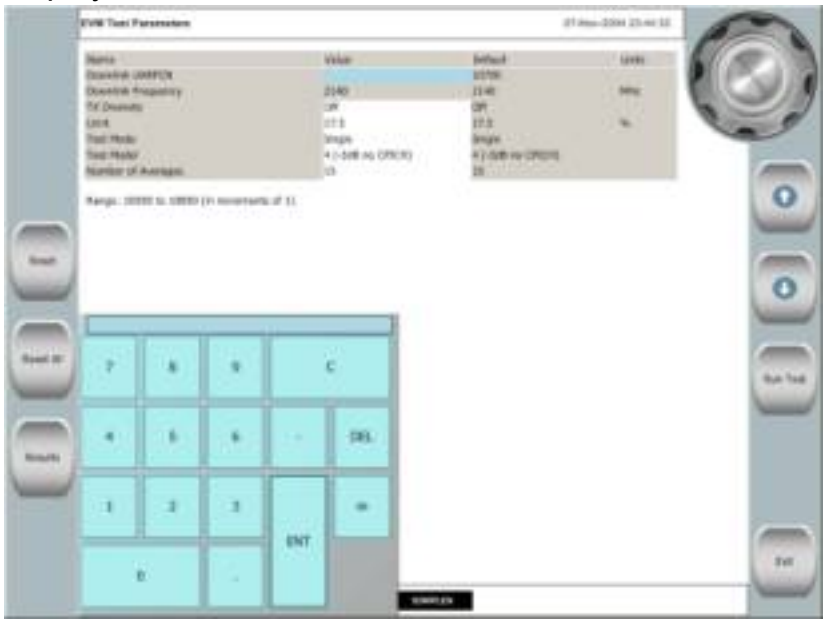
Next ...

Test Results are accessible offline by two different methods:

- Test Reports are available in the directory D:\6413A\TestReports. Reports can be viewed off-line using the appropriate viewer for the report format (Word, Acrobat, etc.).
- Test Logs are available in the directory D:\6413A\Logs. Test logs are stored in internal format, but can be viewed by renaming the file with an xml suffix and opened using a browser. For each test in the log there is a timestamp (<Progress>), the test parameters (<TestParameter>), the test result (<Measurement>), and the test summary (<TestResult>).

Next ...

The 6413A operates with a GUI designed for use with a touch screen. In order to navigate through the unit functionality the unit presents choices by means of soft keys on menu pages. The Options for each menu page are displayed as a series of buttons down each side of the page, and parameters associated with the menu page are displayed in the middle of the screen.



6413A menu screens

Next Section ...

The 6413A main menu provides access to the main Test Functions, Test Sequences, Global Parameter and Option setting, results, and the help system.

Global Parameters

Tests (Functional, Transmitter, Receiver, Special Functions)

Test Sequences

Test Results

Help

Options


Previous

Test Functions provide access to the test menus.


Functional Tests access the Iub test functions, including Link Test, Reset, and Node B Configuration


Transmitter Tests perform parametric tests on Node B transmitter power accuracies, signal quality, etc.


Receiver Tests perform parametric tests on Node B sensitivities, BER, etc.


Special Functions accesses Multi-Mode tests, Spectrum Analyser functions, Code Domain Analyser, Diagnostics


Test Sequences give access to tools for creating and running test sequences


More ...


Previous


Global Parameters enable set-up of parameters related to the Node B, including Manufacturer, Max O/P Power, etc.


Options enables set-up of unit parameters such as Language, Duplex/RF Out mode, Frequency Standard, etc.


Test Results enables storage and manipulation of results gathered during tests made by the 6413A


Results Header enables text settings which will be included in test results


Help gives access to the 6413A help system


Next ...

 Functional Buttons

 Tests

The left button bar gives rapid access to other test groups, the right buttons select and run tests:

Up Button - scrolls upwards through the test or parameters list

Down Button - scrolls downwards through the test or parameters list

Run Test - runs the test directly with the previously selected parameters

Edit Test Parameters - selects the test parameters menu for the test

Exit - returns to the previous menu

Function Tests ...

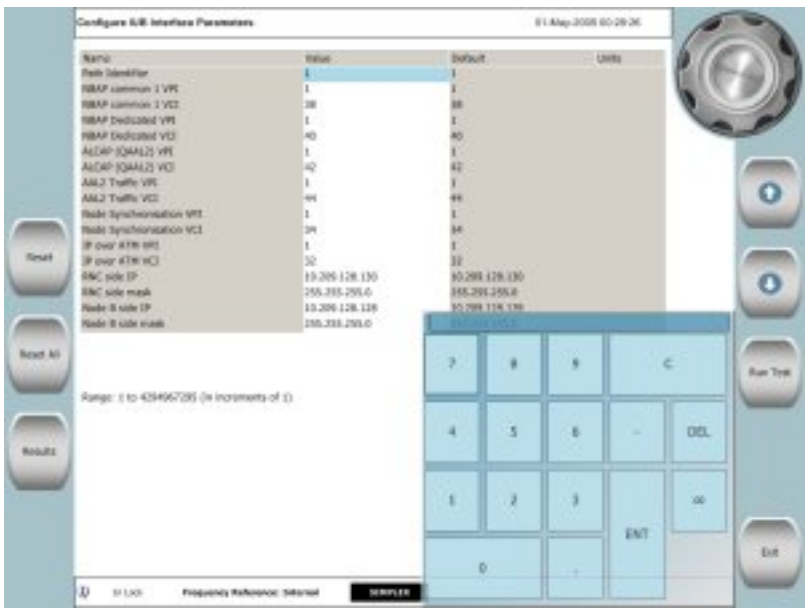
The following tests are available on the Functional Test menu

 Configure Iub Interface - Set up Node B communication parameters

 Reset Iub Interface - Resets the 6413A Iub protocol stacks. Reset Iub Interface is used when running the Configure Iub Interface test if incorrect parameters have been entered and the Configure Iub Interface test fails. It can also be used if the Node B has become out of sync with the 6413A, for example due to abnormal test termination.
Note: Reset Iub Interface will necessitate re-running the Configure Iub Interface before further tests can be performed.

 Iub Status - Monitors the status of the Physical and Logical Iub status lines for diagnosing Iub problems.

 Next ...



 Functional Buttons

 Parameters

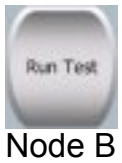

Up - move up to select previous parameter.

Reset - return parameter to the default value


Down - move down to select next parameter.

Reset all - return all parameters to the default value

Results - display parameters recovered from the Node B



Run Test - attempt to recover parameters from the Node B

Exit - returns to the previous menu


Parameters ...

Iub Interface Configuration parameters are:

- Path ID
- NBAP common 1 VPI/VCI
- NBAP dedicated 1 VPI/VCI
- ALCAP (QAAL2) VPI/VCI
- AAL2 Traffic VPI/VCI
- Node Synchronisation VPI/VCI


More ...

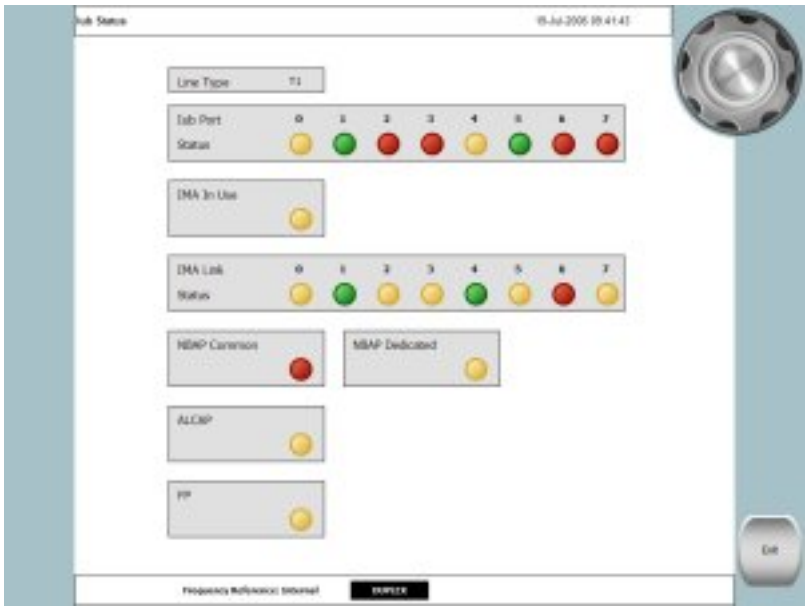
Previous

The Configure Iub will attempt to set up various Iub Parameters, and read back certain Node B settings.

On completion of the test the GUI will display buttons indicating the cells that have been identified on the Node B.

Select the Cell ID of the cell to be tested. This can be changed on individual test parameter screens without having to re-run the Configure Iub test.

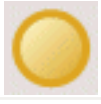
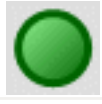
Next ...



This test displays the various element of the Iub link(s) and determines if operation is correct. For each configured element the LEDs display the status (see next page for status explanation).

LED Status

Next ...

Element			
Link Status	Loss of Signal or Line Disconnected	Loss of Frame, Loss of Multi-Frame Alignment, Remote Alarm Indication, Alarm Indication Signal	Connected and Synchronised
IMA Status	IMA not in use	IMA not Synchronised	IMA Connected and Synchronised
IMA Link Status	Not in Group or Deleted	Useable/Unassigned but not Active	Active
NBAP Common, NBAP Dedicated, ALCAP, FP	Protocol Down		Protocol Up

 Next ...

 Contents ...

 Functional Buttons

 Transmitter Tests

 Transmitter Test Parameters

The left button bar gives rapid access to other test groups, the right buttons select and run tests:

Up Button - scrolls upwards through the test or parameters list

Down Button - scrolls downwards through the test or parameters list

Run Test - runs the test directly with the previously selected parameters

Edit Test Parameters - selects the test parameters menu for the test

Exit - returns to the previous menu

Transmitter Tests ...

Transmitter tests perform parametric tests on the Node B transmit functions.

Maximum Output Power (25.141 - Section 6.2.1)

Error Vector Magnitude (25.141 - Section 6.7.1)

Peak Code Domain Error (25.141 - Section 6.7.2)

Frequency Error (25.141 - Section 6.3)

More ...

Previous

CPICH Power Accuracy (25.141 - Section 6.2.2)

Adjacent Channel Leakage Ratio (25.141 - Section 6.5.2.2)

Absolute CPICH Power Accuracy (25.141 - N/A)

Occupied Bandwidth (25.141 - Section 6.5.1)

More ...

Previous

Total Power Dynamic Range (25.141 - Section 6.4.4)

Power Control Dynamic Range (25.141 - Section 6.4.3)

Power Control Steps (25.141 - Section 6.4.2)

Spectrum Emission Mask (25.141 - Section 6.5.2.1)

Next ...

The majority of Transmitter Test parameters are common to all the Transmitter Tests:

Tx Diversity - Select to test on Tx diversity port (when supported by Node B)

Local Cell Id - selects the cell to be tested on the Node B

Downlink UARFCN - determined from site documentation or LMT. Changing the Downlink UARFCN will automatically adjust the Uplink UARFCN to the corresponding value for the Band being tested

Downlink Frequency - calculated from the Downlink UARFCN - this parameter is displayed only and cannot be entered

Downlink Primary Scrambling Code - determined from the site documentation or the LMT

Uplink UARFCN - this value is automatically calculated when entering the Downlink UARFCN. This value can be changed and this will not be reflected in the Downlink UARFCN, enabling non-standard combinations to be selected. Note that in normal use only the Downlink UARFCN should be entered or Receiver Tests may not work

Uplink Frequency - calculated from the Uplink UARFCN - this parameter is displayed only and cannot be entered

More ...


Previous

Test Mode - Single (performs a single measurement and records results in the test log), Continuous (repeats the measurement continuously, displaying the result, but not recording it), Continuous with Logging (As Continuous but records results in the test log. Note that significant quantities of data my be generated in this mode)

Test Model - Test Model to be generated by the Node B to carry out the test. Note that certain Test Models are defined for each test in 25.141 and selection of the wrong Test Model can result in incorrect measurement results. To reset the Test Model to the 25.141 defined Test Model select this parameter and press the 'Reset' button. In certain tests this is not adjustable.

Number of Averages - the number of consecutive measurements that are averaged before displaying the final result. Increasing this value will reduce the measurement uncertainty, but may extend the measurement time

Downlink Power - the power level that will be set on the Node B - this will be set by the value entered in the Maximum Output Power parameter in the Global Parameters screen.

Test Limits - the limits that will be applied to determine a pass or fail. To reset these to 25.141 limits select the parameters and press the 'Reset' button


More ...

Previous

Absolute CPICH Power - sets value required for the Absolute CPICH Power Accuracy test

Power Control Step Size - the Power Step size selected for the Power Control Step Size test

Next ...

 Functional Buttons

 Receiver Tests

 Receiver Test Parameters

The left button bar gives rapid access to other test groups, the right buttons select and run tests:

Up Button - scrolls upwards through the test or parameters list

Down Button - scrolls downwards through the test or parameters list

Run Test - runs the test directly with the previously selected parameters

Edit Test Parameters - selects the test parameters menu for the test

Exit - returns to the previous menu

Receiver Tests ...

Receiver tests perform parametric tests on the Node B receive functions.

 Reference Sensitivity Level (25.141 - Section 7.2)

 Dynamic Range (25.141 - Section 7.3)

 Uplink Wideband Power

 Absolute Sensitivity - measures the input sensitivity for a given BER value

 Next ...

The majority of Receiver Test parameters are common to all the Receiver Tests:

Tx Diversity - Select to test on Tx diversity port (when supported by Node B)

Local Cell Id - selects the cell to be tested on the Node B

Downlink UARFCN - determined from site documentation or LMT. Changing the Downlink UARFCN will automatically adjust the Uplink UARFCN to the corresponding value for the Band being tested

Downlink Frequency - calculated from the Downlink UARFCN - this parameter is displayed only and cannot be entered

Downlink Primary Scrambling Code - determined from the site documentation or the LMT

Uplink UARFCN - this value is automatically calculated when entering the Downlink UARFCN. This value can be changed and this will not be reflected in the Downlink UARFCN, enabling non-standard combinations to be selected. Note that in normal use only the Downlink UARFCN should be entered or Receiver Tests may not work

Uplink Frequency - calculated from the Uplink UARFCN - this parameter is displayed only and cannot be entered

More ...

Previous

Test Mode - Single (performs a single measurement and records results in the test log), Continuous (repeats the measurement continuously, displaying the result, but not recording it), Continuous with Logging (As Continuous but records results in the test log. Note that significant quantities of data my be generated in this mode)

Uplink Scrambling Code - the scrambling code used for the uplink - generally this does not need to be changed from the default value

Downlink Power - the power level that will be set on the Node B - this will be initially set by the value entered in the Maximum Output Power parameter in the Global Parameters screen but can be modiied.

Test Limits - the limits that will be applied to determine a pass or fail. To reset these to 25.141 limits select the parameters and press the 'Reset' button

More ...

Data rate - the transmitted signal data rate

Uplink Power - the power transmitted in the Receiver Sensitivity test or the Wideband Power Measurement test

Absolute Sensitivity Uplink Start Power - the starting power for the Absolute Sensitivity test measurement algorythm

Uplink Wanted Signal Power - the power level of the main signal in the Dynamic Power Range test

Interfering AWGN Absolute Power - power level of the interfering noise

No of bits for BER measurement - the length of the data transmission used to determine BER

Cumulative Mode - the BER measurement can be a continuous measurement where the BER is continuously calculated, or the measurement can reset at the start of each measurement period - only applicable in continuous mode

 Functional Buttons

 Special Function Tests

 Special Function Test Parameters

The left button bar gives rapid access to other test groups, the right buttons select and run tests:

Up Button - scrolls upwards through the test or parameters list

Down Button - scrolls downwards through the test or parameters list

Run Test - runs the test directly with the previously selected parameters

Edit Test Parameters - selects the test parameters menu for the test

Exit - returns to the previous menu

Special Function Tests ...

Special Functions include the following test functions.

Multi-Mode - simultaneous measurement and display of a number of Transmitter parameters

Spectrum Analysis Graph

Code Domain Analyser

Diagnostic Test - A diagnostic test sequence that is designed to assists the operator in diagnosing problems with Node Bs.

Next ...

The majority of Special Function parameters are common to all the Special Function Tests Tests:

Tx Diversity - Select to test on Tx diversity port (when supported by Node B)

Local Cell Id - selects the cell to be tested on the Node B

Downlink UARFCN - determined from site documentation or LMT. Changing the Downlink UARFCN will automatically adjust the Uplink UARFCN to the corresponding value for the Band being tested

Downlink Frequency - calculated from the Downlink UARFCN - this parameter is displayed only and cannot be entered

Downlink Primary Scrambling Code - determined from the site documentation or the LMT

Uplink UARFCN - this value is automatically calculated when entering the Downlink UARFCN. This value can be changed and this will not be reflected in the Downlink UARFCN, enabling non-standard combinations to be selected. Note that in normal use only the Downlink UARFCN should be entered or Receiver Tests may not work

Uplink Frequency - calculated from the Uplink UARFCN - this parameter is displayed only and cannot be entered

More ...

Previous

Test Mode - Single (performs a single measurement and records results in the test log), Continuous (repeats the measurement continuously, displaying the result, but not recording it), Continuous with Logging (As Continuous but records results in the test log. Note that significant quantities of data my be generated in this mode)

Test Model - Test Model to be generated by the Node B to carry out the test. Note that certain Test Models are defined for each test in 25.141 and selection of the wrong Test Model can result in incorrect measurement results. To reset the Test Model to the 25.141 defined Test Model select this parameter and press the 'Reset' button. In certain tests this is not adjustable. Note that in spectrum analyser mode the Node B is set to transmit Basic Cell only.

Downlink Power - the power level that will be set on the Node B - this will be initially set by the value entered in the Maximum Output Power parameter in the Global Parameters screen but can be modiied.

Number of Averages - the number of consecutive measurements that are averaged before displaying the final result. Increasing this value will reduce the measurement uncertainty, but may extend the measurement time

More ...

Previous

Test Limits - the limits that will be applied to determine a pass or fail in the Multi-Mode test. To reset these to 25.141 limits select the parameters and press the 'Reset' button

Spreading factor - determines how data is spread across the code space, and hence how the channels are displayed

Next ...

Test sequences allow the user to record a sequence of tests, store the sequence, and replay it at a later date.

 More ...

Record Mode Button: Starts Record Mode, or Stops Record Mode when recording. When recording the display shows: Recording Sequence.

Load Sequence: Loads a previously stored sequence

Save Sequence: Saves a recorded test sequence for later recall

Run Sequence: Runs the current sequence

Abort Sequence: Stops the currently executing sequence

Exit - returns to the previous menu 

 File Browser ...

The File Browser provides a file management facility, designed for use with the touch screen GUI.

To navigate to a particular file select the Drive, then the Directories, and then the File name. To enter a subdirectory, double click on the directory name. Lists can be scrolled by the up and down buttons.

To move up the directory tree use the up button.

 Main Menu ...

 Functional Buttons

 Parameters


Up - move up to select previous parameter.

Reset - return parameter to the default value


Down - move down to select next parameter.

Reset all - return all parameters to the default value

Exit - returns to the previous menu


Parameters ...

Global Parameters define the Node B characteristics which will be used by the test system. The Node B selection will also set up the default parameters and test limits used by the parametric and functional tests.

- Operating Band - Determines Frequency Ranges
- Manufacturer - supported manufacturers options
- Model - supported model types
- Software Version - supported software versions
- Maximum Downlink Power Capability - Maximum Output Power of the Node B reported by the Audit in Configure Iub
- Maximum Output Power - User configured value for high power tests (Maximum Output Power, etc.)
- Uplink External Loss - Loss in dB of the cable connected to the TNC connector in RF Our Mode and N-type connector in Duplex Mode
- Downlink External Loss - Loss in dB of the cable connected to the N-type connector in Duplex or RF Out

Next ...

 Functional Buttons

 Parameters

Clean Screen - suspends operation of the GUI for 30 seconds to enable cleaning of the touch screen

Import unit settings and parameters

Export unit settings and parameters

Diagnostics Screen

Restore Settings - resets unit options to factory defaults


Parameters ...


Up - move up to select previous parameter.


Down - move down to select next parameter.

About - displays version and hardware configuration of the system

Apply - applies the currently selected parameters immediately (e.g. contrast)

Exit - returns to the previous menu

Options that can be selected are:

- Frequency Reference - Internal Ovened Oscillator, or External Input
- Spinwheel - On or Off
- Language - the GUI language can be selected from the list. Note that the selected language will not be active until the GUI has closed and re-opened.
- RF Connection mode - Duplex or RF Out
- Display Contrast Level - enables the colours to be optimised for best viewing

Next ...

Runs 6413A Built In Self Test (BIST)

Saves 6413A parameters and captured waveforms for off-line analysis by Aeroflex Customer Support


Parameters

Functional Buttons

File Browser

Displaying and saving results

Functional Buttons:

Load - Loads a previously saved results log

Save - Saves the current results log

Start New Log - abandons the current results log and starts a new log

Test Report - Generates a test report

Exit - returns to the previous menu


File Browser ...

The File Browser provides a file management facility, designed for use with the touch screen GUI.

To navigate to a particular file select the Drive, then the Directories, and then the File name. To enter a subdirectory, double click on the directory name. Lists can be scrolled by the up and down buttons.

To move up the directory tree use the up button.

Next ...

To display the current test log results as a report, press the Test Report button.

Results will be displayed in a printable format.

To scroll within a page drag the page with the mouse, and to change the page press the up or down button.

To save test results press the Save Report button, choose the format required, and use the file navigator to save the file.

Note: Saved Reports can not be viewed on the 6413A. Test Result Log Files are saved on entry to the Test Report Generator. In order to view the results again reload the Results Log File.

Next ...


Functional Buttons


Parameters

Functional Buttons:

 Up - select previous parameter

 Down - select next parameter

Exit - returns to the previous menu

 More ...

The Results Header menu enables details to be entered which will be displayed on all printed results headers:

- User Name
- Comments
- UUT Software Version
- UUT Serial Number


Next ...

 Functional Buttons

 Navigation

Functional Buttons:

Back - returns the browser to the previously selected page

Contents - moves directly to the Help system Contents page

Forward - moves to the next selected page (after using the Back button

Exit - returns to the previous menu


Next ...

- The Help system is navigated by Hyperlinks. These appear in blue on the screen and can be clicked to jump to the referenced page.
- At the top of each page is a reference to the hierarchy of pages leading to the current page. The user can click on any link in the hierarchy to move directly to that page.
- At the bottom of most pages is a link to either the next topic, or to the next page where the page would otherwise overflow on the display.


Next ...

Sequences provide a method of automating a number of measurements into a test campaign, with results recorded in the test log. Sequences can be generated off-line using a suitable editor, or by recording a number of test steps and saving them to a sequence file.

Recorded Sequences

Off-Line Sequence Generation

Remote Access

Next Section ...

Test sequences allow the user to record a sequence of tests, store the sequence, and replay it at a later date.

 Functional Buttons ...

Record Mode Button: Starts Record Mode, or Stops Record Mode when recording. When recording the display shows: Recording Sequence.

Load Sequence: Loads a previously stored sequence

Save Sequence: Saves a recorded test sequence for later recall

Run Sequence: Runs the current sequence

Abort Sequence: Stops the currently executing sequence

Exit - returns to the previous menu 

 File Browser ...

The File Browser provides a file management facility, designed for use with the touch screen GUI.

To navigate to a particular file select the Drive, then the Directories, and then the File name. To enter a subdirectory, double click on the directory name. Lists can be scrolled by the up and down buttons.

To move up the directory tree use the up button.

 Next Section ...

Test Sequences can be recorded on the 6413A for later playback, can be generated off-line, or recorded sequences can be edited/modified off-line. Sequences can be generated or edited using any suitable text editor (e.g. Notepad). A User API is provided to facilitate high level programming.

Sequences should be stored in the Sequences Directory (D:\6413A\Sequences), after which they will be available for use from the 6413A GUI (Test Sequences, Load Sequences).

6413A User API - See Application Note AN06-0029

Next Section ...

The 6413A can be accessed remotely in two ways:

1. Remote Desktop using a Remote Desktop client from a Windows 2000 or Windows XP PC. This enables the remote machine to access the 6413A using the 6413A GUI. Test results are stored on the 6413A but are accessible via the shared D drive.
2. Remote access via the User API. Test results can be stored on the 6413A and accessed via the shared D drive, or reported via the API. **This function is currently TBA.**

Both methods require knowledge of the 6413A IP address

 Access via Remote Desktop

 Remote Access via 6413A User API

 Determining/Setting the 6413A IP address

 Next Section ...

To control the 6413A by Remote Desktop:

1. Activate Remote Desktop on the 6413A. To do this, log onto the system as 6413Admin, select Control Panel, System, and the Remote tab, and enable "Allow users to connect remotely to this computer". Click on Select Remote Users, and add FieldUser.
2. Ensure that the Remote Computer is either running Windows XP, has the Remote Desktop Client installed, or download and install the Remote Desktop client from: http://www.microsoft.com/windowsxp/downloads/tools/rdclientdl.mspx.
3. Determine the IP address (See Determining/Setting the 6413A IP address).
4. Start the Remote Desktop Client (Start, Programmes, Accessories, Communications) and log onto the 6413A as FieldUser to run tests, or 6413Admin to carry out remote administrative tasks.

Determining/Setting the 6413A IP address

Next Section ...

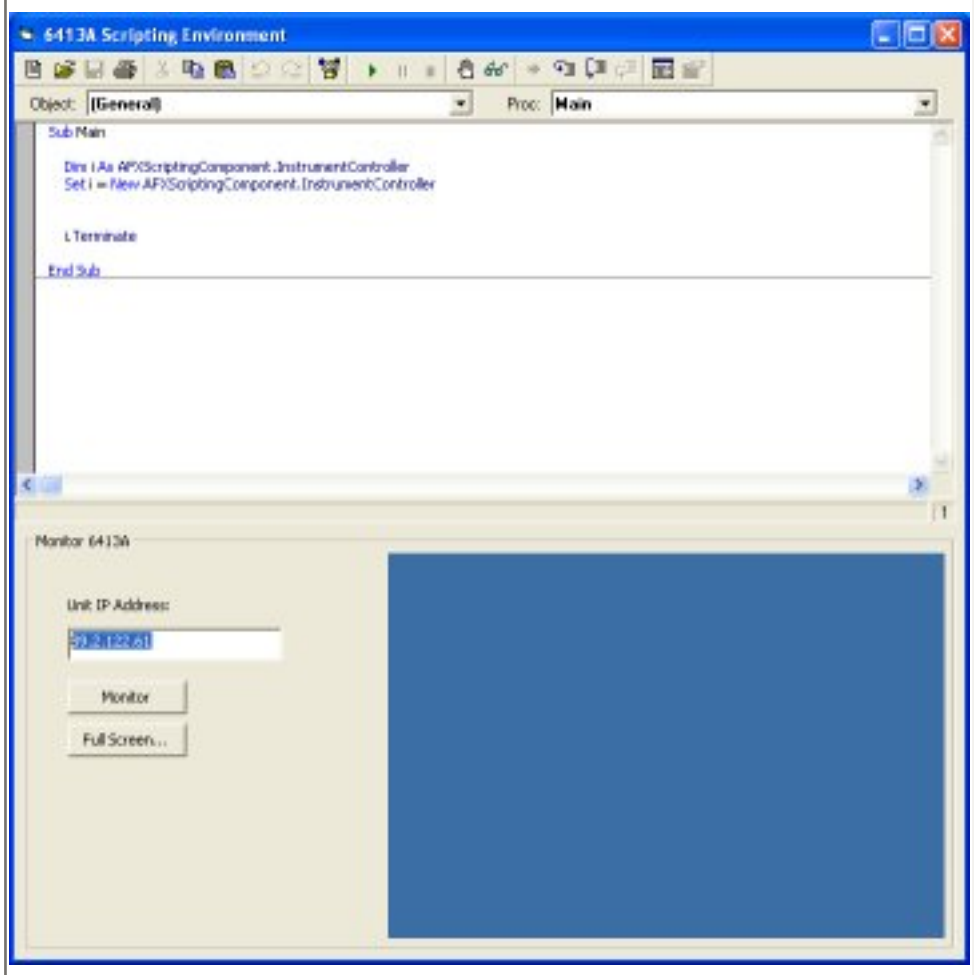
The 6413A can be set up for remote operation and programming using the User API. The User API uses commands that are similar to those generated when recording a test sequence, and this is often the best place to start when producing a remote test programme.

In order to remotely access the Lomond it is necessary to install the API on the remote PC:

1. Locate the API install programme (6413A_API_Setup.exe) in the C drive root directory
2. Copy to the remote PC
3. Run the Setup programme which will install the API components, and also the API editor.

The 6413A can be run from the API Editor or any COM aware programme.

API Editor	COM aware programming
6413A User API - See Application Note AN06-0029	Sample Script
Next Section ...	



The Editor contains an editing window and a monitor window.

Command sequences are entered in the editing window, between the Set command and the i. Terminate command.

To insert a command position the cursor and type "`i.`". A drop down box will list the commands available. After selecting the command type a space and a pop-up box will list the parameters required for the command. Note that most tests require the Cell Id to be entered.

For remote operation the first command should be RemoteServer with the IP address of the remote 6413A entered in quotes.

Entering the IP address of the remote 6413A in the bottom half of the screen will show the display of the remote unit, updated approximately every 10 seconds.

 COM aware programming

The Remote API is installed with the API editor by the 6413A_API_Setup.exe. Having installed the software on the remote PC, double-click on "6413ARemoteAPI.exe", and follow the instructions. The Remote API should now be ready for use

The Remote API is provided in the form of a COM interface, and so may be called from any COM-aware programming (or scripting) language. It is identical to the API used on the 6413A unit for running Test Sequences.

To enable remote operation, simply call the "RemoteServer" function, followed by the IP address of the 6413A unit:

```
Option Explicit

Sub Main

Dim i As AFXScriptingComponent.InstrumentController
Set i = New AFXScriptingComponent.InstrumentController

i.RemoteServer "89.2.122.61"

Dim localCellID As Long
localCellID = i.GetCellID
i.EVMTest localCellID, False, 10700, 0, 9750, 17.5, TESTMODE_Sngle, TESTMODEL_FourMinus3dBCPICH, 15, False

i.Terminate

End Sub
```

6413A User API - See Application Note AN06-0029 Next ...

This script runs the Configure IUB Interface test, followed by an Error Vector Magnitude test
To run this script from a remote PC, uncomment out the "RemoteServer", "LockFrontPanel" and "UnlockFrontPanel" lines, and change the sample IP address (89.2.122.61) to the actual IP address of the 6413A unit

```
Sub Main
      Dim i As AFXScriptingComponent.InstrumentController
      Set i = New AFXScriptingComponent.InstrumentController
         'i.RemoteServer "89.2.122.61"
         'i.LockFrontPanel
      Dim cellID As Long
         i.CIITest
         cellID = i.GetCellID
         i.EVMTest cellID, False, 10700, 0, 9750, 17.5, TESTMODE_Sngle, TESTMODEL_FourMinus3dBCPICH,
15, False

      If i.GetLastError <> 0 Then
            MsgBox "Error starting test: " & i.GetLastErrorText
      Else
            If i.GetLastTestResult("EVM") = TESTRESULT_Pass Then
               MsgBox "EVM Test Passed"
               MsgBox "EVM Measurement was " & CStr(i.GetLastMeasurement("EVM"))
               MsgBox "Test limit was " & i.GetParameter("b109")
            Else
               MsgBox "Test Failed (or result was invalid)"
            End If
      End If
         'i.UnlockFrontPanel
         i.Terminate
End Sub
```

Next Section ...

In order to determine the 6413A IP address assigned to the Ethernet ports:

1. Login as 6413A admin and connect the network to the appropriate Ethernet port.
2. Select Start, Run, and at the prompt type cmd and press return.
3. In the DOS window type ipconfig /all. The IP addresses for all active ports will be shown. The two ethernet connectors are ports 2 and 3.
4. Assuming only one port is attached the unused port will indicate:
   Media State . . . . . : Media disconnected
   The connected port will report:
   Ethernet adapter Local Area Connection 3:
   Connection-specific DNS Suffix . : riwsg.com
   Description . . . . . : Intel(R) PRO/1000 MT Dual Port Network Connection #2
   Physical Address. . . . . : 00-20-13-F0-77-9F
   Dhcp Enabled. . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   IP Address. . . . . : 89.2.121.92
   Subnet Mask . . . . . : 255.0.0.0
5. The Dhcp Enabled . . . : Yes indicates that dynamic IP address allocation is selected (No would indicate a fixed IP address.

Fixing the 6413A IP address Next Section ...

To fix the IP address:

1. Select Start, Control Panel, Network Connections. Assuming only one network connection is attached, either Local Area Network 2 or 3 will show "Network Cable Unplugged", and the other will show "Enabled". Double on the enabled network, and select Properties.
2. On the general tab, highlight "Internet Protocol (TCP/IP)", and select properties.
3. Select "Use the following IP address:" and enter the required address and subnet mask (and Gateway if required).
4. To reset a port to automatic address allocation select "Obtain an IP address automatically"
5. Click OK, as required, to exit.
6. If necessary the second Ethernet port IP address can be set in the same way.

Note:

1. **Installation of PCs, installation of software on PCs, and setting up network connections for the PCs are usually carried out by the corporate IT departments within a company, and must be performed in accordance with any existing company procedures and guidelines. This is especially true for assigning IP addresses to PCs and Test Systems.**
   If you cannot obtain adequate help from your corporate IT department, you should contact Aeroflex for assistance
2. **Any change to IP addresses will require the system to be rebooted.**


Next Section ...

To switch off the 6413A press Exit until the Main Screen is reached, and the press the Quit button, and confirm that you wish to exit. If the log contains unsaved data a warning is displayed.

Quitting the 6413A application will return the user to the launch screen.

Select Shutdown system to exit Windows and put the unit into shutdown mode. To restart the system the mains power should be cycled by the mains switch (located next to the Mains Inlet connector). This method is preferred as it will shut the operating system in an orderly fashion and give better security of data.

Remove all connections to the Node B.

 Contents ...

This section contains the following information:

Error Messages

Troubleshooting Software Installation Problems

Troubleshooting Hardware Problems

Troubleshooting Operational Problems

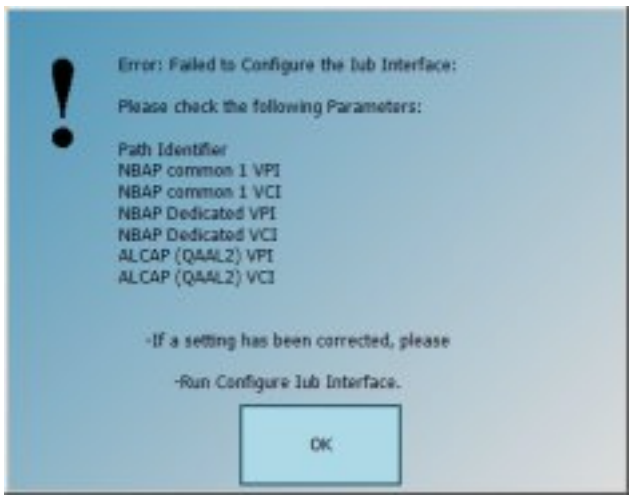
Note: Known limitations of the 6413A application software are documented in the Release Notes

View Release Notes

Contents ...

During Operation the user may be presented with Error Messages for a variety of reasons:

- User and parameter errors and warnings
- Iub Interface Errors and Warnings
- Test Operation Errors, Warnings, and Conditions
- Next Section ...



User Errors and Warnings are presented as a pop-up window when an invalid entry or condition is encountered:

The pop-up will also give suggestions on the probable causes and remedies for the error conditions.

Next Section ...

Iub Interface Errors and Warnings are presented in the Status Bar on the GUI


Errors and Warnings


Next Section ...

Iub Interface Errors and Warnings are presented in the Status Bar on the GUI

Failed to Configure Iub Interface

Failed to set up the Downlink

TC_CONFIG

RADIO_LINK_FAILURE / RADIO_LINK_RESTORE

Next Section ...

Error Message: ERROR: Failed to Configure Iub Interface. Please exit, reboot, change parameters and try again

The Test Parameters for **Configure Iub Interface** are incorrect, which has caused the operation to fail.

Parameters affected:

Various

Action: Exit the GUI, reboot the PC, change the Test Parameters and Run Configure Iub Interface again.

Back

Error Message: ERROR: Failed to set up the Downlink. Please check the Test Parameters and try again. Test aborting....

The messages to the NodeB via the Iub Interface which set up the downlink have failed. This is likely to be errors in the Test Parameters such as ‘the difference between the Uplink UARFCN and the Downlink UARFCN are incorrect’

Parameters affected:

Various

Action: Correct the Test Parameters and run Configure Iub Interface again.


Back

Message: TC_CONFIG

This message is displayed normally whilst the Node B Local Cell ID values are detected. This process may take up to 2 minutes. If the LocalCellIDs are not detected within this time, the test will abort

Parameters affected:

Various

Action: If test aborts, exit the GUI, reboot the PC, change the Test Parameters and Run Configure Iub Interface again.

Back

Error Message: RADIO_LINK_FAILURE / RADIO_LINK_RESTORE

These messages are displayed during the ‘Absolute Sensitivity’ test because the Uplink transmission stops and restarts at different Uplink power levels during the search process. This is normal behaviour.

Parameters affected:

Various

Action: If a RADIO_LINK_FAILURE occurs at any other time then please check the following:

a) The RF Cables are securely connected.

b) The Uplink Power level is high enough.

Back

Errors and Warning messages are presented on the screen and indicate test progress:

Errors, Warnings, and Conditions

Next Section ...

Test Running Errors

Cell synchronise failed

Failed to achieve correct BER level after 10 attempts

Test Results Errors

Transmitter Tests - No Result Displayed

Next Section ...

Error Message: Cell synchronise failed

If on running a Receiver Test, this message is displayed, it is because the 6413A can not obtain Uplink synchronisation to the Downlink data.

Parameters affected:

Various

Action: Check the following:

a) Check the RF Cables are connected

b) Check the following parameters are set up correctly

\Global Parameters \ Maximum Output Power

\Global Parameters \ Downlink External Loss

\Global Parameters \ Uplink External Loss

c) Check the Downlink Power level

Back

Error Message: Failed to achieve correct BER level after 10 attempts

The ‘Absolute Sensitivity Test Running’ display gives information on the progress of the test e..g.

With Uplink Power = -123 dBm

BER = 0.001

The test searches for the Uplink Power Level, which gives the required BER level. The test has 10 attempts before aborting.

Parameters affected:

Absolute Sensitivity Uplink Start Power

Action: If the test aborts, study the reported UplinkPowers and BER values, then enter a different ‘Absolute Sensitivity Uplink Start Power’ and run the test again.

Back

Error Message: None

On running a Transmitter Test, if no answer is shown in the Test Result Bar Display. This is likely to be because the 6413A can not synchronise to the received Downlink data. This is probably because the Downlink signal is too small.

Parameters affected:

Various

Action: Check the following parameters are set up correctly

\Global Parameters \ Maximum Output Power

\Global Parameters \ Downlink External Loss

\Global Parameters \ Uplink External Loss.


Back

This section contains the following troubleshooting information:

Problems encountered during Software Installation

Problems encountered running a new Software Installation

Next ...

Installation is carried out using an InstallShield application. During Installation the following problems may be encountered:

Insufficient Permission to perform the installation

"The system could not log on." error after installation

Next ...

Error Message: Windows or InstallShield reports that the user does not have sufficient permission to install or copy files

Displayed when system is starting

Parameters affected:

None

Action: The new installation has been installed without un-installing the previous installation. To resolve this:

- Log on as 6413Admin
- Press Start, Control Panel, Add/Remove Programs
- Un-install the Racal Instruments Wireless Solutions 6413A application
- Re-install the new application


Next ...

Error Message: The system could not log on. Make sure User name and domain name are correct and then type your password. Letters in passwords must be typed using correct case.

Displayed when system rebooting after installation.

Parameters affected:

None

Action: The password entered during the installation process does not correspond to the password for the appropriate user. The usual reason for this is that upper and lower case letters are confused. The installation process will check that the password is entered as intended, but InstallShield cannot distinguish between upper and lower case letters.

- Log on as 6413Admin
- Press Start, Control Panel, Add/Remove Programs
- Un-install the Racal Instruments Wireless Solutions 6413A application
- Re-install the new application, taking extra care with passwords

Next ...

After an update or original installation is carried out the following problems may be encountered when operating the 6413A:

Application flags exceptions when starting, or when selecting Global Parameters.

Next ...

Error Message: Windows displays an exception error box

Displayed when system is starting

Parameters affected:

None

Action: The new installation has been installed without un-installing the previous installation. To resolve this:

- Log on as 6413Admin
- Press Start, Control Panel, Add/Remove Programs
- Un-install the Racal Instruments Wireless Solutions 6413A application
- Re-install the new application


Next ...

This section contains information on typical hardware problems and suggests solutions:


The front panel LED is off and you cannot hear the fan running


You hear a beep sound for about 30 seconds and then the Power LED indicator changes to red.


Next ...

The front panel LED is off and you cannot hear the fan running

Possible cause:

The power supply is not properly connected or the mains circuit breaker has operated.

Solution:

Check the mains power supply. If the mains power supply is on, check that the power supply cable is correctly connected (before checking or reconnecting the power supply cable, switch the mains power supply off).

If the mains power supply and the power supply cable are not faulty, check that the mains switch is on and that the mains circuit breaker has not operated.

Next ...

You hear a beep sound for about 30 seconds and then the Power LED indicator changes to red

Possible cause:

The fan is blocked or the Test System has been overheating.

Solution:

Check the fan filter for blockage and clean or replace if blocked. Contact the Aeroflex Helpdesk or an Aeroflex representative for instructions on how to inspect, and clean or replace, the fan filter.

See Also:

Routine Maintenance

Next ...

This section contains information on problems that may be encountered whilst operating the 6413A:

Unit fails to communicate with a network when connected to a 10M Ethernet device

Troubleshooting and Diagnostic Flowcharts

Unit reports RADIO_LINK_SETUP_FAILURE when setting up Test Models

Unexpected Measurement Results

Unit fails to communicate with a network when connected to a 10M Ethernet device

Possible cause:

The Ethernet ports on the EPC are 10/100/1000 Ethernet, and will attempt to auto negotiate with the bridge or other network device. In common with many Gigabit ports the auto negotiation with 10M devices is not always successful and the port may fail to configure properly.

Solution:

Manually configure the Ethernet port to 10M:

- Log on to the unit as 6413Admin.
- Open Control Panel\Network Connections.
- Right-click on the device with description 'Intel(R) PRO\1000 MT Dual Port Network Connection' whos status is marked Enabled.
- Select Properties and click on the Configure button.
- Go to the Advanced tab and set property 'Link Speed & Duplex' to '10Mbps\Full Duplex'. (The default is Auto Detect).
- Click on OK.
- The network driver will then be reconfigured to use the new settings and the network will be reconnected.

Back ...

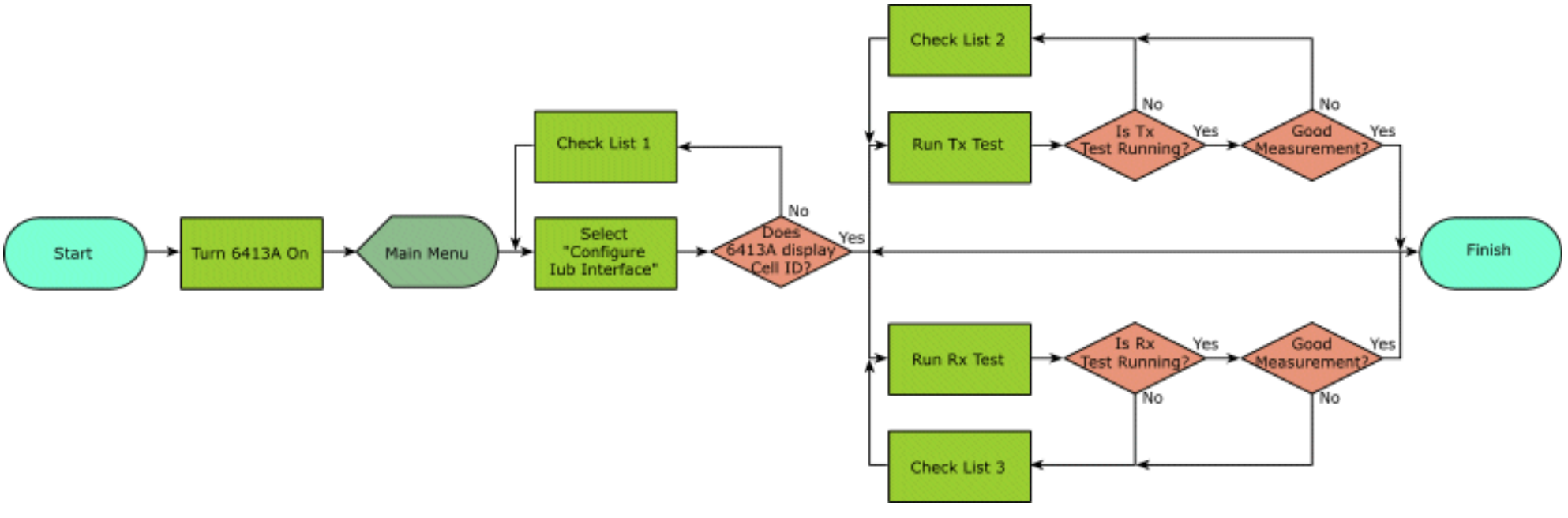
This section contains a number of flowcharts and diagnostic information for use where a measurement fails when made on a system operating supported Node B and Software Versions.

Before using this process the operator is encouraged to run the Diagnostic Test (on the Special Functions Menu) that will guide the user through a similar process automatically.

 Main Flowchart

 Back ...

Click on a box for further information:



Note: If the Node B fails to configure the user should run the Reset Iub Interface test before retrying.

Back ...

Turn 6413A On

- Refer to "Using the 6413A" in the User Guide.
- Ensure that the Node B is powered on.
- **Hint**: Various Node Bs react differently to removal of the Iub interface. Refer to the "Manufacturer Specific Information" section of the User Guide to determine the specific sequence for turning on the unit and connecting the Iub Cable.


Main Flowchart ...

Main Menu

- The unit should display the main menu.
- If the main menu is not displayed check that the system has been started as Field User.
- If diagnosing from 6413A Admin start the 6413A application from the desktop. To do this double-click on the RIWS 6413A application on the desktop:

 Main Flowchart ...

Configure Iub Interface

This test initiates communication with the Node B and selects the cell to be tested. The test parameters selected in the Edit Parameters screen are very important, an incorrect parameter will prevent (possibly all) communication with the Node B. It is the equivalent of dialling an incorrect telephone number and expecting to talk to the correct person.

- Path ID is Node B specific and will be identified from the LMT
- VPI and VCI values can be determined from the LMT, site documentation (may be unreliable), or may be guessed from a network operator's or manufacturer's default settings.
- IP addresses are Node B specific and will be identified from the LMT.

Main Flowchart

Does 6413A Display Cell ID?

If correct control is established over the Iub the 6413A will display the Cell ID of the cells identified with the Node B:

If control is not established an error message will be displayed. For further details see Iub Diagnostic Flowchart.

Iub Diagnostic Flowchart Main Flowchart ...

Run Tx Test

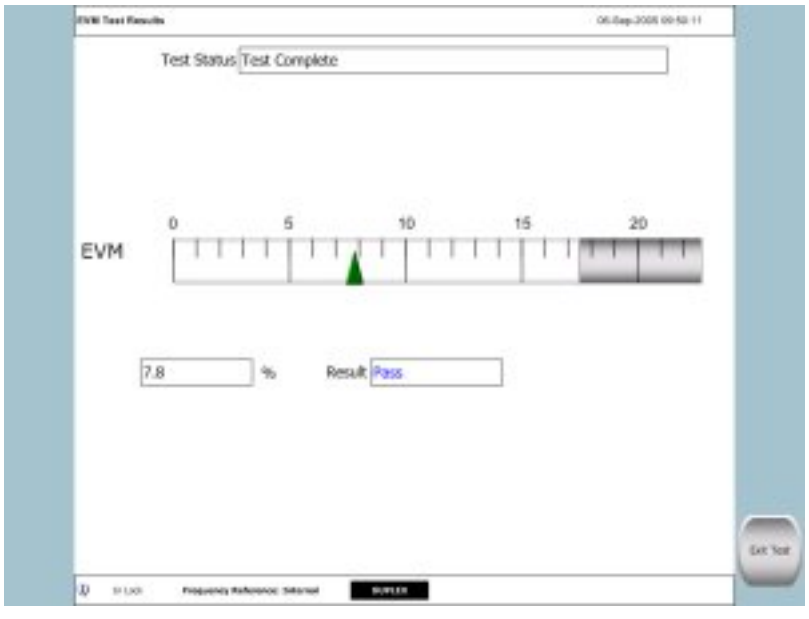
Running a Tx test will ensure that the Node B can be commanded to create a cell and transmit RF.

To run a test select Transmitter Tests from the main menu, set up the parameters in the Edit Parameters screen, and run test.


Main Flowchart ...

Is Tx Test Running?

A successful test will display the results on the screen:

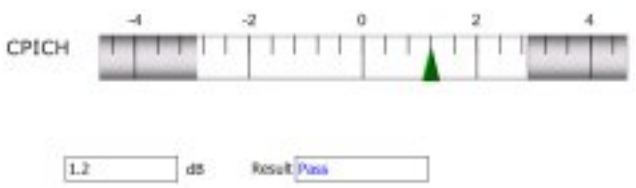


If a successful test is not achieved an error message will be displayed. For further details see Tx Diagnostic Flowchart.

Tx Diagnostic Flowchart Main Flowchart

Is Tx Measurement Good?

A good (in spec) measurement will be indicated by a green marker in the results bar, and Pass in the Result box:



A poor measurement will be indicated by a red marker and Fail in the Result box.

Typical causes of bad measurements could be:

- Faulty Node B
- Incorrect parameter settings (cable losses, expected power values, etc.)
- Damaged connectors or cables

Main Flowchart

Run Rx Test

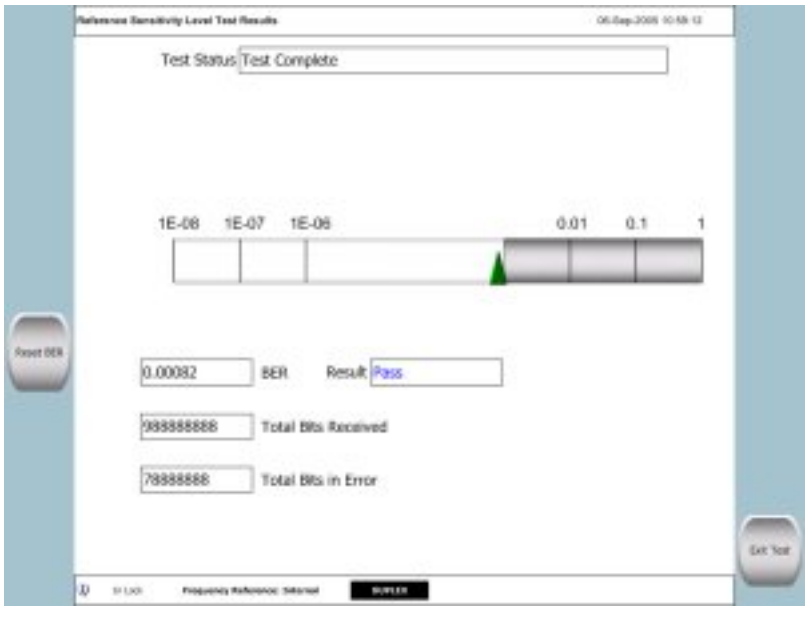
Running a Rx test will ensure that the Node B can be commanded to create a cell and transmit RF, and that it can receive RF.

To run a test select Receiver Tests from the main menu, set up the parameters in the Edit Parameters screen, and run test.


Main Flowchart ...

Is Rx Test Running?

A successful test will display the results on the screen:



If a successful test is not achieved an error message will be displayed. For further details see Rx Diagnostic Flowchart.

Rx Diagnostic Flowchart Main Flowchart

Is Rx Measurement Good?

A good (in spec) measurement will be indicated by a green marker in the results bar, and Pass in the Result box:

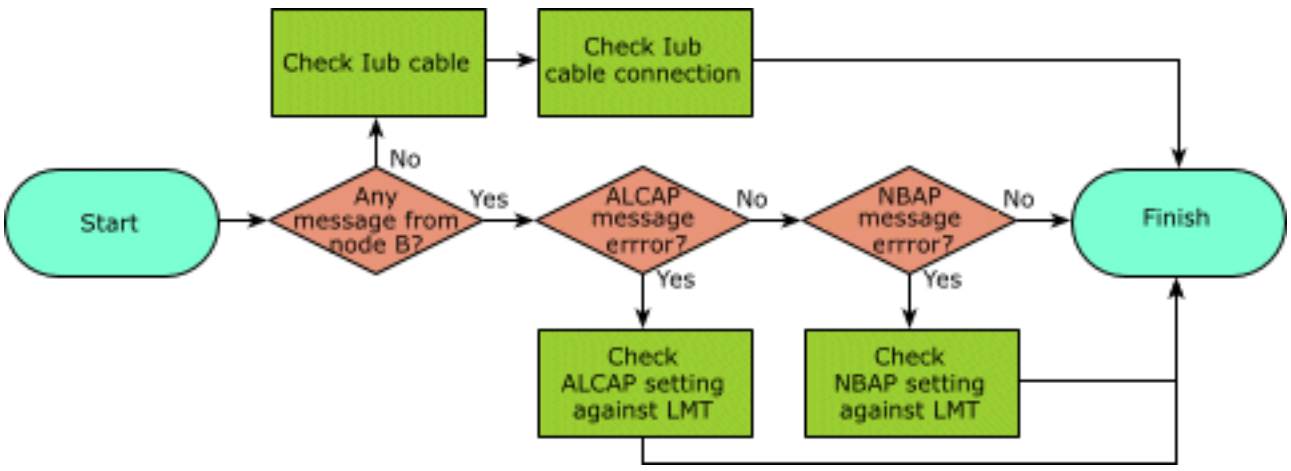
A poor measurement will be indicated by a red marker and Fail in the Result box. A poor measurement could also be indicated by and exceptionally good BER.

Typical causes of bad measurements could be:

- Faulty Node B
- Incorrect parameter settings (cable losses, expected power values, etc.)
- Damaged connectors or cables
- Leakage between Rx ports on the Node B
- Poor connection giving leakage between Main and Diversity ports, resulting in exceptional BER at very low levels

Main Flowchart

Click on a box for further information:



Note: If the Node B fails to configure the user should run the Reset Iub Interface test before retrying.

Main Flowchart

Any Message from Node B?

Check communications with the Node B:

- Are there any messages from the Node B?
- Does the Node B sync up to the Iub clock?

Iub Flowchart

Check Iub Cable

Check the Iub cable:

- Is the cable the correct type (should it be cross over, etc.)?
- Check that the Iub cable is not damaged.
- Check that the Iub cable connectors are not worn/damaged.

 Iub Flowchart

Check Iub Cable Connection

Check that:

- The connectors are securely seated
- The connections are correctly made (especially with flying lead connections)
- The connectors are in the correct locations on the 6413A and the Node B

Iub Flowchart

ALCAP Message Error?

If there is an ALCAP error (often 358), check the following:

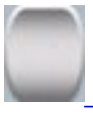
- The connections to the Node B are correct (e.g. Tx and Rx not swapped)
- The VCI and VPI addresses correspond to those set in the Node B LMT


Iub Flowchart

Check ALCAP Settings against LMT

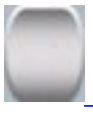
Check the following:

- The VCI/VPI addresses correspond to those set in the Node B LMT


Iub Flowchart

NBAP Message Error?

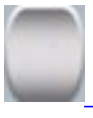
NBAP message errors will be flagged on the GUI.

 Iub Flowchart

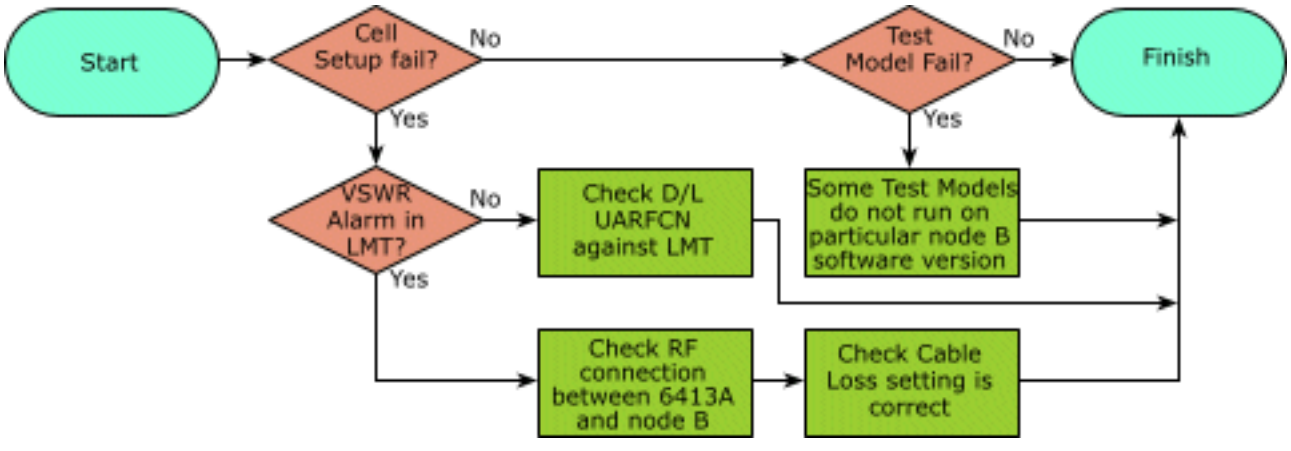
Check NBAP Settings against LMT

Check the following:

- The VCI/VPI addresses correspond to those set in the Node B LMT


Iub Flowchart

Click on a box for further information:



Main Flowchart

Cell Setup Fail?

Cell setup failures will be indicated by messages at the bottom of the GUI while a test is running, or by an error message on the screen


Tx Flowchart

Test Model Fail?

Test model setup failure will be indicated by a message at the bottom of the screen


Tx Flowchart

Node B Software Version

Some Node Bs determine the maximum capacities of cells such that they cannot be commanded to generate all test models. Limitations of the test models supported are detailed in the release notes


Tx Flowchart

VSWR Alarm in LMT?

Check the LMT to identify whether there are any VSWR alarms.


Tx Flowchart

Check Downlink UARFCN

Check that:

- The Downlink UARFCN is set correctly.
- The Downlink UARFCN is within the operational band on the Node B (some are limited to those in use by particular operators)
- The correct operating band is used


Tx Flowchart

Check RF Connection

Presence of a VSWR alarm may indicate that the RF cables are damaged or not connected properly.


Tx Flowchart

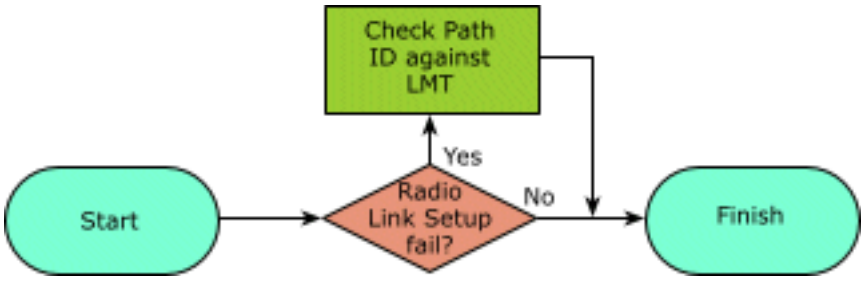
Check cable Loss Settings

Check that:

- The correct RF cables are being used
- The losses for the cables are correctly entered in the Global Parameters screen

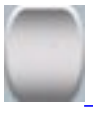

Tx Flowchart

Click on a box for further information:



Main Flowchart

Radio Link Setup Fail?

 Rx Flowchart

Check Path ID against LMT

Check the following:

- The Path ID corresponds to that set in the Node B LMT


Tx Flowchart

Warning Message: Unit reports RADIO_LINK_FAILURE, or occasional unexpected, or out of specification, results

Unit occasionally displays a unexpected result, or fails to add a DPCH when setting up test models. Some Node Bs detect the power in the Tx power amp with a power meter, before adding further channels. When the Maximum Output Power (set in the Global Parameters screen) equals the Maximum Downlink Power capability, when Test Models that result in high power outputs measurement uncertainty in the power meter will occasionally flag a power a being too great. This may result in the Node B refusing to add further channels, which will result in incorrect measurements.

Note: The Uplink Wideband Power receiver test will produce the message RADIO_LINK_FAILURE. This is because it is simply a test of the Node B power measurement capability and does not require synchronisation on the air interface. This is normal operation and the failure message can be ignored.

Parameters affected:

"Maximum Output Power" (in the "Global Parameters" screen)
"Maximum Downlink Power Capability" (in the "Global Parameters" screen)

Action: Reduce the 'Maximum Output Power' to approximately 0.5 dB below the 'Maximum Downlink Power Capability' figure in the Global Parameters screen.

Back ...

Warning Message: Occasional unexpected, or out of specification, results, or unit reports RADIO_LINK_FAILURE

Unit occasionally displays a unexpected result, or fails to add a DPCH when setting up test models. Some Node Bs detect the power in the Tx power amp with a power meter, before adding further channels. When the Maximum Output Power (set in the Global Parameters screen) equals the Maximum Downlink Power capability, when Test Models that result in high power outputs measurement uncertainty in the power meter will occasionally flag a power a being too great. This may result in the Node B refusing to add further channels, which will result in incorrect measurements.

Note: The Uplink Wideband Power receiver test will produce the message RADIO_LINK_FAILURE. This is because it is simply a test of the Node B power measurement capability and does not require synchronisation on the air interface. This is normal operation and the failure message can be ignored.

Parameters affected:

"Maximum Output Power" (in the "Global Parameters" screen)
"Maximum Downlink Power Capability" (in the "Global Parameters" screen)

Action: Reduce the 'Maximum Output Power' to approximately 0.5 dB below the 'Maximum Downlink Power Capability' figure in the Global Parameters screen.

Back ...

This section contains the following information:

- Software Updates
- Software and System Security
- Cleaning the Equipment
- Routine Maintenance
- Calibration Requirements
- Returning the Test System for Calibration or Repair

Contents ...

Software Updates are periodically available for the 6413A. These will be automatically notified while the system is covered by a software maintenance agreement if the user has opted in to the Customer Download Portal mailing list.

Software updates will normally be supplied as an InstallShield application, providing ease of installation.

Detailed instructions for the installation of software updates are included in the Release_Notes.doc file issued with each software update.

Note: Unless specifically notified by Aeroflex, Windows updates available from the Microsoft website should **NOT** be installed on the 6413A

Next ...

The 6413A is designed to give a good level of security against virus and other forms of attack. In order to maintain the correct operation of the system virus scanners and other similar applications should not be installed as they will reduce the processing capacity of the system.

In order to maintain the integrity of the system the following precautions should be observed when maintaining the system:.

- The system should only be operated under the Administrator login for maintenance and updates purposes
- Only software issued by Aeroflex should be installed on the system. Note that the Windows XPE operating system does not permit the installation of Windows office software to be operated from the desktop.
- File and share permissions, and groups/users should not be modified.
- Only Settings and Test Sequence files should be installed on the system (in .XML format only). Files should only be installed by 'pulling' from external servers or memory devices.
- Disks are shared for external read only, and should be virus scanned periodically from an external PC.

Next ...

This equipment must be kept clean and free from contamination. If necessary, clean the equipment as described below. If the equipment is severely contaminated, it should be returned to Aeroflex or approved service agent.

- Disconnect the equipment from the mains supply. Dampen a clean lint-free cloth with clean water and wring out all surplus water to leave the cloth barely damp. Carefully wipe away dust or light soiling from the outside of the cabinet and inside the nacelle. Allow the equipment to dry thoroughly before reconnecting to the mains supply.
- The screen may be cleaned with the unit switched off or switched on with the 6413A application running.
  - To clean the screen with the unit switched off follow the instructions for cleaning the unit.
  - To clean the screen with the unit switched on and the application running, select Options from the main screen, and then press the Clean Screen button. This function disconnects the touch screen from the application and allows approximately 45 seconds for cleaning. Use a soft dry cloth to clean the screen.
  - In the event of heavy screen contamination an IPA impregnated cloth or wipe can be used with the unit switched off, but care must be taken to avoid damage to the front panel paintwork.

Next ...

The following routine maintenance tasks are required for the 6413ATest System:

- Every month the fan filter should be checked, and cleaned or replaced if necessary. Contact the Aeroflex Helpdesk or an Aeroflex representative for instructions on how to check and clean the filter.
- The fan filter (Aeroflex Part No. 13-6154) should be replaced every twelve months, at least, or more often as required. Contact the Aeroflex Helpdesk or an Aeroflex representative for instructions on how to replace the filter.
- After eight years' service it may be necessary to replace the frequency standard if the tuning range becomes too restricted for calibration. The Test System must be returned to Aeroflex or to an approved Service Agent for this work to be carried out.
- The lithium battery for the non-volatile memory should be replaced every ten years. The Test System must be returned to Aeroflex or to an approved Service Agent for this work to be carried out.

CAUTION:

ALWAYS MAKE SURE THAT THE TEST SYSTEM IS SWITCHED OFF BEFORE INSERTING OR REMOVING MODULES. FAILURE TO FOLLOW THIS PRECAUTION MAY RESULT IN DAMAGE TO THE MODULES.

MODULES SHOULD SLIDE EASILY INTO AND OUT OF THE TEST SYSTEM SLOTS. IF RESISTANCE IS MET, CHECK THE ALIGNMENT OF THE MODULE BEFORE CONTINUING TO INSERT OR REMOVE FROM THE TEST SYSTEM.

Next ...

The 6413ATest System should be returned to Aeroflex, or approved Service Agent, for calibration once every year.

Next ...

If the Test System is to be returned for calibration (or repair), contact the Aeroflex Helpdesk or your local Aeroflex agent for instructions before shipment.

The original packaging should be used whenever possible. If this is not available, a strong shipping container, fitted with internal shock-absorbing packing capable of preventing movement of the Test System within the container, must be used.

 Contents ...

This section contains the following information:

General Specifications

Transmitter Test Specifications

Receiver Test Specifications

RF Specifications

Test descriptions

Contents ...

TEST CAPABILITY

Transmitter tests	Max output power
	Frequency error
	Error vector magnitude
	Peak code domain error
	ACLR
	CPICH power accuracy
	Absolute CPICH Power Accuracy
	Occupied Bandwidth
Receiver tests	Reference sensitivity level
	Dynamic range
	Uplink Wideband Power
	Absolute Senstivity
Functional tests	Configure IUB Interface
	Node B reset
	Iub link tests


More ...

Previous

DATA RATES

Uplink	Up to 2MB/s (64kbit/s Initial)
Downlink	Up to 2MB/s (64kbit/s Initial)

Iub INTERFACE

Format	E1, T1, STM-1
E1 interface	75• unbalanced (with external Balun)
	120• balanced
STM-1 interface	Single mode 1300nm

More ...

Previous

EMBEDDED PC INTERFACES

PC Interface	USB and Ethernet
External keyboard / mouse	USB
External memory device	USB

REFERENCE FREQUENCY INPUT

Input frequency	N x 0.96 MHz for N = 1, 2, 4, 8, or 16 N x 1.00 MHz for N = 1, 2, 5, 10, 12, 13, or 15 N x 1.024 MHz for N = 1, 2, 4, 8, or 16 N x 1.2288 MHz for N = 1, 2, 3, 4, 6, 8, 9, 12, or 16
Input frequency tolerance	±5ppm
Input power range	+19 to –2dBm, for Ref. In. >1.92MHz +19 to +3dBm, for Ref. In. <1.92MHz
Input Survival	AC 3.5V RMS, DC ±35V
Impedance / Coupling	50Ω nominal / AC coupled

More ...

Previous

REFERENCE FREQUENCY OUTPUT

Source	Internal Standard (Int. Std.) or Reference Input (Ref. In.)
Output frequency	Int. Std. selected : 10MHz nominal
	Ref. In. selected: As per Reference Input
Waveshape	Sine wave (nominal)
Output power	Int. Std. selected : +3dBm ± 4dB Ref. In. selected : +7dBm ± 5dB
Output protection	Will withstand a permanent short-circuit
Reverse survival	AC 3.5V RMS, DC ±35V
Impedance / Coupling	50Ω nominal / AC coupled

More ...

Previous

TIMING MARKER IN

Timing resolution	$(12\times10^6)^{-1}$ s (approx 83ns)
Logic levels	74LVC logic compatible : V_{in_low} = 0V to 0.8V V_{in_high} = 2.0V to 5.5V
Connector	BNC Female

TIMING MARKER OUT

Clock frequency range	24 to 36MHz
Logic levels	74LVC logic compatible : V_{out_low} < 0.55V @ 24mA max sink current V_{out_high} > 2.2V @ 24mA max source current
Connector	BNC Female

More ...

Previous

DIMENSIONS, ENVIRONMENTAL AND SAFETY

Typical weight (excluding accessories)	18.5 kg
Voltage Range	85 to 264V AC
Frequency Range	45 to 66Hz
Operating temperature	0° to 45°C
Storage temperature	-40° to 70°C
Altitude range	0 to 2000m
Humidity	0 to 75%
	Complies with IEC60068
Calibration interval	1 year
EMC	Complies with EN61326-1:1997+A1:1998+A2:2001 +A3:2003 Class A (emissions) , EN61326-1:1997 +A1:1998+A2:2001+A3:2003 Table 1 (immunity)
Safety	Complies with EN61010-1 : 2001

More ...

Previous

Environmental Classifications	According to EN60721 'Classification of environmental conditions'
	Exceeds the requirements of BS EN60721-3-7: 1996 'Portable and non-stationary use', classification IE73 (when used with the Padded Environmental Carrying Bag Option 6413-Opt61)
	Exceeds the requirements of BS EN60721-3-3: 1996 'Stationary use at weather protected locations', classification IE33
	Exceeds the requirements of BS EN60721-3-2: 1997 'Transportation', classification IE21 (when suitably packaged)
	Exceeds the requirements of BS EN60721-3-1: 1997 'Storage', classification IE11

Next ...

Maximum Output Power

Power measurement range	0 to +46dBm
Absolute accuracy (At select port: Duplex or RF Out)	
+18° to +28°C	±1.5dB
0° to +45°C	±2.0dB
Test model used	Test model 1

Frequency Error

Frequency error range	0 to 500Hz
Test model used	Test model 4

Error Vector Magnitude (EVM)

EVM range	5.0 to 22.5%
Test model used	Test model 4


More ...

Previous

Peak Code Domain Error

Code power range	-30 to –36dB for each code at SF=256
Test model used	Test model 3

ACLR (Adjacent Channel Leakage Ratio)

ACLR range	40 to 48dB at 5MHz offset 40 to 60dB at 10MHz offset
Test model used	Test model 1

CPICH power accuracy

CPICH power error range	-6 to +6dB
Test model used	Test model 2

More ...

Previous

Absolute CPICH power accuracy

CPICH Power range +46 to -10dBm	+46 to -10dBm
Test model used	Test model 2

Occupied Bandwidth

Power range	+46 to 0dBm
Bandwidth Range	4 to 6 MHz
Active Channels	Test Model Basic Cell (no CPICH) - where supported by Node B

Next ...

Dynamic Range

RF signal power	-91dBm/3.84MHz
AWGN power	+10 to +35dBc/3.84MHz relative to RF signal power
Absolute accuracy (for RF signal & AWGN combined)	
+18° to +28°C	±1.5dB
0° to +45°C	±2.0dB

UL wideband power

UL RF signal power	–55 to –130dBm/3.84MHz
DL power range	+46 to 0dBm

 More ...

Previous

Reference Sensitivity Level

RF signal power	-121 to -115dBm/3.84MHz
Absolute accuracy	
+18° to +28°C	±1.5dB
0° to +45°C	±2.0dB

Absolute Sensitivity Level

RF signal power	-55 to -115dBm/3.84MHz
Absolute accuracy	
+18° to +28°C	±1.5dB > -125 dBm
0° to +45°C	±2.0dB > -125 dBm

Next ...

RF SIGNAL SOURCE

Frequency range	800 to 960MHz
	1.71 to 2.20GHz
Output power	-125 to –55dBm (RF Out Mode)
3GPP FDD mode frequency ranges:	
Band I	1920.0 1980.0 GHz
Band II	1850.0 1910.0 GHz
Band III	1710.0 1785.0 GHz
Band IV	1710.0 1755.0 GHz
Impedance	50• nominal
Connector	N-Type female, TNC female


More ...

Previous

RF MEASUREMENT RECEIVER

Frequency range	800MHz to 2.20GHz
3GPP FDD mode frequency ranges:	
Band I	2110.0 2170.0 GHz
Band II	1930.0 1990.0 GHz
Band III	1805.0 1880.0 GHz
Band IV	2110.0 2155.0 GHz
Input power survival level	+47dBm (50W) continuous, combined RF and DC power
Impedance	50• nominal
Connector	N-type female
SWR	1.2:1 maximum

Next ...

Functional Tests

Transmitter Tests

Receiver Tests

Special Functions

Contents ...

Configure Iub Interface

Reset Iub Interface

Iub Status

Contents ...

Test: Configure Iub Interface.

25.141 Section: N/A.

Description: Sets up communication with the Node B, establishing NBAP and carries out a cell audit.

Possible Failure Causes: Incorrect VPI/VCI settings, incorrect cabling, unsupported Manufacturer's software, faulty Node B interface hardware.

Suggestion: Run Iub Status test in Functional Tests

Next ... Contents ...

Test: Reset Iub Interface.

25.141 Section: N/A.

Description: Resets internal system Iub Protocol Stacks. This should be used if the unit fails to audit successfully or fails to set up cells or otherwise configure tests. After Reset the user must re-run the Configure Iub Test.

Possible Failure Causes: N/A.

Suggestion: N/A

Next ... Contents ...

Test: Iub Status

25.141 Section: N/A.

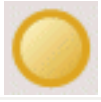
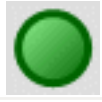
Description: This test displays the various element of the Iub link(s) and determines if operation is correct. For each configured element the LEDs display the status (see next page for status explanation).

Possible Failure Causes: E1/T1 Link - suspect damaged or incorrectly connected Iub cables. IMA in use, IMA link status - IMA not selected or not set up correctly on 6413A or Node B. NBAP, AAL-2 - incorrect VCI/VPI setting. FP - incorrect Path Id or VCI/VPI settings.

Suggestion: Replace cables or check/amend settings.

Note: Due to the operation of some Node B Iub interfaces it may be possible to get apparently correct operation with incorrect VCI/VPI combinations. If transmitter tests work but with the wrong Test Models output (use Code Domain Analyser), or transmitter tests work, but receiver tests fail, check VCI/VPI addresses for ALCAP and FP.

LED Status ... Contents ...

Element			
Link Status	Loss of Signal or Line Disconnected	Loss of Frame, Loss of Multi-Frame Alignment, Remote Alarm Indication, Alarm Indication Signal	Connected and Synchronised
IMA Status	IMA not in use	IMA not Synchronised	IMA Connected and Synchronised
IMA Link Status	Not in Group or Deleted	Useable/Unassigned but not Active	Active
NBAP Common, NBAP Dedicated, ALCAP, FP	Protocol Down		Protocol Up

Next ...

Contents ...

Maximum Output Power

Error Vector Magnitude

Peak Code Domain Error

Frequency Error

More ...

Contents ...

Previous ...

CPICH Power Accuracy

Adjacent Channel Leakage Ratio

Absolute CPICH Power Accuracy

Occupied Bandwidth

More ...

Contents ...

Previous ...

Total Power Dynamic Range

Power Control Dynamic Range

Power Control Steps

Spectrum Emission Mask

Next ...

Contents ...

Test: Maximum Output Power

25.141 Section: 6.2.1.

Description: Measures the output power of the Node B, whilst it is set to transmit Test Model 1 (which simulates a cell transmitting heavy traffic). The Node B is commanded to transmit a combination of control and traffic channels at a level close to the maximum power or the Node B. The 6413A measures the output power of the Node B transmitter and compare it to the requested output level.

Possible Failure Causes: Faulty PA, Faulty RF path, Incorrect Node B configuration, Faulty or Wrongly Connected Cables, Incorrect Cable Losses

Suggestion: Run Diagnostic Test Special Function screen

Next ... Contents ...

Test: Error Vector Magnitude (EVM)

25.141 Section: 6.7.1.

Description: Provides a measurement of the quality of the modulated signal of the Node B, whilst it is set to transmit Test Model 1 (which simulates a cell transmitting heavy traffic). The Node B is commanded to transmit a combination of control and traffic channels at a level close to the maximum power or the Node B. The 6413A measures the Error Vector Magnitude of the Node B transmitter.

Possible Failure Causes: Faulty PA, Faulty RF path, Faulty Baseband

Suggestion: Run Diagnostic Test Special Function screen

Next ... Contents ...

Test: Peak Code Domain Error

25.141 Section: 6.7.2.

Description: Provides a measurement of the leakage between channels transmitted by the Node B, whilst it is set to transmit Test Model 3 (which simulates a cell transmitting heavy traffic but with a very controlled structure). The Node B is commanded to transmit a combination of control and traffic channels at a level close to the maximum power or the Node B. The 6413A measures the Peak Code Domain Error of the Node B transmitter.

Possible Failure Causes: Poor Oscillator Phase Noise or Clock Jitter, Incorrect Test Model

Suggestion: Run Diagnostic Test Special Function screen

Next ... Contents ...

Test: Frequency Error

25.141 Section: 6.3.

Description: Measures the Frequency Error of the Node B whilst it is set to transmit Test Model 1 which simulates a cell transmitting heavy traffic. The Node B is commanded to transmit a combination of control and traffic channels at a level close to the maximum power or the Node B. The 6413A measures the Frequency of the Node B transmitter and compare it to the allocated frequency.

Possible Failure Causes: Insufficient Settling Time, Incorrect Reference Standard Source Selection, Faulty Node B Reference.

Suggestion: Allow time for the frequency to adjust, carry out fast sync on Node B (if available), check 6413A standard is set to Internal, check Node B is set to recover clock from E1 link, suspect Node B Frequency Standard system.

Next ... Contents ...

Test: CPICH Power Accuracy

25.141 Section: 6.2.2.

Description: Measures the difference between the requested and actual CPICH power of the Node B whilst it is set to transmit Test Model 2 (which simulates a cell transmitting minimal traffic). The Node B is commanded to transmit a combination of control and traffic channels at a level close to the maximum power or the Node B. The 6413A measures the CPICH power of the Node B transmitter and compare it to the requested CPICH level.

Possible Failure Causes: Incorrect Node B Configuration, Faulty Baseband

Suggestion: Check Node B configuration, Run Diagnostic Test Special Function screen

Next ... Contents ...

Test: Adjacent Channel Leakage Ratio

25.141 Section: 6.5.2.2.

Description: Measures the ratio of the wanted output power of the Node B to the power transmitted in adjacent bands, whilst the Node B is set to transmit Test Model 1 (which simulates a cell transmitting heavy traffic). The Node B is commanded to transmit a combination of control and traffic channels at a level close to the maximum power or the Node B. The 6413A measures the output power of the Node B transmitter and compare it to the requested output level.

Possible Failure Causes: Faulty PA

Suggestion: Run Diagnostic Test Special Function screen

Next ... Contents ...

Test: Absolute CPICH Power Accuracy

25.141 Section: N/A

Description: Measures the difference between the requested and actual absolute CPICH Code Domain power of the Node B whilst it is set to transmit Test Model 2 (which simulates a cell transmitting minimal traffic). The Node B is commanded to transmit a combination of control and traffic channels at a level close to the maximum power or the Node B. The 6413A measures the CPICH power of the Node B transmitter and compares it to the requested CPICH level.

Possible Failure Causes: Incorrect Node B Configuration, Faulty Baseband

Suggestion: Check Node B configuration, Run Diagnostic Test Special Function screen

Next ... Contents ...

Test: Occupied Bandwidth

25.141 Section: 6.5.1.

Description: Measures the Occupied Bandwidth of the transmitted signal from the Node B whilst it is set to transmit Test Model 1 (which simulates a cell transmitting heavy traffic). The Node B is commanded to transmit a combination of control and traffic channels at a level close to the maximum power or the Node B. The 6413A measures the bandwidth of the Node B transmitted signal.

Possible Failure Causes: Faulty Tx Baseband, Faulty PA

Suggestion: Run Diagnostic Test Special Function screen

Next ... Contents ...

Test: Total Power Dynamic Range

25.141 Section: 6.4.4.

Description: Measures the difference between the maximum output power and the minimum output power of the Node B. The maximum output power is measured whilst the Node B is set to transmit Test Model 1(which simulates a cell transmitting heavy traffic), and the minimum power is measured whilst the Node B is set to transmit Test Model 4 (which simulates a cell transmitting no traffic). The Node B is commanded to transmit a combination of control and traffic channels at the maximum power or the Node B and the power measured. The Node B is then commanded to transmit a combination of control channels at the minimum power or the Node B, the power measured, and the difference calculated.

Possible Failure Causes: Faulty PA, Incorrect Node B configuration, Faulty Baseband

Suggestion: Run Diagnostic Test Special Function screen

Next ... Contents ...

Test: Power Control Dynamic Range

25.141 Section: 6.4.3.

Description: Measures the power control range of a single code channel of the Node B whilst it is set to transmit Test Model 2 (which simulates a cell transmitting 3 traffic channels). The Node B is commanded to transmit a combination of control and traffic channels at a level close to the maximum power of the Node B, and the power of the code channel measured. The Node B is then instructed to reduce the power of the code channel to -28 dB and the 6413A measures the code power of the specified traffic channel.

Possible Failure Causes: Faulty PA, Incorrect Node B configuration, Faulty Baseband

Suggestion: Run Diagnostic Test Special Function screen

Next ... Contents ...

Test: Power Control Steps

25.141 Section: 6.2.1.

Description: Measures the ability of the Node B to ramp the code power up and down in response to power control commands from the mobile, whilst it is set to transmit Test Model 2 (which simulates a cell transmitting 3 traffic channels). The Node B is commanded to transmit a combination of control and traffic channels at a level close to the maximum power or the Node B. The 6413A syncs to the downlink and transmits an uplink waveform including a sequence of 10 power down TPC symbols, 10 up TPC symbols, and 10 no-change TPC symbols. The 6413A measures the resulting channel power profile from the Node B and checks the level change over 10 steps.

Possible Failure Causes: Incorrect Node B configuration, Faulty Baseband

Suggestion: Run Diagnostic Test Special Function screen

Next ... Contents ...

Test: Spectrum Emission Mask

25.141 Section: 6.5.2.1.

Description: Measures the out-of-band emissions of the Node B in a 25 MHz band of the Node B whilst it is set to transmit Test Model 1 (which simulates a cell transmitting heavy traffic). The Node B is commanded to transmit a combination of control and traffic channels at a level close to the maximum power or the Node B. The 6413A performs a spectrum analyser sweep across a 25 MHz band centered on the wanted signal, and compares the resulting spectrum against a pre-defined mask.

Possible Failure Causes: Faulty Tx Baseband, Faulty PA

Suggestion: Run Diagnostic Test Special Function screen

Next ... Contents ...

Reference Sensitivity Level

Dynamic Range

Uplink Wideband Power

Absolute Sensitivity

Next ... Contents ...

Test: Reference Sensitivity Level

25.141 Section: 7.2.

Description: Measures the BER on a received signal at a defined input level. The Node B is commanded to transmit a combination of control channels at a defined level and to open a traffic channel. The 6413A synchronises to the Node B transmitted signal and generates an Uplink transmission on the traffic channel, consisting of a PN9 sequence, at the required test level. The 6413A recovers the traffic channel on the Iub uplink and recovers the data in order to perform the BER measurement which is displayed on the screen.

Possible Failure Causes:

Suggestion: Run Diagnostic Test Special Function screen

Next ... Contents ...

Test: Dynamic Range

25.141 Section: 7.3.

Description: Measures the ability of the Node B to receive a signal in the presence of noise. The Node B is commanded to transmit a combination of control channels at a defined level and to open a traffic channel. The 6413A synchronises to the Node B transmitted signal and generates an Uplink transmission on the traffic channel, consisting of a PN9 sequence, at the required test level, plus noise at the required level. The 6413A recovers the traffic channel on the Iub uplink and recovers the data in order to perform the BER measurement which is displayed on the screen.

Possible Failure Causes: Faulty RF path, Faulty or Wrongly Connected Cables, Faulty or Wrongly Connected TMA, Receiver System Fault

Suggestion: Run Diagnostic Test Special Function screen

Next ... Contents ...

Test: Wideband Uplink Power

25.141 Section: N/A.

Description: Checks the ability of the Node B wideband power meter to measure the input power present at the input of the receiver. The Node B is commanded to create a Basic Cell with control channels and the 6413A transmits a signal, the level of which is read by the Node B and reported to the 6413A by NBAP.

Possible Failure Causes: Faulty RF path, Incorrect Node B configuration, Faulty or Wrongly Connected Cables, Incorrect Cable Losses, Faulty or Wrongly Connected TMA, Receiver System Fault

Suggestion: Run Diagnostic Test Special Function screen

Next ... Contents ...

Test: Absolute Sensitivity

25.141 Section: N/A.

Description: Measures the absolute sensitivity of the Node B receiver. The Node B is commanded to transmit a combination of control channels at a defined level and to open a traffic channel. The 6413A synchronises to the Node B transmitted signal and generates an Uplink transmission on the traffic channel, consisting of a PN9 sequence, at the initial test level. The 6413A recovers the traffic channel on the Iub uplink and recovers the data in order to perform the BER measurement If the BER is greater than the required BER the 6413A reduces the transmitted signal level and re-measures the BER. This is repeated until the required BER is achieved and the output level is displayed. The step size is set automatically according to the measured BER and the test will carry out a maximum of 10 steps.

Possible Failure Causes: Faulty RF path, Faulty or Wrongly Connected Cables, Incorrect Cable Losses, Faulty or Wrongly Connected TMA, Receiver System Fault

Suggestion: Run Diagnostic Test Special Function screen

Next ... Contents ...

Multi-Mode

Spectrum Analysis Graph

Code Domain Analyser

Diagnostic Test

Contents ...

Test: Multi-Mode

25.141 Section: N/A.

Description: Measures and simultaneously displays a number of common parameters related to the Node B transmitter. The Node B is set to transmit Test Model 4 (which simulates a cell transmitting no traffic), but any test model can be selected. The Node B is commanded to transmit a combination of control and traffic channels at a level close to the maximum power or the Node B. The 6413A measures the Node B transmitter EVM, Frequency Error, Peak Code Domain Error, Output Power, and CPICH Power.

Possible Failure Causes: Possible causes of failure are detailed in the individual tests

Suggestion: Run Diagnostic Test Special Function screen

Next ... Contents ...

Test: Spectrum Analyser

25.141 Section: N/A.

Description: Displays the signal at the input of the 6413A in the Frequency Domain. The signal is displayed on a 10 MHz span. When the Node B is under Iub control the Node B is commanded to set up a test model prior to displaying the spectrum. In use 2 markers can be applied to the waveform to measure frequency and amplitude.

Possible Failure Causes: Faulty PA, Faulty RF path, Incorrect Node B configuration, Faulty or Wrongly Connected Cables, Incorrect Cable Losses, Faulty or Wrongly Connected TMA, Incorrect UARFCN

Suggestion: Run Diagnostic Test Special Function screen

Next ... Contents ...

Test: Code Domain Analyser

25.141 Section: N/A.

Description: Displays the signal at the input of the 6413A in the Code Domain. When the Node B is under Iub control the Node B is commanded to set up a test model prior to displaying the spectrum. The Code Domain Analyser displays the control and data channels present in the signal at the input to the 6413A. For each channel the channel type, code channel, channel offset, and channel power are displayed. In addition for each channel the slot power, symbol EVM, and symbol constellation can be displayed.

Possible Failure Causes: The Code Domain Analyser will display the channels it sees at the input. Failure to run may indicate a general RF failure (see Spectrum Analyser) or an inability to sync to the input. Incorrect channels for a particular Test Model can be indicative of: Incorrect Node B configuration, Faulty Baseband, Faulty or Wrongly Connected TMA, Incorrect Test Model, Faulty Iub Configuration

Suggestion: Run Diagnostic Test Special Function screen, Run Iub Diagnostic screen

Next ... Contents ...

Test: Diagnostic Test

25.141 Section: N/A.

Description: The diagnostic test runs a test sequence that makes a series of measurements of the Node B designed to help the user to identify possible causes of Node B or test setup failure. The test sequence runs with 'safe' parameters that should enable a correctly working Node B to pass all tests. On the transmit path the test sequence will check for Iub connection/configuration, basic transmit path operation, frequency synchronisation, full transmission of a test model. On the receive path the test sequence will check for basic receive path operation, correct demodulation of a received signal, and receiver sensitivity.

Possible Failure Causes: See reports from Diagnostic Test Sequence

Suggestion: N/A

More ... Contents ...

Test Category	6413A Tests Run	Purpose
Iub setup	Reset Iub Configure Iub	Checks connection, operation, and configuration of the Iub interface
Basic transmitter test	Spectrum Analyser	Checks for transmission of a UMTS basic cell, Tx operation, cabling, etc.
Node B frequency error	Frequency Error	Checks for synchronisation of Node B frequency standard (often precursor to data transmission)
Advanced transmitter test	Maximum Output Power	Checks configuration of data channels, Node B baseband, Tx operation, and cable losses
Initial receiver test	Uplink Wideband Power	Checks operation of basic receiver path and cabling
Receiver test	Reference Sensitivity Level	Checks basic operation of receiver paths and baseband
Advanced receiver test	Absolute Sensitivity Level	Checks sensitivity of Node B receive path, and cable losses

This section contains the following information:

Reference Documents

Channel Frequencies

Applications Notes

Contents

It may be useful to refer to the following reference documents:

- 3GPP (3rd Generation Partnership Project) Universal Mobile Telecommunications System Standards, Release 99 March 2003 baseline.
- 3GPP (3rd Generation Partnership Project) Base Station Conformance Testing (FDD) (Release 1999) - 3GPP 3rd Generation Partnership Project TS 25.141 V3.9.0 (2003-03)

Channel Frequencies ...

UTRA FDD frequency bands

Operating Band	UL Frequencies UE transmit, Node B receive	DL frequencies UE receive, Node B transmit
I	1920 – 1980 MHz	2110 –2170 MHz
II	1850 –1910 MHz	1930 –1990 MHz
III	1710-1785 MHz	1805-1880 MHz
IV	1710-1755 MHz	2110 –2155 MHz

TX–RX frequency separation

UTRA/FDD is designed to operate with the following TX-RX frequency separation

Operating Band	TX-RX frequency separation
I	190 MHz
II	80 MHz.
III	95 MHz.
IV	400 MHz


Allocated UARFCN Numbers

Previous

UARFCN Numbers are calculated as follows:

Uplink: $N_U = 5 * (F_{UL} - F_{UL\_Offset})$, for the carrier frequency range $F_{UL\_low} \leq F_{UL} \leq F_{UL\_high}$

Downlink: $N_D = 5 * (F_{DL} - F_{DL\_Offset})$, for the carrier frequency range $F_{DL\_low} \leq F_{DL} \leq F_{DL\_high}$

nd	UPLINK (UL) UE transmit, Node B receive			DOWNLINK (DL) UE receive, Node B transmit		
	UARFCN formula offset F_{UL_Offset} [MHz]	Carrier frequency (F_{UL}) range [MHz]		UARFCN formula offset F_{DL_Offset} [MHz]	Carrier frequency (F_{DL}) range [MHz]	
		F_{UL_low}	F_{UL_high}		F_{DL_low}	F_{DL_high}
I	0	1922.4	1977.6	0	2112.4	2167.6
II	0	1852.4	1907.6	0	1932.4	1987.6
III	1525	1712.4	1782.6	1575	1807.4	1877.6
IV	1450	1712.4	1752.6	1805	2112.4	2152.6

Additional Channels

Previous

The following additional channels are provided as shown. The UARFCN is calculated using the normal formula, but with different offsets which are defined in this table:

Band	UPLINK (UL) UE transmit, Node B receive		DOWNLINK (DL) UE receive, Node B transmit	
	UARFCN formula offset F_{UL_Offset} [MHz]	**Carrier frequency [MHz]** (F_{UL})	**UARFCN formula offset F_{DL_Offset} [MHz]**	**Carrier frequency [MHz]** (F_{DL})
I	-	-	-	-
II	1850.1	1852.5, 1857.5, 1862.5, 1867.5, 1872.5, 1877.5, 1882.5, 1887.5, 1892.5, 1897.5, 1902.5, 1907.5	1850.1	1932.5, 1937.5, 1942.5, 1947.5, 1952.5, 1957.5, 1962.5, 1967.5, 1972.5, 1977.5, 1982.5, 1987.5
III	-	-	-	-
IV	1380.1	1712.5, 1717.5, 1722.5, 1727.5, 1732.5, 1737.5 1742.5, 1747.5, 1752.5	1735.1	2112.5, 2117.5, 2122.5, 2127.5, 2132.5, 2137.5, 2142.5, 2147.5, 2152.5

Application Notes

AN05_0006: Testing UMTS Node B’s

AN05_0009: Testing Diversity Receiver Node B's With The 6413A

AN05_0029: 6413A User API

Contents

Software Licenses:

The use of the 6413A is subject to License Agreements with Aeroflex and Microsoft. The user should read and familiarise themselves with the Software License Agreements by selecting:

'Options' / 'About' and pressing the 'View License' button to view the Aeroflex License Agreement

'Options' / 'About' and pressing the 'View XP License' button to view the Microsoft License Agreement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