Nokia Siemens Networks

470318A
Nokia Flexi EDGE Base Station, Rel. EP1,
Product Documentation, v.1

Testing Nokia Flexi EDGE BTS

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Contents

1 Powering on the BTS at a new site

Before you start

Ensure that all BTS modules are properly installed and that the mains power and BTS power supplies are switched off.

Steps

1. **Switch the mains breaker on.**

2. **Switch the BTS power supply on.**

   This applies to 24 VDC and 230 VAC cases only. With the 48 VDC supply the BTS starts as soon as the supply voltage is connected to the System Module.

3. **Check the BTS modules for power.**

   Observe the LED lights of the BTS modules and ensure that power is supplied. If the LED lights are off, troubleshoot the applicable modules.

2 Running BTS tests

2.1 Overview of testing

Purpose

The purpose of the tests presented in this document are to verify that the hardware or BTS System is functioning properly and that the test reports can be generated in addition to identifying any maintenance needs.

In general, these tests are performed during normal operation (to verify that the system is functioning properly), troubleshooting situations and when new HW has been installed.

During commissioning the tests are performed automatically. However, if Abis is not available during commissioning the tests can be run manually.

Note the following on the availability of the tests:

- BCCH Transmission test can only be run in Local Mode
- TRX Continuous Transmission test does not work in Local Mode since it requires the target TRX to be in Supervisory operational state
- EAC input and output tests are not available until the BTS is commissioned
- All other tests are available when the BTS is uncommissioned, or when the BTS is commissioned and connected to the BSC, or when the BTS is in Local Mode (Commissioned but not connected to the BSC).

Before you start

For information on connecting to the BTS with PC and BTS Manager as well as the commissioning procedure see the *Nokia Flexi EDGE BTS Commissioning* document.

For more information on radio network testing see the *Radio Network Testing* document in BSC3119 Nokia BSC/TCSM, Rel. S12, Product Documentation.

Check the alarms and correct the faults before starting the tests. For more information on the alarms see the *Trouble Management of Nokia Flexi EDGE BTS* document.

The terms 'Local mode' and 'Configuring state' appear in the text. Their definitions are:

Local mode: In local mode the BTS does not have an Abis connection to BSC. After a start-up the BTS first reaches 'Waiting for LAPD Establishment' operational state when the user can by using the command "Use Current SW" cause the BTS to use its active SW and therefore BCF to go into the Supervisory and TRX(s) into the Configuring states. The BTS will remain in the resulting Local Mode until the BTS is reset or power cycled.

In Configuring state the BTS_CONF_DATA reception step is skipped and the BTS issues default configuration to TRX objects. After power or BCF reset (from local BTS Manager), BTS tries to again connect to BSC.

Summary

You can execute tests or run diagnostic tools on the BTS by choosing appropriate command in Tests menu. Choosing any command from the **Tests** menu or clicking the Tests button in the **View Bar** opens the Tests view. The TRX Test tab sheet is shown as default. See the figure below for the location of the **Tests** menu and the **Tests** button in the **View Bar**.

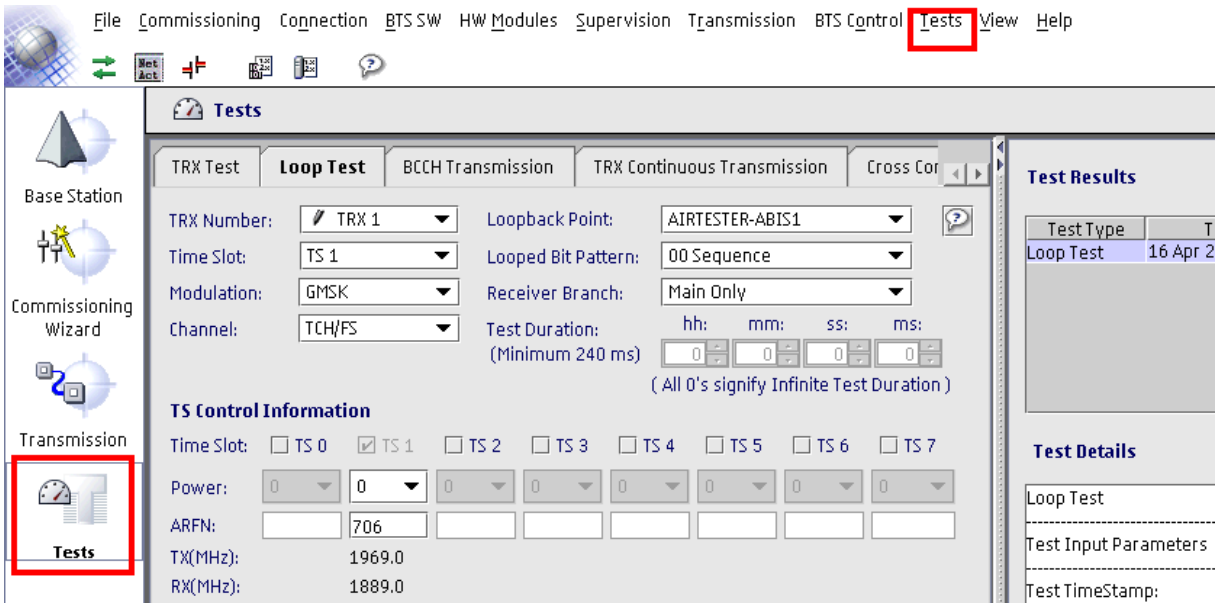

Figure 1. Tests menu and View Bar locations

The Test View screen consists two parts; The tabbed pane on the left and the Report Area on the right.

Tabbed Pane:

The tabbed pane displays the following tab sheets:

- TRX Test (shown as default)
- Loop Test
- BCCH (Broadcast Control Channel) Transmission
- EAC (External Alarm Control) Input
- EAC Output
- TRX Continuous Transmission with BCCH Power level
- Cross Connection Validity Check

The test specific functions and information are displayed below the tabs.

Report Area:

This area is common for all the individual test tab sheets displaying two areas; Test Results and Test Details.

Test Results:

- Test Type column specifies the Test or Diagnostic Tool executed
- Time column specifies the date and time stamp of the Tests executed
- Status column specifies the status of the Test or Diagnostic Tool executed

Values for tests:

- Start Requested - implies the start request for Test has been sent to BTS.
- Ongoing - implies the requested Test has been started at BTS and BTS Manager has received its acknowledgement.
- Stop Request - implies the stop request for Test has been sent to BTS.
- Passed / Partially Passed / Failed - are the status of the executed Test.
- Completed- the requested Test has been stopped at BTS and BTS Manager has received its acknowledgement.

Values for diagnostic tool

- Start Requested - implies the start request for Diagnostic Tool has been sent to BTS.
- Ongoing - implies the requested Diagnostic Tool has been started at BTS and BTS Manager has received its acknowledgement.
- Stop Request - implies the stop request for Diagnostic Tool has been sent to BTS.
- Completed - implies the stop request has been acknowledged by BTS.

If you want to save or print the test reports use the buttons on the upper right hand corners of the Test Details and Test Results areas. The rightmost button on the Test Result area clears the test results.

Test Details:

This area displays the report of the test selected in the Test Results table. The test details can either be saved in xml format or printed.

Steps

1. **Launch the BTS Manager.**
2. **Click the Tests button on the View bar.**
3. **Choose the test you wish to run.**

2.2 Running a TRX test

Summary

The purpose of the TRX Test is to verify the TRX object's functionality. During TRX test session the BTS will execute various loops to gather the required measurement results. The test is carrier based, which can be run from TRX to TRX. The TRX test can be run only in one sector at a given time, that is the TRX test for both the sectors, in a same TRX module, cannot be run in parallel.

Choosing the **Test | TRX Test** command or clicking the Tests button in the **View Bar** opens the Tests view displaying the TRX Test tab sheet as default.

TRX Test tab enables the user to define the TRX Test configuration. Following selections are available:

- **TRX Number**: Enables the user to select the TRX on which to execute the TRX test from a list that also shows the state icon of the TRX. Values are TRX 1 - TRX 24 and the default is the first available TRX.

  The Configuring state has specific icon, the Supervisory state has no icon and rest of the states have error icon.
- **Time Slot**: Enables the user to select the Time Slot on which execute the TRX test. Values: TS 0 - TS 7, default TS 0.
- **Modulation**: Enables the user to select the modulation scheme. Values: GMSK / 8PSK, default GMSK.
- **Start**: Enables the user to start the TRX test. The Start button will be disabled while execution of the TRX test, until the report arrives or negative acknowledgement (NACK) is received.

Note that

- If the selected TRX is not in configuring/supervisory state, the TRX Test cannot be performed and the **Start** button will also be disabled.
- If the selected TRX is in Locked Administrative state by the BSC the TRX Test cannot be performed and the **Start** button will also be disabled.
- If the selected TRX is in the Shutdown state the TRX Test cannot be performed and the **Start** button will also be disabled.

Also note that the TRX test can not be run during BB hopping.

Steps

1. Choose the TRX Test command on the Tests menu or choose the TRX Test tab sheet in the Tests view.

See the TRX test figure below.

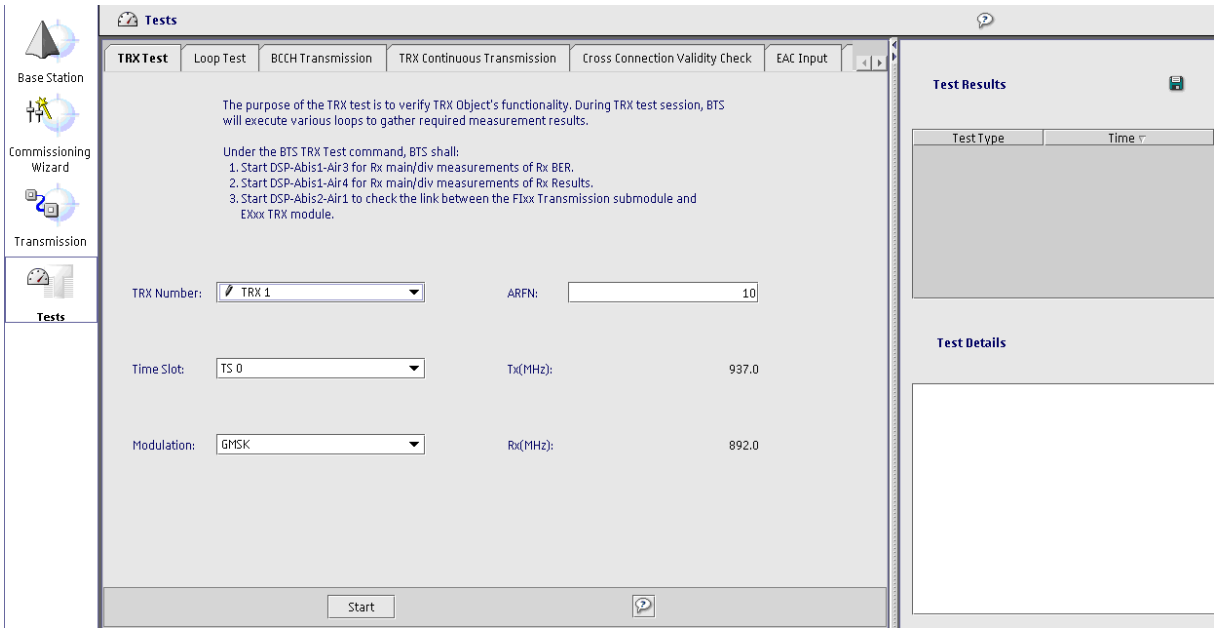

Figure 2. TRX test

2. Select the TRX Number on which test to be performed.

3. **Select Time Slot of the selected TRX.**

4. **Select Modulation of the TRX.**

5. **Select the ARFN.**

   Note that the ARFN (Absolute Radio Frequency Number) value selection is only available in local mode. In network mode it is given by the BSC.

6. **Click Start to execute test with selected parameters.**

   The Test report parameters are displayed on the Test Details pane:

Table 1. Test report parameters

Property	Explanation
Test Result	Indicates if the test has passed or failed
Failure Reason	If a test has failed the reason for failure is shown here
Timeslot	Timeslot on which the TRX or Loop test is started
Tx Power[1)]	Measured TX power level (dBm)
Main Rx BER [2)]	Measured Bit Error Ratio for Main receive branch (%)
Main Rx Result [3)]	Rx Result TRX Test for Main receive branch (dBm)
Diversity Rx BER [2)]	Measured diversity Bit Error Ratio for Diversity receive branch (%)
Diversity Rx Result [3)]	Rx Result TRX Test for Diversity receive branch (dBm)

[1)] Reported TX power is based on the measured RX level value, TRX loop module conversion loss and Power Level values stored in DTRX's internal memory. Test fails if reported TX power level is outside +/- 4 dB of the nominal power value.

[2)] BER (Bit Error Ratio) shows % of the errors seen in the received data. Test fails if:

- BER > 2% in the RF part , or
- BER > 0% in BB part

3) The Rx Result in TRX Test estimates the Rx Level needed by a single receiver for good quality decode of Full Rate speech. The Rx Result in TRX Test is calculated from Measurement of Noise & Interference Rx Level on an Idle radio channel Plus detection margins. The Rx Level reported includes masthead Amplifier (MHA) gain and cable loss allowances, depending on MHA type and configuration. Typical values are -85 dBm to -118 dBm in a normal operating environment.

The Rx Result in TRX Test is calculated from measurement of Noise & Interference Rx Level on an idle radio channel plus detection margin.

Note that the Diversity Rx BER and Diversity Rx Result are only shown if the BTS HW configuration supports RX diversity and the diversity is enabled on BSC (RDIV parameter set to Y)

The Test Results are displayed on the Test Results pane.

If the test fails look for troubleshooting instructions in the *Troubleshooting TRX test and TRX loop test failures with BTS Manager* section in the *Trouble Management of Nokia Flexi EDGE BTS* document.

2.3 Running a Loop test

Summary

The purpose of the Loop Test is to verify the operation of the signal path from the Base Station Controller (BSC) and the Air interface, and back. You can execute a Loop Test to test internal connections of the BTS. The choice of loopback determines the extent of the loop test. Loops are categorised according to the loopback points.

- If Abis4 loop is required there must be loop module served either by the BSC or a TRAU/PCU Emulator.
- If Abis3 loop is required there must be a wired loop in the E1/T1 set up.
- If Air Tester is required there must be an Air Tester set up as loop mode, the Air Tester must give 3 time-slots delay on uplink .

Following selections are available from the **Loop Test** tab:

- **TRX Number**: Enables the user to select the TRX on which to execute the loop test.
- **Time Slot**: Enables the user to select the time slot on which to execute the loop test.
- **Modulation**: Enables user to select the modulation scheme.
- **Channel**: Enables user to select the channel. This field contains a variable list that depends on the modulation chosen in the above drop down list
- **Loopback Point**: Enables user to select the loop to execute.
- **Looped Bit Pattern**: Enables user to select the looped bit pattern.
- **Receiver Branch**: Enables user to select the RX diversity.
- **Test Duration**: Enables user to set the duration of loop test in hours, minutes and seconds. Default: 320 ms, min: 240 ms.

TS Control Information is only editable when TRX is in Configuring State. Following fields are still visible in all cases:

- **Timeslot**: User can select time slot for executing Test Pattern transmission when Site is not under BSC Control and TRX is in Configuring State. User needs to provide Power, ARFN, AGC main & AGC Div values for the selected timeslots. The timeslot, on which Loop Test is requested, is selected by default and cannot be deselected. In case TRX is in Supervisory state, Test Pattern Transmission cannot be executed.
- **Power**: Enables user to specify the power of selected time slot. Power is not changeable if the site is under BSC Control.
- **ARFN**: Enables user to specify the ARFN of selected time slot. ARFN value has to be specified for selected timeslot in order to execute the loop test. ARFN is not editable if the site is under BSC Control. Values: In case the site is under BSC Control, the ARFN received from the site is displayed. In case the TRX is RF-Hopping, text “Hopping" is displayed. In the case when site is not under BSC Control, the lowest of the range of ARFNs depending upon the band of the TRX is displayed as default.
- **Tx (MHz)**: Displays the Transmit frequency of the ARFN displayed/ selected in the above ARFN edit fields. Value: This value is calculated on the basis of the ARFN value.
- **Rx (MHz)**: Displays the Receive frequency of the ARFN displayed/ selected in the above ARFN edit fields. Value: This value is calculated on the basis of the ARFN value.

- **AGC Main**: Enables user to select AGC Main.
- **AGC Div**: Enables user to select AGC Div.

Note that

- If the selected TRX is not in configuring/supervisory state, the TRX Test cannot be performed and the **Start** button will also be disabled.
- If the selected TRX is in Locked Administrative state by the BSC the TRX Test cannot be performed and the **Start** button will also be disabled.
- If the selected TRX is in the Shutdown state the TRX Test cannot be performed and the **Start** button will also be disabled.

Also note that the TRX Loop test can not be run during BB hopping.

Steps

1. **Choose the Loop Test command on the Tests menu or the Loop Test tab sheet in the Tests view.**

2. **Select the TRX Number on which test to be performed.**

   See the Loop test figure below.

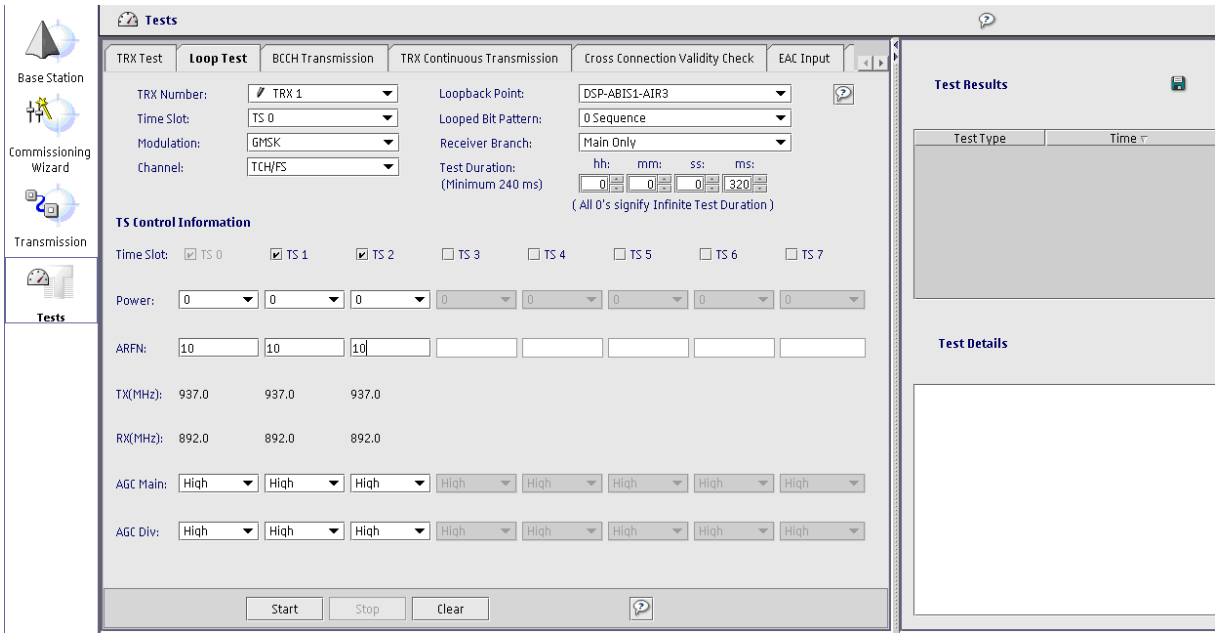

Figure 3. Loop test

3. **Select Time Slot of the selected TRX.**

4. **Select the Modulation.**

5. **Select the Channel.**

6. **Select the Loopback Point.**

7. **Select the Looped Bit Pattern.**

8. **Select the Receiver Branch.**

9. **Select the time the test will be executed.**

10. **If the TRX is in Configuring State, select the values for TS Control Information.**

11. **Click Start to execute test with selected parameters.**

Figures below show the loops on the RTC and Dual Duplexer units.

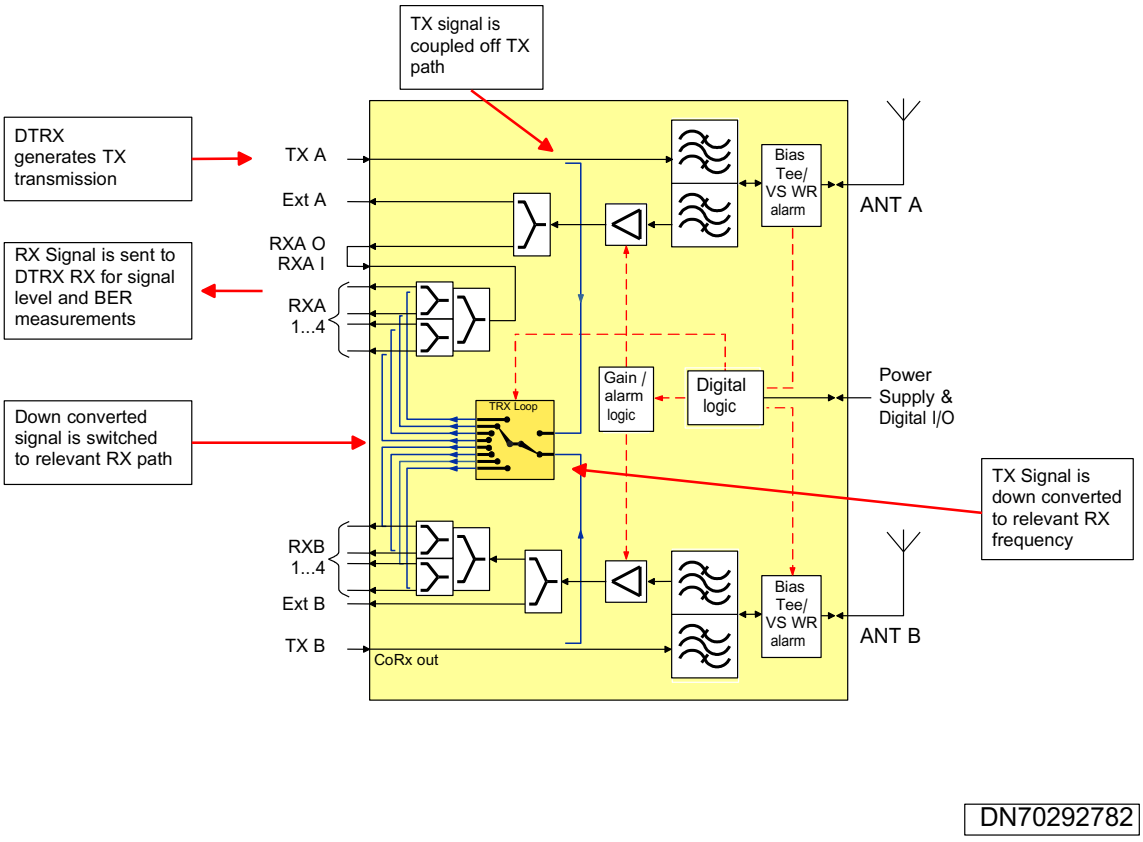

Figure 4. TRX Loop (ERxA, DDU module)

The TX to RX Loop switcihing is arbitrated on timeslot (577 microseconds) basis to guarantee that other TSs' traffic is not cut during the loop.

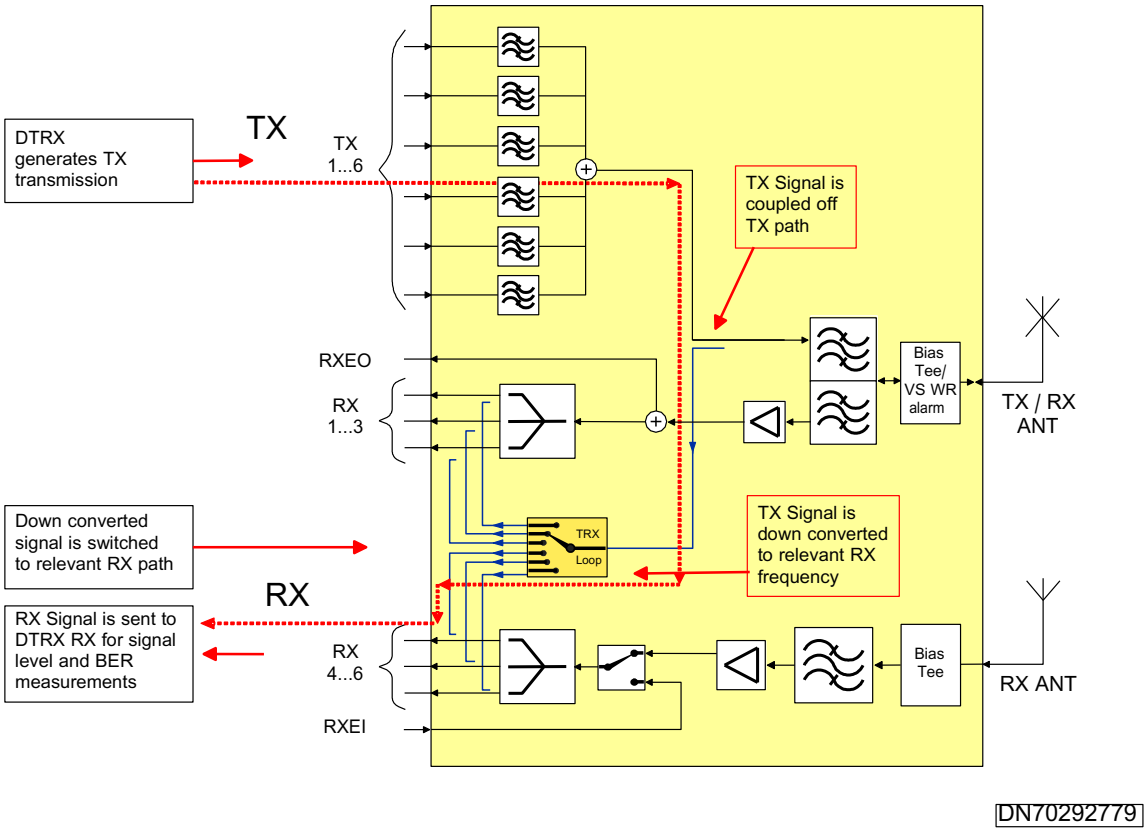

Figure 5. TRX Loop (ECxA, RTC module)

The Test report parameters are displayed on the Test Details pane:

Table 2. Test report parameters

Property	**Explanation**
Test Result	Indicates if the test has passed or failed
Failure Reason	If a test has failed the reason for failure is shown here
Actual Test Duration	Actual duration of the test.
S/N Ratio	Level of the received signal compared to background noise
RX Quality	Quality of received signal in terms of bit error propability
Main RX Level	Main RX Level in dBm
Div RX Level	Div RX level in dBm

Table 2. Test report parameters (cont.)

Property	Explanation
FER (BLER)	Frame (block) error rate, amount of failures with frame (block) decoding
BER	Bit error rate, amount of bit errors in decoded frames
RBER1b	Residual BER in class 1b speech bits
RBER2	Residual BER in class 2 speech bits

The Test Results are displayed on the Test Results pane.

If the test fails look for troubleshooting instructions in the *Troubleshooting TRX test and TRX loop test failures with BTS Manager* section in the *Trouble Management of Nokia Flexi EDGE BTS* document.

2.4 Running a BCCH Transmission Test

Summary

The purpose of this test is to have all timeslots transmit on the power level specified for the test.

BCCH (Broadcast Control Channel) Transmission is a diagnostic tool. The user interface has a drop-down list that has a listing of all the TRXs present in the BTS and any of these TRXs can be chosen for a test.

Following selections are available:

- **TRX Number**: Enables the user to select the TRX on which to execute the BCCH Transmission.
- **Power**: Enables the user to specify the power of the selected time slot. Power in not changeable if the site is under BSC Control.
- **Network Color Code**: Enables the user to specify the Network Color Code of the BTS.

- **Base Station Color Code**: Enables the user to specify the Base Station Color Code.
- Enables user to specify the ARFN of selected time slot, at least one ARFN value has to be specified in order to execute the loop test. ARFN is not editable if the site is under BSC Control. In case the site is under BSC Control, the ARFN received from the site is displayed. In case the TRX is RF-Hopping, text “Hopping" is displayed. In the case when site is not under BSC Control, the lowest of the range of ARFNs depending upon the band of the TRX is displayed as default.

Note that if the selected TRX is not in configuring state the BCCH test cannot be performed. If the BTS is under Local Mode the command is not available because then the BSC has control on the BCCH.

Steps

1. **Choose the BCCH Transmission command on the Tests menu or choose the BCCH Transmission tab sheet in the Tests view.**

2. **Select the TRX Number on which diagnosis to be performed.**

   See the BCCH Transmission Test figure below.

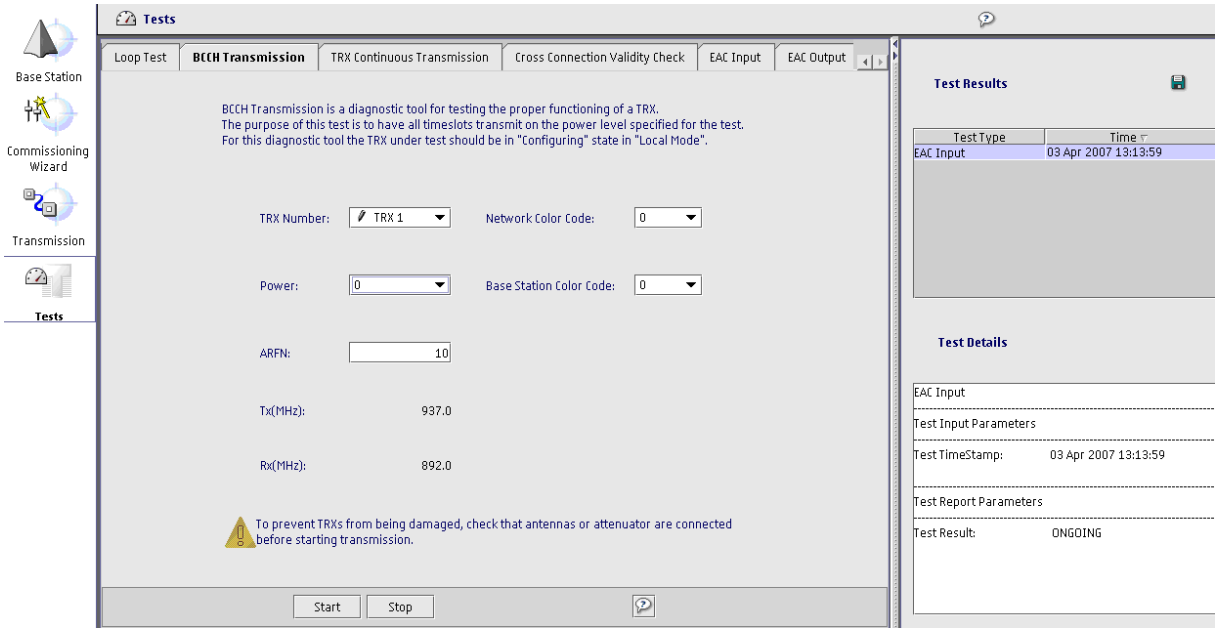

Figure 6. BCCH Transmission test

3. **Select Power control range of the selected TRX.**

   The default value is 15.

4. **Select Network Color Code.**

5. **Select Base Station Color Code.**

6. **Select the ARFN.**

   Note that the ARFN (Absolute Radio Frequency Number) value selection is only available in local mode. In network mode it is given by the BSC.

7. **Click Start to execute diagnosis with selected parameters.**

   The Test Details are displayed on the Test Details pane.

   The Test Results are displayed on the Test Results pane. If an error occurs as a test result see the table below for more details.

Table 3. Test result errors

Test result	Explanation
TRX is not in Configuring State	The selected TRX is not in Configuring state. Check the TRX State and run the test again.
Selected TRX is in Shutdown state	The selected TRX is in Shutdown state. Check the TRX State and run the test again.

2.5 Running an EAC Input test

Summary

EAC inputs are connected to the EAC connector of the BTS and the user can freely decide which inputs to connect and where. The states of these inputs can be viewed on the EAC Inputs page.

Note that the EAC Input test runs autonomously for 2 hours. If the test is run manually during BTS commissioning the process can be accelerated by stopping the test when the autonomous timer of 2 hours has run up to 2 hours in the background.

Steps

1. **Choose the EAC Input command on the Tests menu or choose the EAC Input tab sheet in the Tests view.**

   EAC input line states will be shown. See the figure below.

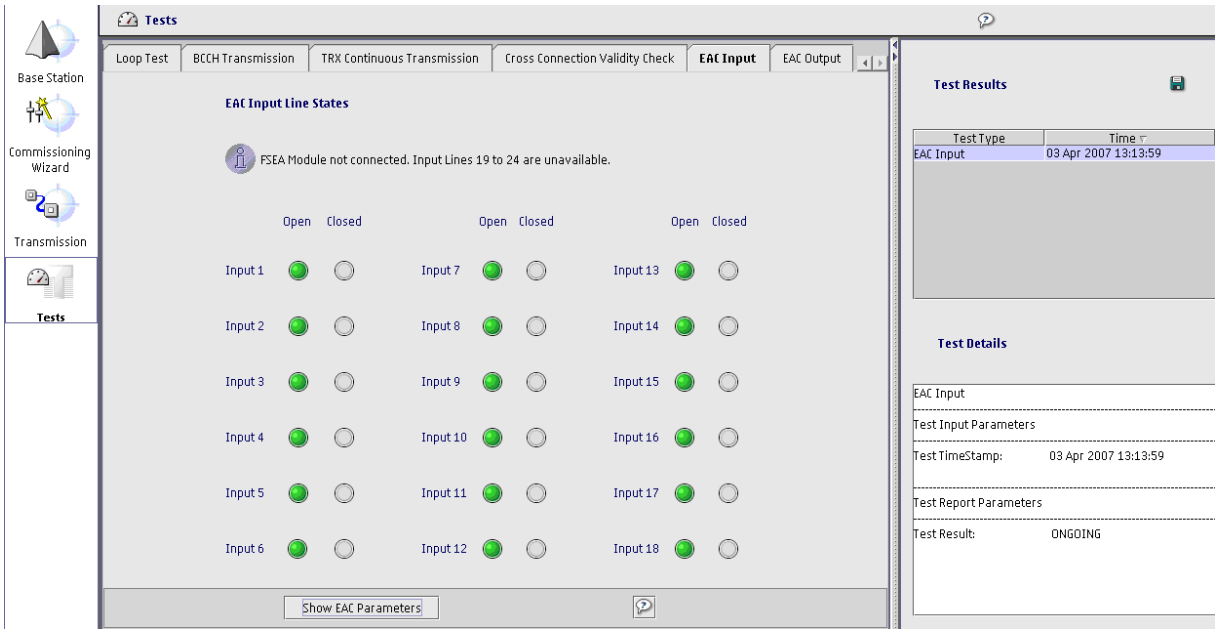

Figure 7. EAC input line states

2. **If you wish to see the EAC parameters click the Show EAC parameters button.**

   EAC parameters show the following input line states and configurations:

   - **Show Input Lines 7 to 18/ Show Input Lines 19 to 24**: Enables you to switch the view to display the lines 7-18 or 19-24. Starting page shows lines 1-6.
   - **Line State**: Displays the current state of each input line: Open, Close or Unknown.
   - **Polarity**: Displays the polarity of the EAC input lines: Active When Open, Active When Closed or Unknown.
   - **Alarm**: Displays the state of the alarm.

First page that opens shows the input lines from 1 to 6, second page shows input lines 7 to 18 and the last page shows lines 19 to 24. The pages can be accessed by clicking the corresponding button, for example **Show Input Lines 7 to 18** for the second page.

- If only ESMA is used, EAC input lines 1-12 are at ESMA EAC connector (MDR36)
- If FSEB is connected to ESMA, EAC input lines 1-24 are at FSEB (Screw connectors and Sub D-37 connector).

  Note that FPA connector is used for optional power (BBU) related alarms only.

The Test Details are displayed on the Test Details pane.

The Test Results are displayed on the Test Results pane. If an error occurs as a test result see the table below for more details.

Table 4. Test result errors

Test result	Explanation
EAC Input Test could not be started	BCF (Base Station Control Function) is not in supervisory state. Check the BCF state and run the test again.

3. **Click the Hide EAC Parameters button to return to the EAC Input Line States screen.**

2.6 Running an EAC Output test

Summary

The EAC output screen is used to either set the EAC output lines or to show the actual EAC output line status present at the BTS.

Following selections are available:

- **Current Output Line States**: Displays the current status of the EAC Output lines.
- **EAC Output Test Parameter**: Enables the user to select the output line states for performing the EAC Output test: ON or OFF.

- **Set**: Sets the selected EAC output line states.
- **Revert**: Reverts the EAC output lines states back to the default values (current BSC output line states). Enabled after you have changed the states once by clicking the Set button.

Steps

1. **Choose the EAC Output command on the Tests menu or choose the EAC Output tab sheet in the Tests view.**

   Current EAC output line states will be shown. See the figure below.

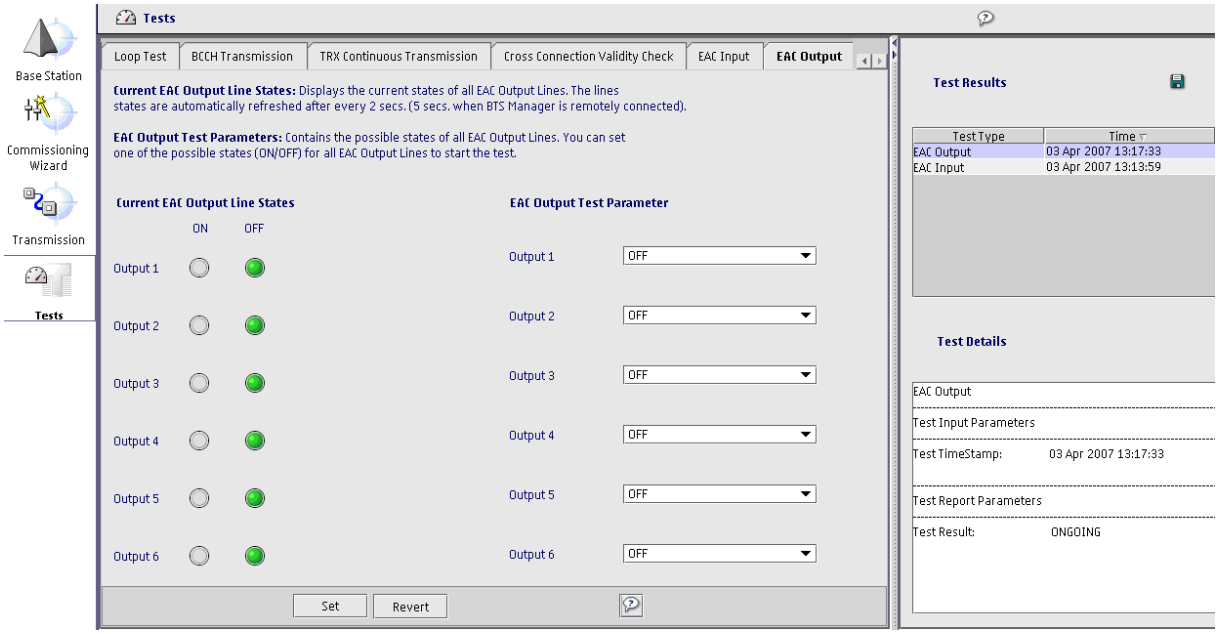

Figure 8. EAC output test

2. **Set the EAC Output Test Parameter values.**

   Values are ON and OFF.

3. **Click the Set button to execute the test with the selected parameters.**

   The Test Details are displayed on the Test Details pane.

The Test Results are displayed on the Test Results pane. If an error occurs as a test result see the table below for more details.

Table 5. Test result errors

Test result	Explanation
Invalid Response Received. You may again set the EAC Output line states.	EAC Output line states have not been set. Select the EAC Output line states (ON/OFF)
Invalid Response Received. You may again revert the EAC Output line states.	EAC Output line states have not been reverted. Revert the EAC Output line states by clicking the **Revert** button.

4. Click the Revert button to stop the test.

The **Revert** button reverts the EAC output lines states back to the default values (current BSC output line states).

2.7 Running a Cross Connection Validity Check test

Summary

The purpose of the cross connection validity check is to verify that:

- OMUSIG is configured
- at least one TRXSIG is configured
- Traffic channels for at least one TRX are configured

If one of the above is missing the test result is shown as FAIL with the description. Note that the cross connection validity check does not change any settings.

Steps

1. Choose the Cross Connection Validity Check command on the Tests menu or choose the Cross Connection Validity Check tab sheet in the Tests view.

See the figure below.

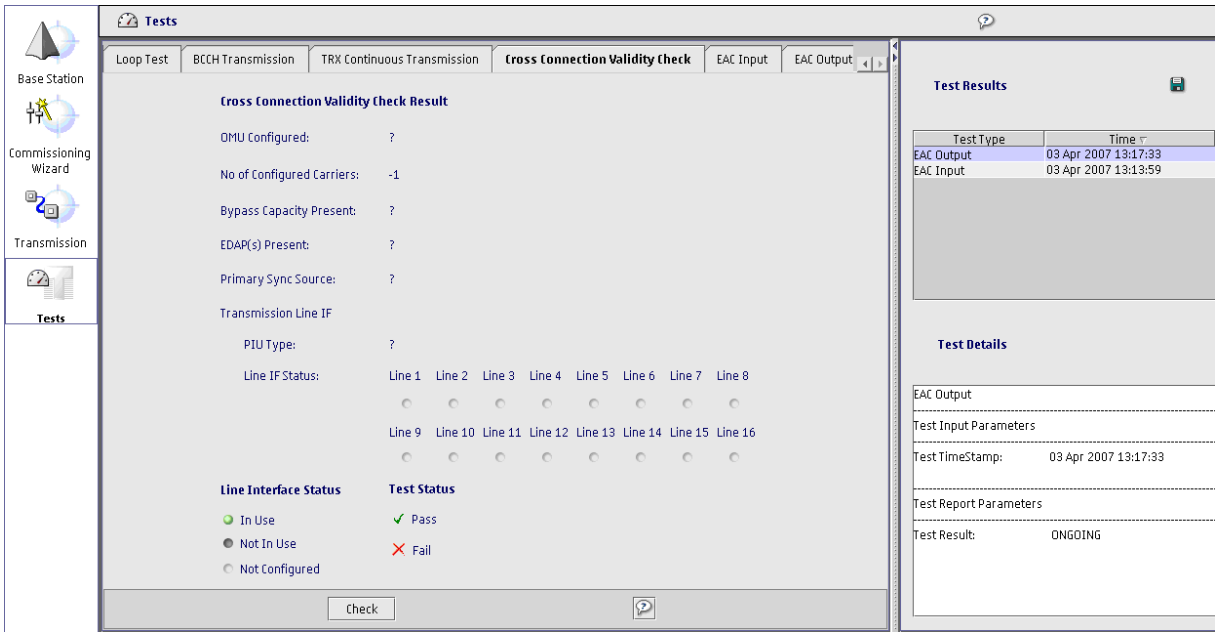

Figure 9. Cross Connection Validity Check

2. Click the Check button to execute the test.

The following results are displayed:

- **OMU Configured**: Displays whether the OMU is configured or not.
- **No of Configured Carriers**: Displays the number of the configured carriers.
- **Bypass Capacity Present**: Displays whether the bypass capacity is present or not.
- **EDAP(s) Present**: Displays whether the EDAP is present or not.
- **Primary Sync Source**: Displays the primary synchronisation timing source.
- **Transmission Line IF**
  - **PIU Type**: Displays the interface mode.
  - **Line IF Status**: Displays whether the line is in use (green bullet), not in use (dark grey bullet) or not configured (light grey bullet)
- **Test Status**: Displays whether the check is passed or failed.

The Test Details are displayed on the Test Details pane.

The Test Results are displayed on the Test Results pane. If an error occurs as a test result see the table below for more details.

Table 6. Test result errors

Test result	Explanation
Invalid Response Received. You may recheck the Cross Connection Validity.	Test results can not be displayed. Check the parameters and run the test again.
Test Result: FAIL	The test has failed due to one of the following: • OMUSIG capacity does not exist. Configure the OMU (Operation and Maintenance Unit). • TRXSIG capacity and Fixed traffic channels do not exist. Check the availability of configured carriers. • 7606 alarm 'No capacity for TRX object'. See the *Trouble Management of Nokia Flexi EDGE BTS* document for instructions.

2.8 Running a TRX Continuous Transmission with BCCH Power Level test

Summary

TRX Test Pattern Transmission is a diagnostic tool. The user interface has a drop-down list that has a listing of all the TRXs present in the BTS and any of these TRXs can be chosen for a test.

Steps

1. **Choose the TRX Continuous Transmission command on the Tests menu or choose the TRX Continuous Transmission tab sheet in the Tests view.**

2. **Select the TRX Number on which test to be performed.**

   See the TRX Continuous Transmission with BCCH Power Level test figure below.

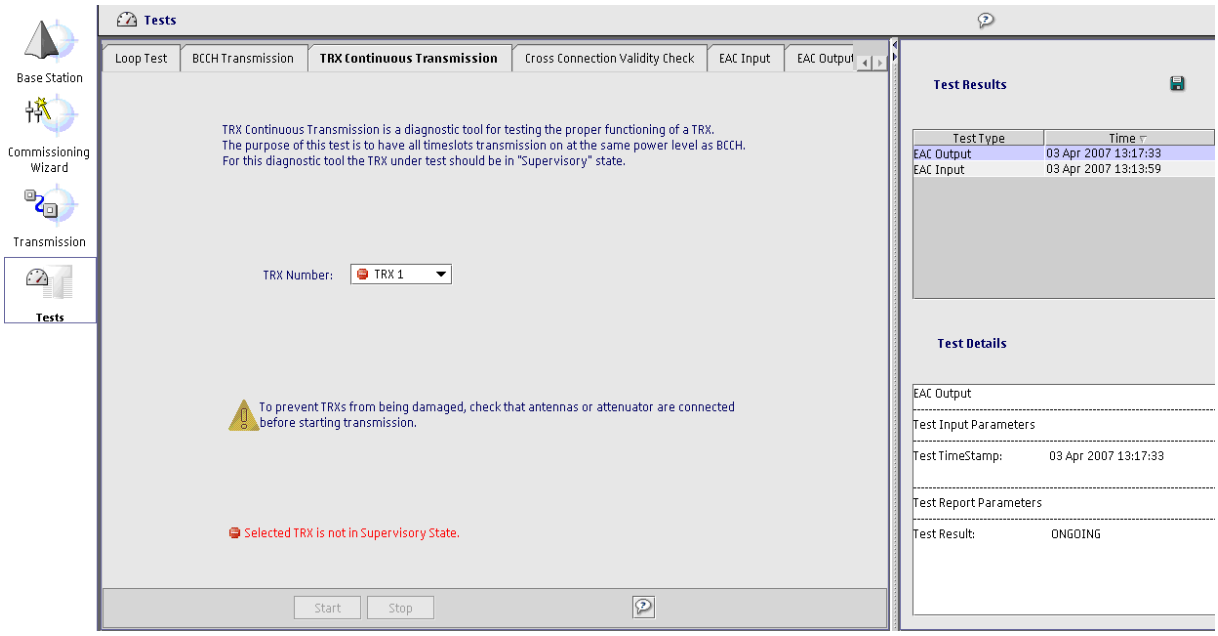

Figure 10. TRX Continuous Transmission with BCCH Power Level test

3. Click Start to execute test with selected parameters.

The Test Details are displayed on the Test Details pane.

The Test Results are displayed on the Test Results pane. If an error occurs as a test result see the table below for more details.

Table 7. Test result errors

Test result	Explanation
Selected TRX is not in Supervisory State	The selected TRX is not in Supervisory state. Check the TRX State and run the test again.
Selected TRX is Locked by the BSC.	The selected TRX is locked by the BSC. Check the TRX State and run the test again.
Selected TRX is in Shutdown state	The selected TRX is in Shutdown state. Check the TRX State and run the test again.

4. Click Stop to stop the test.

Appendix A Loop test with external air device using a CMU

A.1 Configuring a loop test with external air device using a CMU

Before you start

The BTS should be configured in the normal way with Nokia Flexi EDGE BTS Manager. SW should be loaded onto the site and the site should be in a fully configured state. The test should only be executed in case of a suspected faulty module.

Summary

Follow these instructions to configure a loop test with external air device using a Rohde & Schwartz CMU 300 (Universal Radio Communication Tester) and a Nokia Flexi EDGE BTS. In this looptest the uplink TRAU (Transcoding and Rate Adaptation Unit) frame is looped back to the downlink TRAU frame inside the BTS, that is the decoded channel block is given to the channel encoder. It is the external device, in this case the CMU 300, that forms the start and end of the loop.

Note that also CMD-54 and CMU 200 can be used for this test.

If the tested module is malfunctioning it can also be due to exceeded specification limits on the CMU 300 and the CMU 300 reports this. In this case the module should be sent to the nearest repair center.

Steps

1. Disable Abis.

The Abis may be either physically disconnected or by selecting **BTS Control** and **Disable Abis** from the BTS Manager menu.

If the Abis is physically disconnected, the following alarms will be raised in BTS Manager: Loss of incoming 2M signal and Loss of synchronisation signal(s). With the Abis disabled BCF should now be reset.

2. Select Use Current from the BTS SW menu.

Use Current can be selected from the **BTS SW** menu when the TRXs have reached a SW loading state.

After the command is given the TRXs should reach a configuring state with yellow LEDs flashing. This can take up to 5 minutes.

3. Connect the CMU 300 to the BTS.

Connect the CMU 300 to the Nokia Flexi EDGE BTS by connecting the clock test cable to Ref In on the CMU 300 and Sync Out connector on the System Module. Connect also the RF cable from the TX connector on the DDU to the RF connector on the CMU.

4. Select Basic Functions | RF | Spectrum from the CMU main menu.

If the centre frequency is correct the following image should appear on the CMU. A scale of 3 MHz/div and a span of 30 MHz should be adequate.

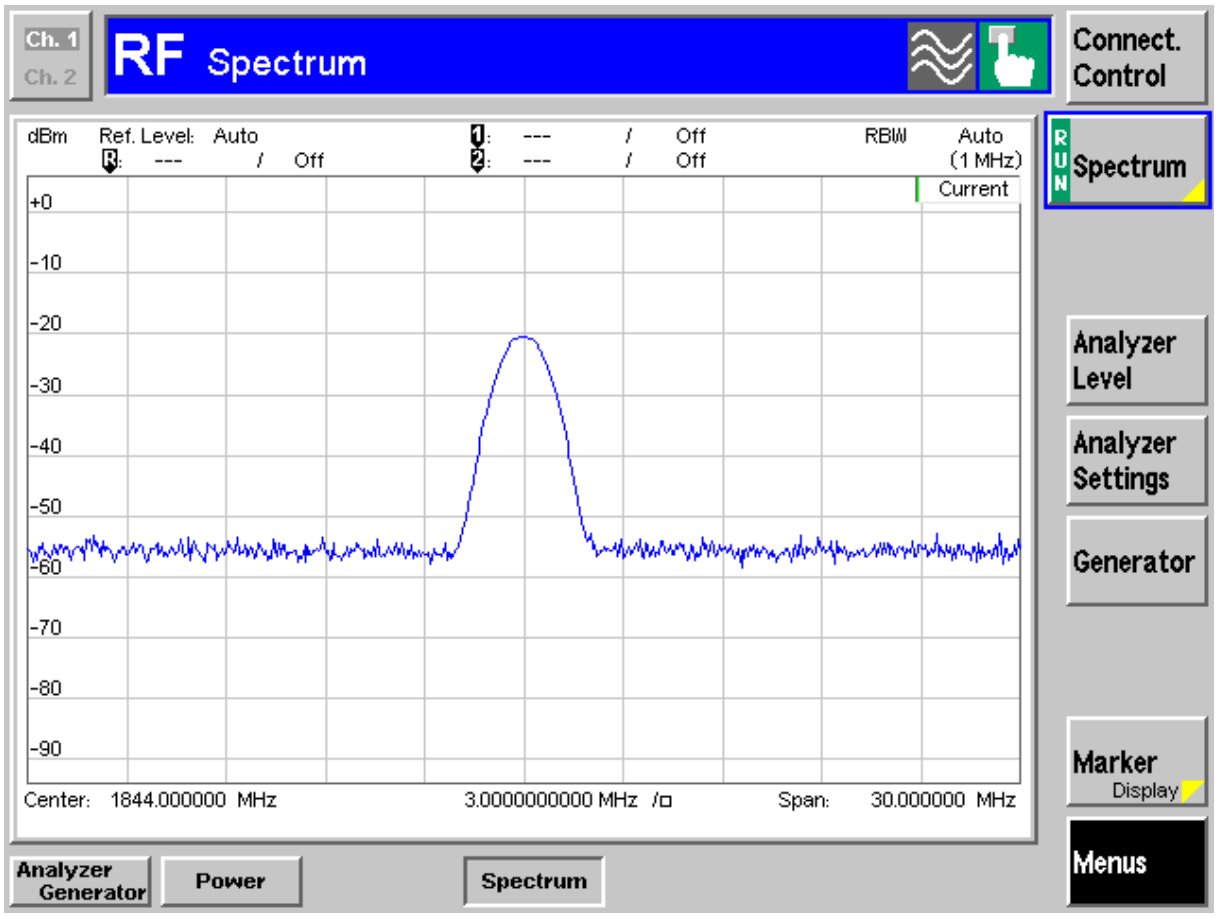

Figure 11. RF spectrum

Note that stopping and starting the BCCH carrier should cause the signal to stop and start. If this is not the case then the configuration and frequency should be checked.

5. **Select GSM Base Transmitter Station | GSM 1800 | Signalling | Receiver Quality | BER CMU from the CMU main menu.**

   See the figure below.

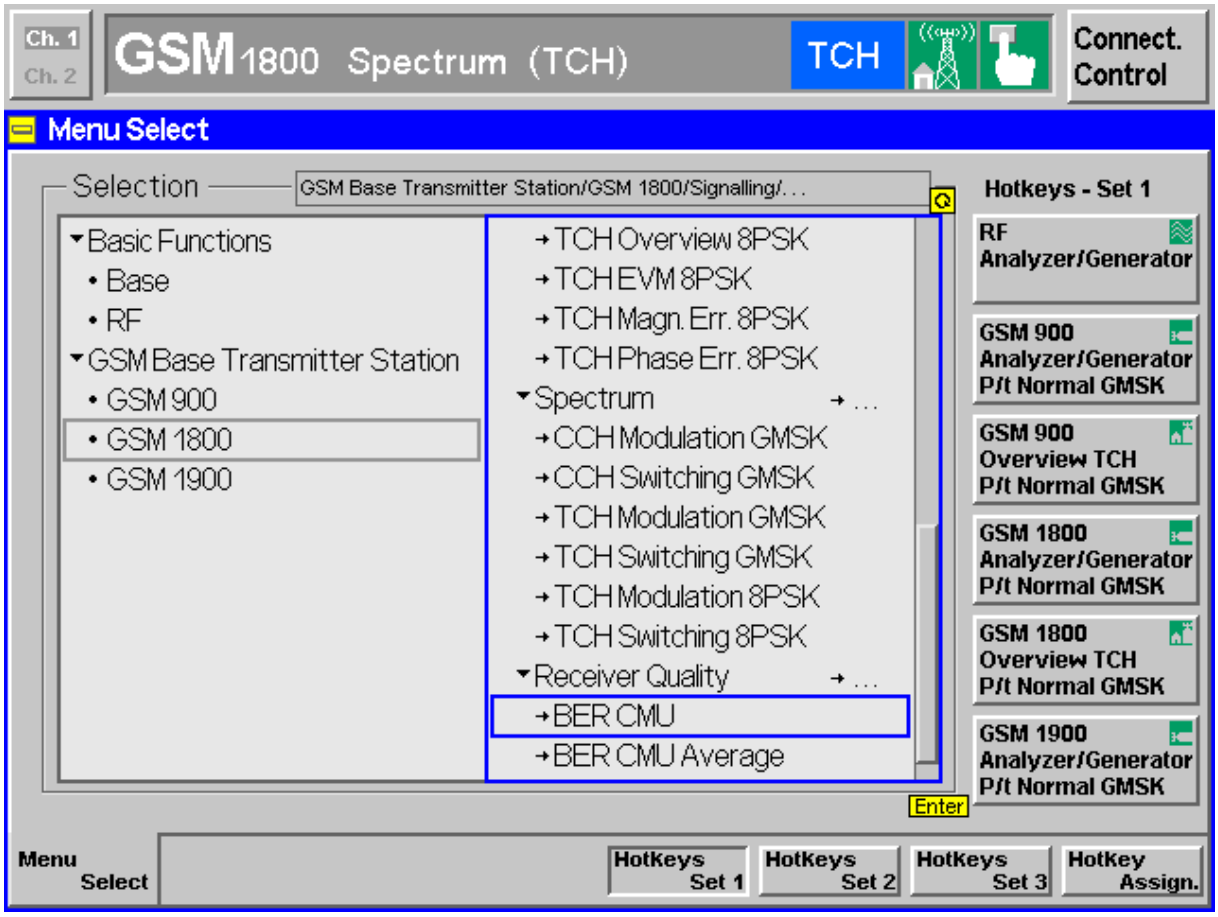

Figure 12. BER CMU

6. **Select Start Sync on the CMU control panel.**

7. **Select Traffic Channel.**

   See the figure below.

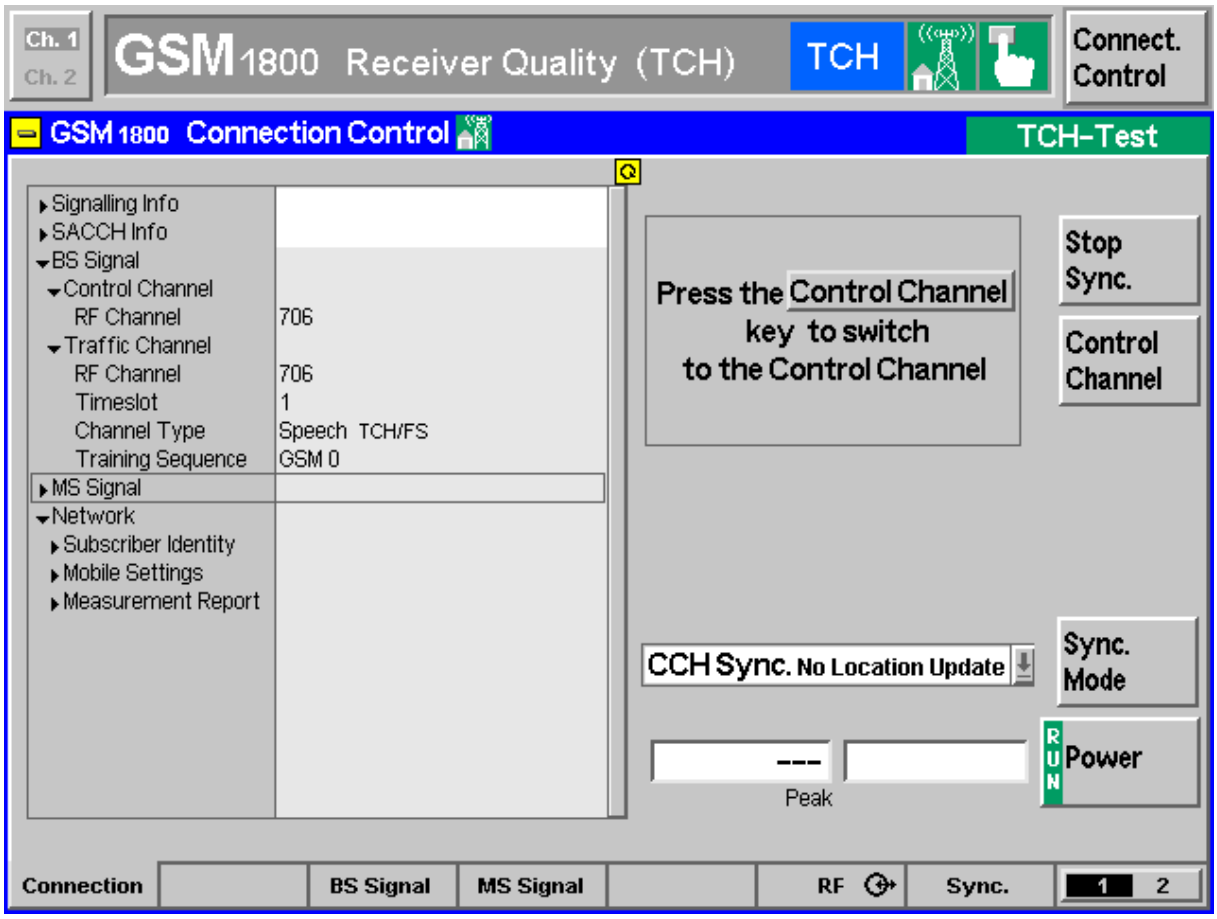

Figure 13. Traffic Channel

Pressing ESCAPE on the CMU at this time will return to the GSM 1800 Receiver Quality (TCH) screen.

Note that if synchronisation is not possible the configuration and connections should be checked. The RF connections for the CMU should also be checked. These should be configured as in the figure below.

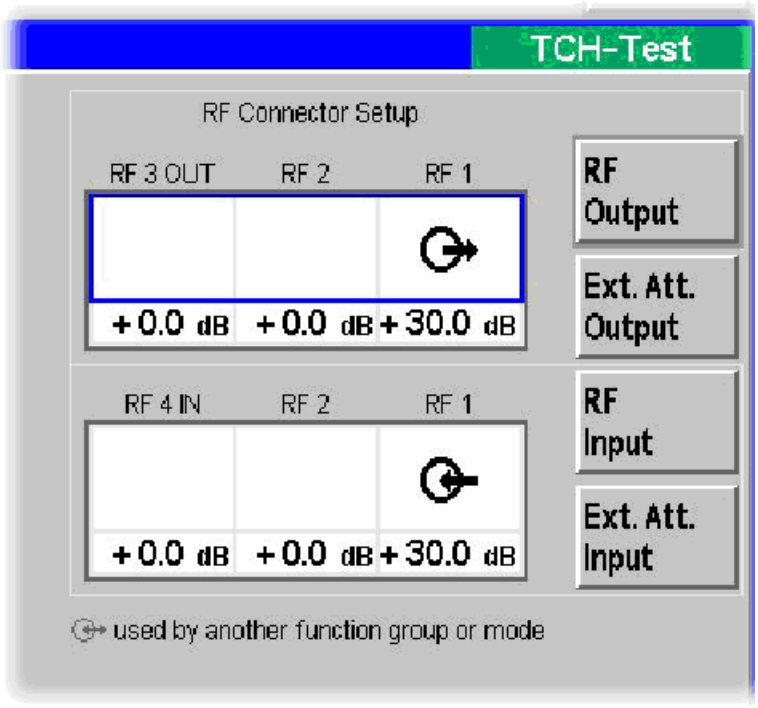

Figure 14. RF connector setup

8. **Choose the Loop Test command on the Tests menu or choose the Loop Test tab sheet in the Tests view in the BTS Manager.**

9. **Select the TRX Number on which the test is to be performed.**

10. **Select Time Slot of the selected TRX.**

11. **Select Modulation of the TRX.**

12. **Select the Channel.**

13. **Select the Loopback Point.**

14. **Select the Looped Bit Pattern.**

15. **Select the Receiver Branch.**

16. **Select the time the test will be executed.**

17. If the TRX is in Configuring State, select the values for TS Control Information.

See the figure below.

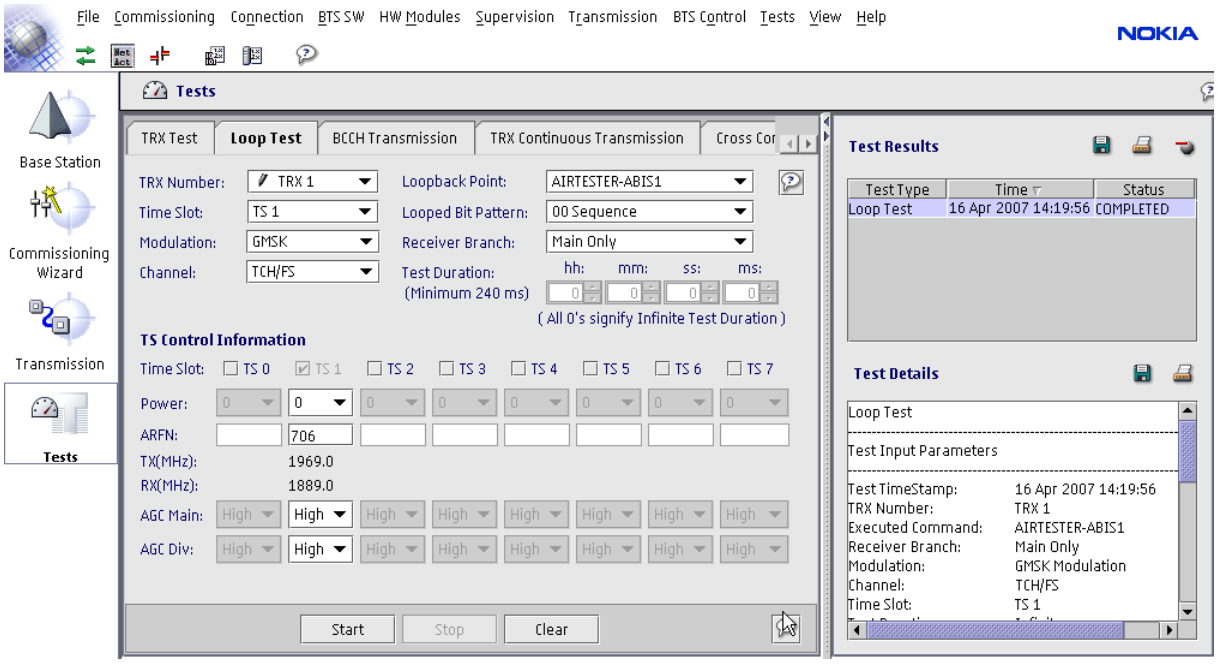

Figure 15. Loop test

18. Click Start to execute test with selected parameters.

See the figure below for an example of a completed test. Note that although the BER in the example figure shows 0.930% the result should be 0%.

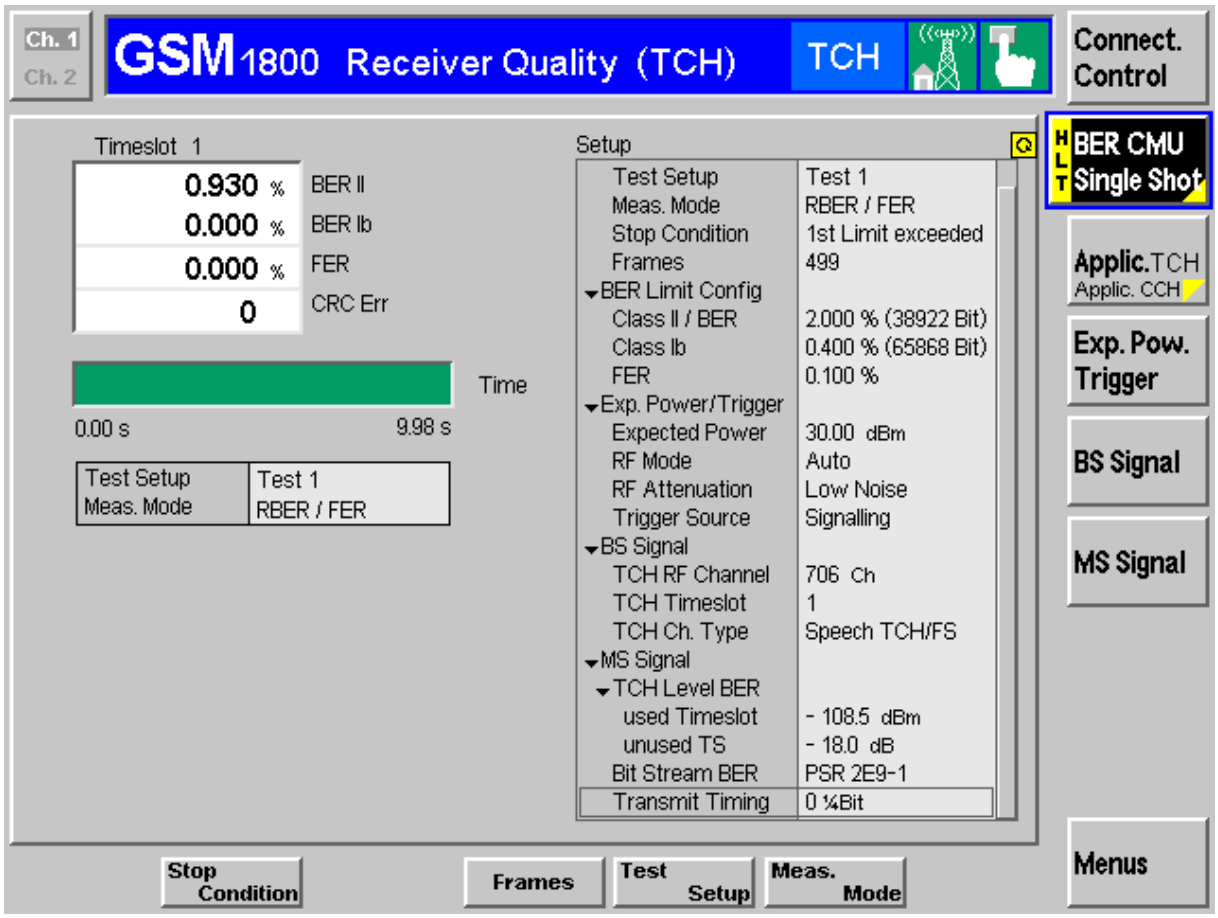

Figure 16. Test result

Depending on the level of SW in the CMU the FER (Frame Error Rate) may not be displayed the first time this screen is selected. This can be corrected by selecting **Meas. Mode** on the CMU and selecting **RBER/FER**.

19. *If* for example you need to perform other tests using the CMU

    Then

    Select GSM Base Transmitter Station | GSM 1800 | Signalling | Power | TCH P/t Normal GMSK

    GMSK = Gaussian Minimum Shift Keying.

With the TRX loop test still running the CMU should now look as shown in the figure below.

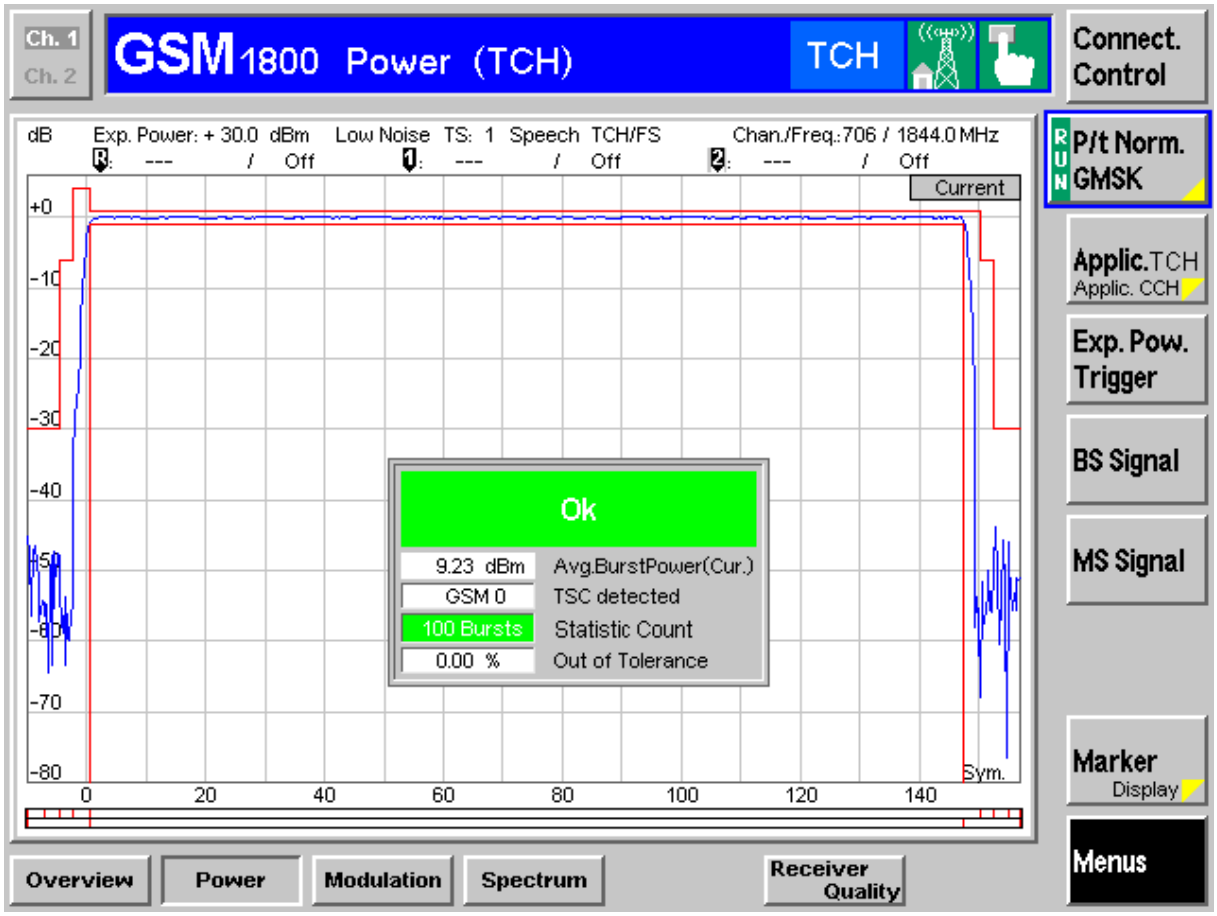

Figure 17. TCH P/t Normal GMSK

The frequency spectrum can also be analysed as shown in the figure below. However, it should be noted that this test may fail if the power level is below power level 10.

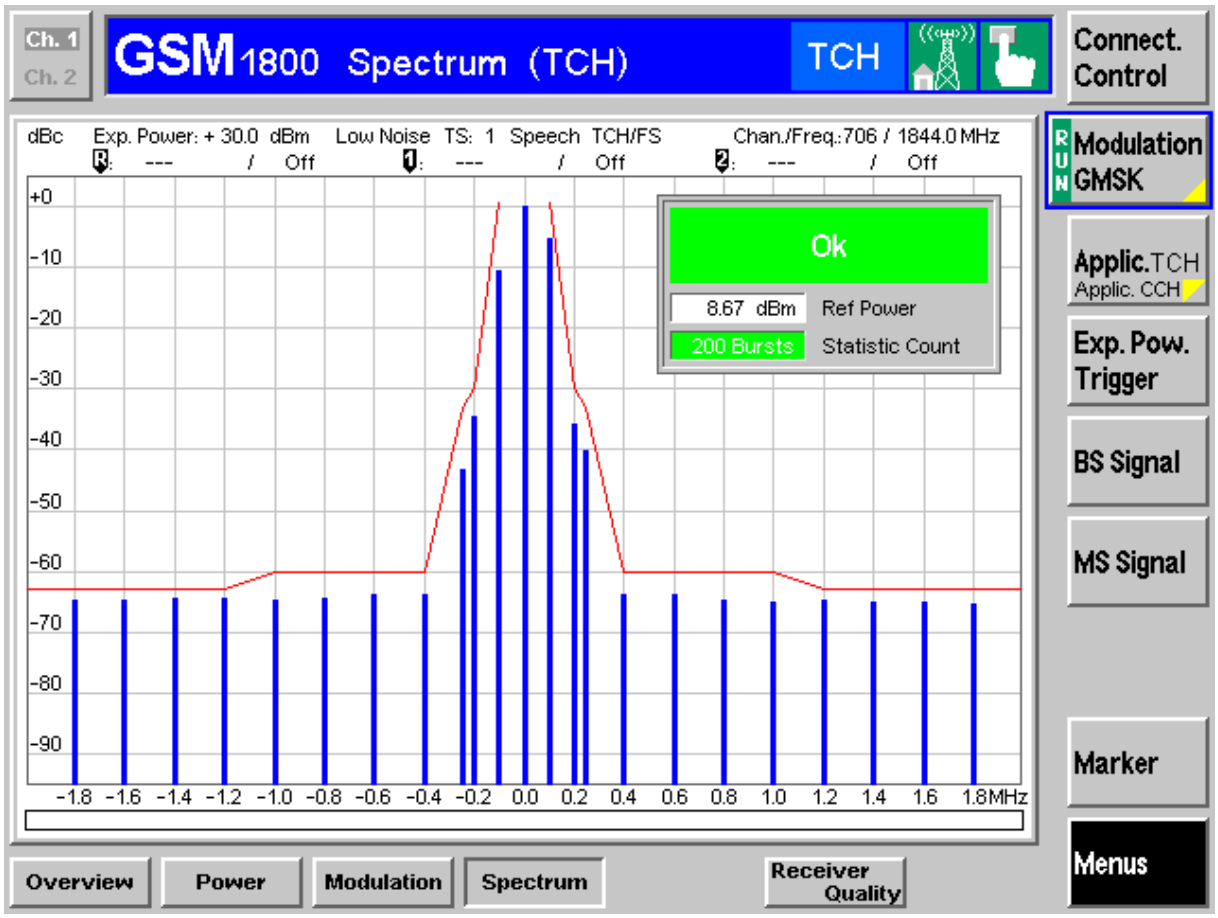

Figure 18. Frequency spectrum

A.2 Nokia Flexi EDGE BTS Sync Test cable (ESTA)

Nokia Flexi EDGE BTS Sync Test cable (ESTA) can be used to gain access to 13 MHz and Frame Clock signals. These signals are needed when measuring the BTS RF performance with external test equipment. For further details on the test set-up see *Testing Nokia Flexi EDGE BTS* document.

The sync test cable (ESTA) can be ordered separately from Nokia HWS. The code is 471521A.

The description of the cable connectors are as follows:

- MDR14: This is inserted into the SYNC OUT connector on the ESMA System Module
- BNC-1 (TSTCLK): Provides 13 MHz clock signal for external test equipment (reference clock for RF measurements)
- BNC-2 (TSTFCLK_OUT) : Provides Frame Clock signal (approx.. 217 Hz) for external test equipment.

Connector pin assignments are listed in the table below.

Table 8. Connector pin assignments

Connector	Pin	Signal
MDR14	11	TSTCLK_OUT
	10	Ground
	13	TSTFCLK_OUT
	14	Ground
BNC 1	Center	TSTCLK_OUT
	Body	Ground
BNC 2	Center	TSTFCLK_OUT
	Body	Ground

Sync Test cable is presented in the figure below.

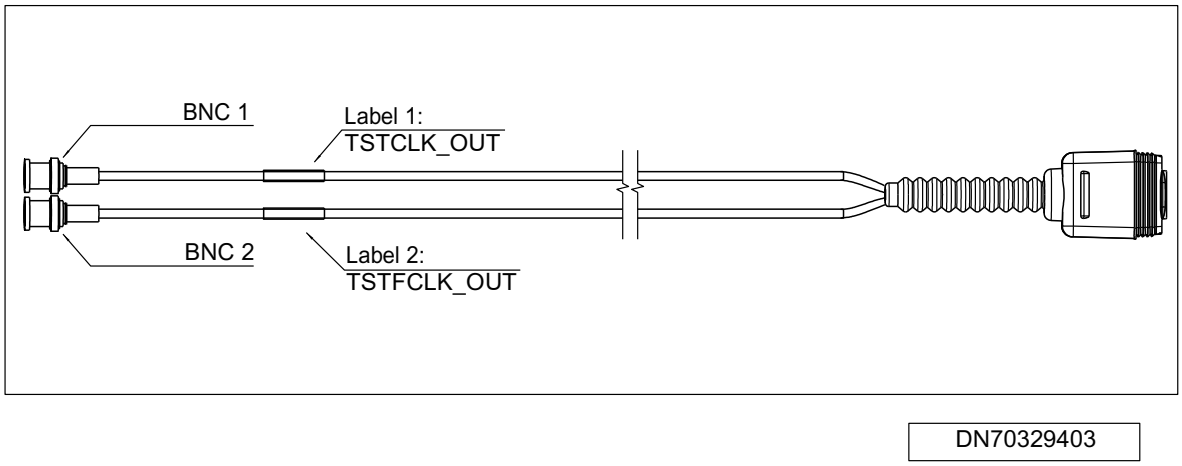

Figure 19. Nokia Flexi EDGE BTS Sync Test cable (ESTA)