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Nokia UltraSite EDGE BTS, Rel. CX5, Product Documentation, v.1

Testing UltraSite EDGE BTS

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Contents

1 Summary of changes in Testing UltraSite EDGE BTS

There are no changes in *Testing UltraSite EDGE BTS* document.

2 Running BTS tests

2.1 Overview of testing

Summary

The two main test types are:

- BTS commissioning tests -- ensure that the hardware is functioning properly at the time the BTS is commissioned and generate a report of test results and configuration information used for site acceptance.
- BTS system tests -- verify the quality and maximum number of calls in a cell, verify the condition of the hardware, and identify appropriate maintenance tasks.

Steps

1. *If* ensuring that the hardware is functioning properly at commissioning or generating a commissioning report,

   Then

   Test with the Commissioning Wizard.

2. *If* measuring the quality and maximum number of calls in a cell, verifying hardware functioning, or identifying maintenance tasks,

   Then

   Run the system tests.

2.2 Powering on the BTS at a new site

Before you start

Ensure that all internal BTS components 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.**
3. **Check the BTS units for power.**

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

2.3 Testing with the Commissioning Wizard

Purpose

The testing phase contains activities which ensure that the hardware is functioning properly. In this phase all feasible tests are run in the transmission node and also in the transmission units found in the node.

The tests run at this phase are cross-connections test, fan test, heating test, battery test, and EAC interface tests.

Note

USBTS Hub Manager allows only cross-connection tests.

Before you start

You have opened the Commissioning Wizard as described in *Commissioning the transmission node with the Commissioning Wizard*.

Steps

1. **Select the tests to be run.**

All tests are run as default. Although you can select which tests to run, site acceptance requires that all tests are completed successfully.

2. **Start the testing process by clicking Next.**

   The manager program executes the selected tests, and the results are shown in the **Testing** dialogue box.

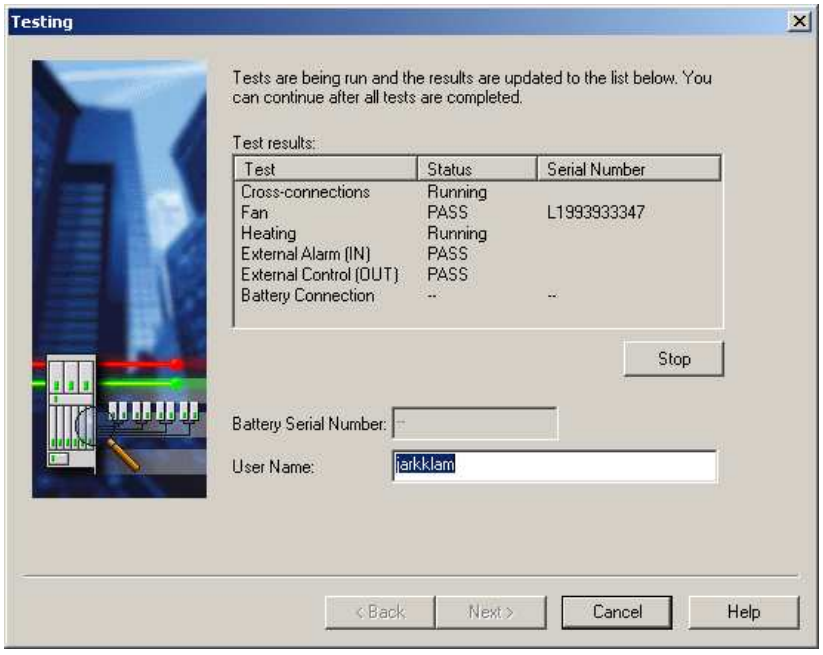

Figure 1. Testing dialogue box

Note

Running the tests takes about four minutes.

3. **Check the results of the tests from the Testing dialogue box and fill in the required fields.**

4. **Click Next.**

   The *Site Selection* dialogue box opens.

5. **Continue the commissioning process as described in Configuring with the Commissioning Wizard.**

2.4 Running a TRX test

Summary

TRX tests run automatically during BTS commissioning. When the BTS is ready for testing, the Commissioning Wizard automatically proceeds to the next window. The Base Station Controller (BSC) runs automatic tests on the Abis link and on each TRX installed in the BTS.

The following information explains the TRX test results that appear in the *BTS Test Reporting* window of the Wizard:

- TX power level is equal to BCCH TRX level. For example, if TRX power level 0 is used, TX power is +47 dBm +/- 4 dBm. Reported TX power is based on the measured RX level value, TRX loop conversion loss, and power level values stored in the TSxx unit's internal memory.
- The measured sensitivity value is an estimate based on the background noise level detected by the TSxx units throughout the whole RX chain at a tested RX frequency. The sensitivity value is typically from -109 dBm to -111 dBm in laboratory conditions. In field conditions with interference, an acceptable value can be around -100 dBm. In case of failure as a result of the sensitivity test, check the RX cabling and confirm that the DVxx and RTxx units are powered on.
- If BER in RF part exceeds 2%, the test fails. If BER in BB part exceeds 0%, the test fails.

Note

The purpose of the TRX test is to check for failure during the delivery. If you need accurate TRX performance values, see the unit test reports (factory test results) shipped with the TRX unit or use external measurement equipment, such as a power meter, to accurately check TX power.

Steps

1. **The BTS Test Reporting window displays.**

When the *BTS Test Reporting* window displays, there is a slight delay before the automatic BSC-controlled tests start. If you click *Manual* to open the *TRX Test* window and the BSC-controlled tests start, the window closes automatically.

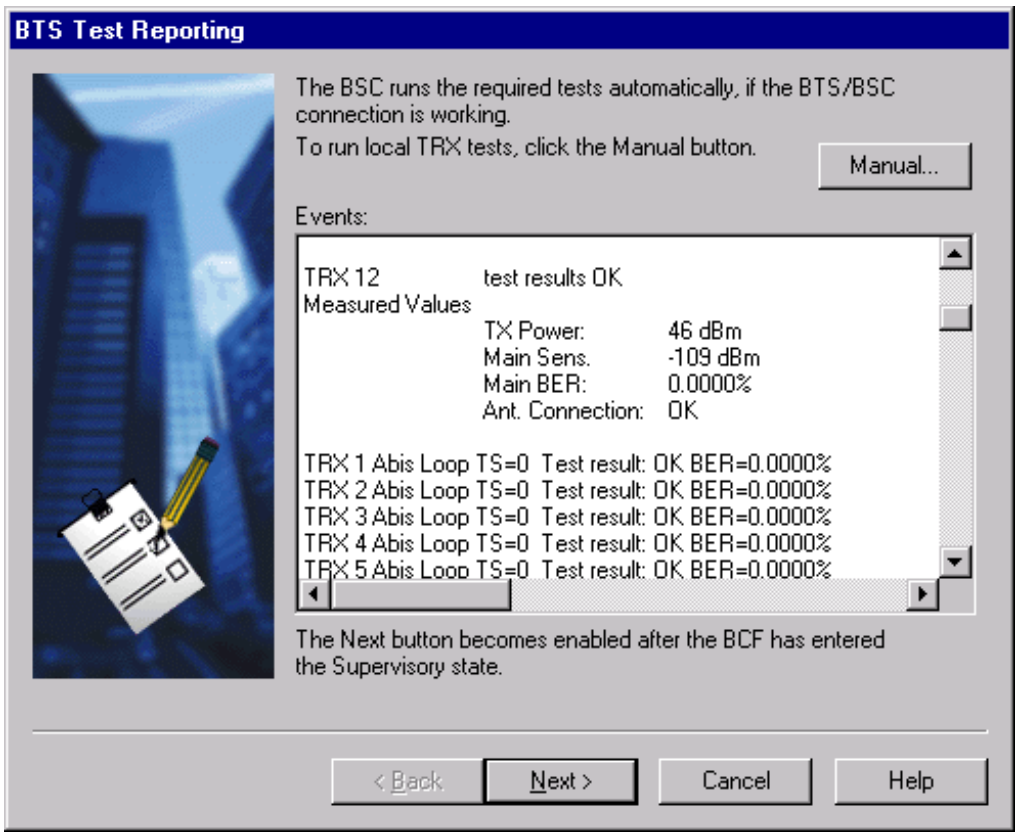

Figure 2. Test events

2. BSC runs tests on Abis link and on each TRX.

When the Base Control Function (BCF) is in the *Configuring* state and the TRXs are ready for testing, the BTS tests are run under the BSC's control. The BSC runs automatic tests on the Abis link and on each TRX installed in the BTS.

The TRX test takes about 6 to 7 seconds for one TRX (one radio time slot per TRX is tested), while the Abis loop test takes about 30 seconds per TRX.

Note

When the BSC-controlled tests are over, click *Manual* to run manual Abis tests.

3. *If* the establishment of the BTS/BSC connection did not succeed and you indicated you wanted to use currently stored SW,

   Then

   Click *Manual* to run the local TRX tests.

4. *If* you wish to manually run TRX tests after commissioning testing is complete,

   Then

   Select manual testing.

   Click *Manual* in the *BTS Test Reporting* window of the Commissioning Wizard after the commissioning testing is complete.

2.5 Testing added TRXs for upgrading the BTS (non-hopping or RF hopping)

Summary

This Hot Insert procedure is not recommended for use when replacing GSM hardware with GSM/EDGE hardware.

Steps

1. **Run the TRX test for each added TRX:**
   a. If using the BTS software CX4.0-3, ensure the Nokia BTS Manager is disconnected from the BTS and then run the TRX test from the BSC (ZUBS, ZUBP).
   b. If using the BTS software CX4.0-4 or later, run the TRX test either from the Nokia BTS Manager or from the BSC.

2.6 Testing added TRXs for upgrading the BTS (BB hopping)

Summary

Note

This Hot Insert procedure is not recommended for use when replacing GSM hardware with GSM/EDGE hardware.

Steps

1. **Lock the BTS sector at the BSC (ZEQS).**
2. **Temporarily set the BTS sector to non-hopping mode to allow the TRX tests to be completed (ZEQE, HOP=N).**
3. **Temporarily set the BTS sector to Cell Barred to prevent customer calls (ZEQF, BAR=Y).**
4. **Unlock the added TRXs at the BSC (ZERS).**
5. **Unlock the BTS sector at the BSC (ZEQS).**
6. **Run the TRX test for each added TRX:**
   a. If using the BTS software CX4.0-3, ensure the Nokia BTS Manager is disconnected from the BTS. Run the TRX test from the BSC (ZUBS, ZUBP).
   b. If using the BTS software CX4.0-4 or later, run the TRX test either from Nokia BTS Manager or from the BSC.

2.7 Blocking and unblocking a TRX

Summary

This section provides detailed procedures on how to block the TRX associated with the TSxx, from the Base Station Controller (BSC). It also describes how to unblock the TRX from the BSC, the NMS/2000, and NetAct.

Steps

1. **From the Nokia BTS Manager, block the TRX associated with the TSxx.**

   Right-click the associated TRX. From the drop-down menu, select *TRX Block*.

   Or

2. **Lock the TRX from the BSC.**

   At the screen prompt, enter:

   ```
   ZERS:BTS=xx:TRX=xx:L::;
   ```

3. **Confirm that the TRX is in locked state.**

   At the screen prompt, enter:

   ```
   ZEEI:BCF=XX:;
   ```

   The screen displays the site configuration at the BSC, the state of the HW, and signalling.

4. **Install the new TSxx unit.**

   For details on TSxx installation, see *Installing a Transceiver (TSxx) unit* in the appropriate installation document.

5. **After running the TRX test, use Nokia BTS Manager to unblock the TRX associated with the TSxx.**

6. *If* the TRX is locked from the BSC,

   Then

   Unlock from the BSC.

   At the screen prompt, enter:

   ```
   ZERS:BTS=xx:TRX=xx:U::;
   ```

7. *If* the TRX is locked from the NMS/2000,

   Then

   Unlock from the NMS/2000.

8. *If* the TRX is locked from NetAct,

   Then

   Unlock from NetAct.

   In this case, the reset is automatic.

2.8 Running an Abis loop test

Steps

1. *If* you wish to automatically run Abis loop tests during BTS commissioning,

   Then

   Base Station Controller (BSC) runs tests on Abis link and on each TRX.

   When the Base Control Function (BCF) is in the *Configuring* state and the TRXs are ready for testing, the BTS tests are run under the BSC's control. The BSC runs automatic tests on the Abis link and on each TRX installed in the BTS.

   The Abis loop test takes about 30 seconds per TRX.

Note

When the BSC-controlled tests are over, click *Manual* to run manual Abis tests.

2. *If* you wish to manually run Abis loop tests after the commissioning testing is complete,

   Then

   Select manual testing.

   Click *Manual* in the *BTS Test Reporting* window of the Commissioning Wizard after the commissioning testing is complete.

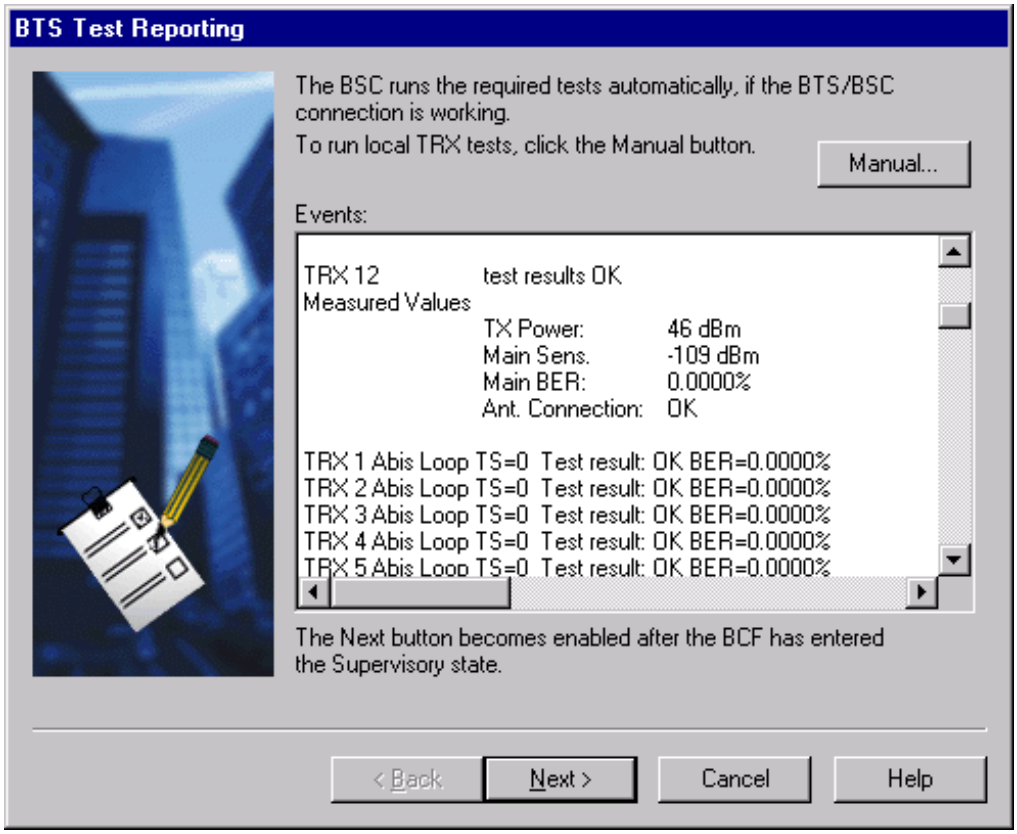

Figure 3. Test events

2.9 Running system tests

Summary

To measure the quality and maximum number of calls in a cell, run the system tests as they apply to your system. The tests verify the condition of the hardware and help identify appropriate maintenance tasks.

Table 1. Remote testing

System	Action
GSM/EDGE system	Run system tests remotely from the Base Station Controller (BSC), NMS/2000, or NetAct.

Steps

1. **Run the Abis loop test.**

2. **Run the TRX test.**

3 Using loopbacks to test the transmission node

3.1 Overview of using loopbacks to test the transmission node

Purpose

The units contain several loopback points that you can set to test the node. These loopbacks are accessed through Nokia FXC E1/(T1) Manager or FXC RRI Manager or FXC STM-1 Manager (standalone or embedded in MetroHub Manager or UltraSite BTS Hub Manager).

The loopback status can change without the user changing it, for example when the timeout has been reached (alarms '*21 Loop to interface*' and '*22 Loop to equipment*').

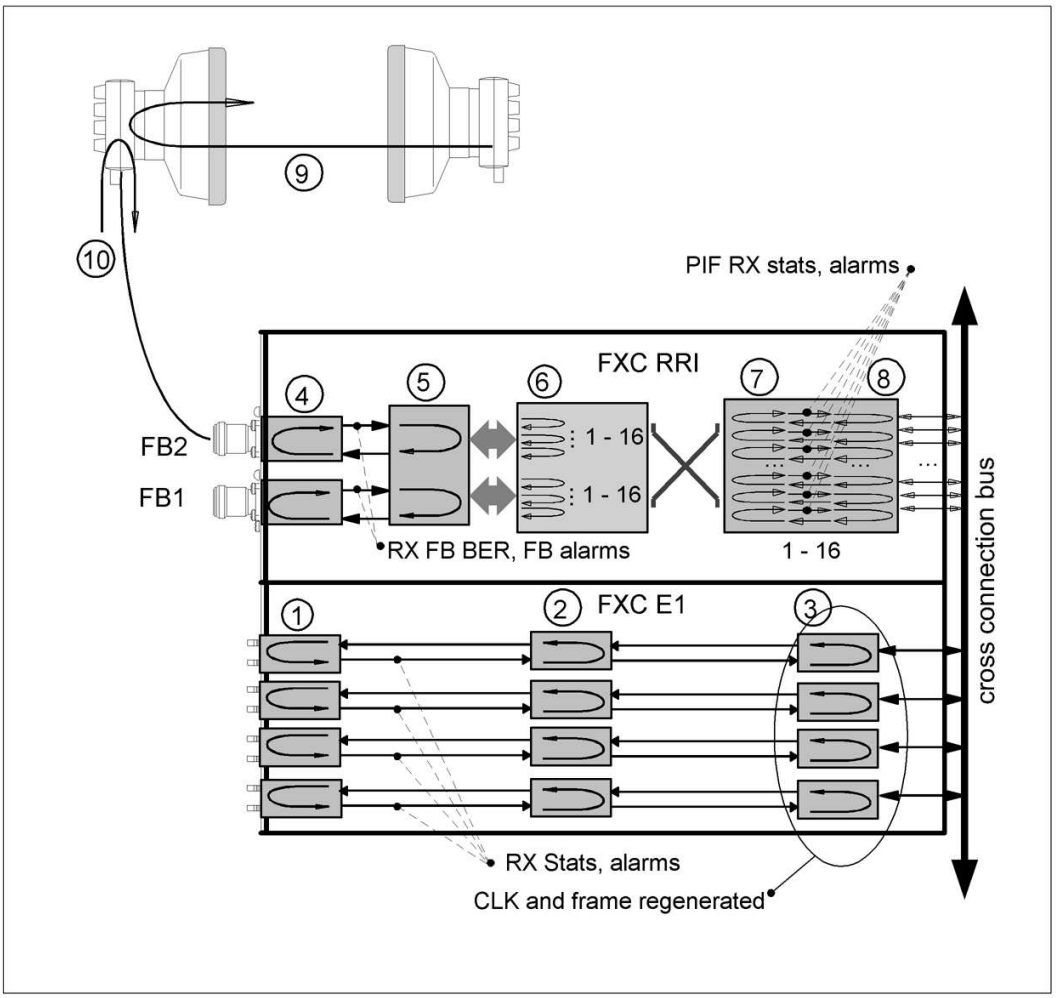

Figure 4. Loopbacks in FXC E1 unit, FXC RRI unit, Nokia FlexiHopper and Nokia MetroHopper

The following loops are supported by the FXC E1 unit, FXC RRI unit, Nokia FlexiHopper, and Nokia MetroHopper:

1. Loop to equipment
2. Loop to interface (line)
3. Loop to interface (payload)
4. Flexbus loop to equipment
5. Flexbus loop to interface

6. Flexbus channel loop to interface
7. Platform interface loop to equipment
8. Platform interface loop to interface
9. Outdoor unit loop to interface
10. Outdoor unit loop to equipment

Steps

1. Configure the unit loopback settings as required.

Configure the unit loopback settings as required. See the following sections for details:

- *Using loopbacks to test the FXC E1(T1) transmission unit*
- *Using loopbacks to test the FXC RRI transmission unit*
- *Using loopbacks to test the FXC STM-1 transmission unit*

2. Define the control time out, which sets how long the loops are active.

When the defined time has expired, the loops are automatically removed. The control time out is set in the **Configuration → Service Interface** menu in FXC units and node managers.

3.2 Using loopbacks to test the FXC E1(/T1) transmission unit

Purpose

Three integrated loopback tests are available in FXC E1(/T1) units for testing and diagnostics purposes. You can verify the operation of the signal path with the help of external BER analyser equipment.

Steps

1. Click FXC E1/T1 → Interface Loops to open the Interface Loops dialogue box.

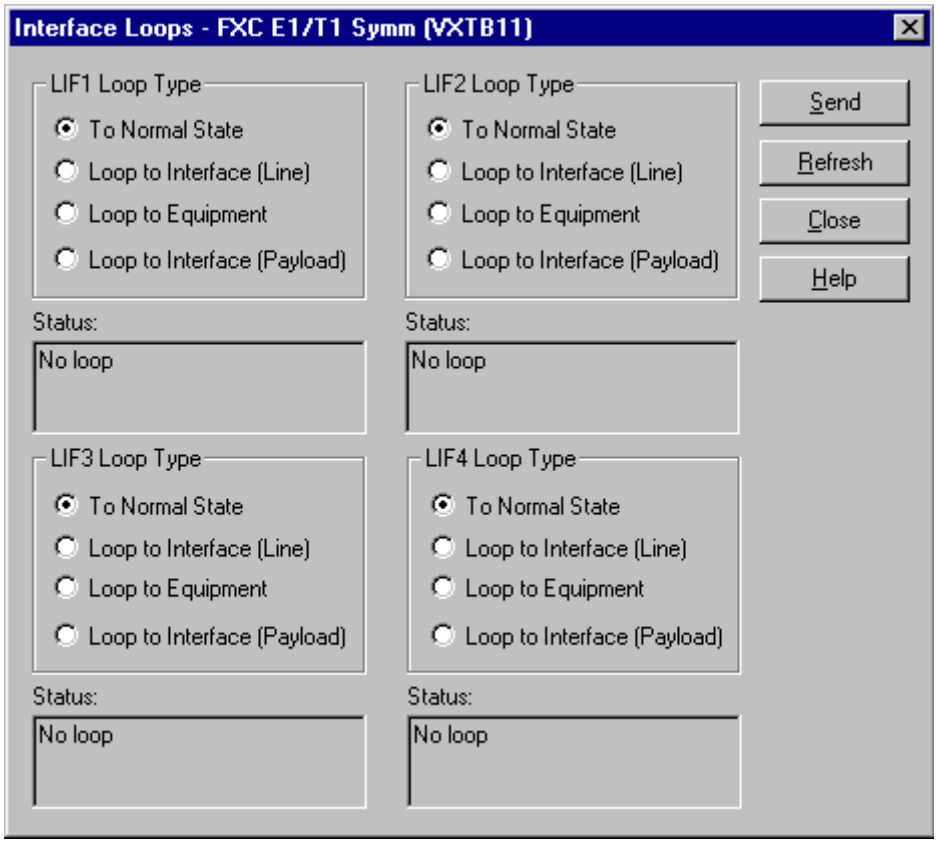

Figure 5. Interface loops dialogue box in the FXC E1/T1 manager

2. Select loop types for particular Line Interfaces (LIFs) as required.

Select loop types for a particular **LIF** (**1**, **2**, **3**, **4**) **Loop Type**, as required:

- **Loop to Equipment** is a near-end loop. The signal is looped back from the interface to the node cross-connection section. The TX direction is forwarded as AIS. This loopback can be used to test the FXC E1 interface framer.
- **Loop to Interface (Line)** is a far-end loop. The signal to the 2M interface from another interface (NE) is looped back. The whole signal in the unit's 2Mbit/s interface is looped back, synchronising it to the incoming signal. The RX direction is forwarded as AIS.
- **Loop to Interface (payload)** is a far-end loop. The signal to the 2M interface from another interface (NE) is looped back. The reframed signal in the unit's 2Mbit/s interfaces is looped back, synchronising it to the node clock. The RX direction is forwarded as AIS.

3. **Click Send to apply the loop(s).**

Note

Traffic is cut when you apply loops in the related interfaces, channels or Flexbuses.

4. **Use the Refresh button to view the current information.**

3.3 Using loopbacks to test the FXC RRI transmission unit

Purpose

Seven integrated loopback tests are available in FXC RRI units for testing and diagnostics purposes. You can verify the operation of the signal path with the help of external BER analyser equipment.

Steps

1. **Click FXC RRI → Interface Loops.**

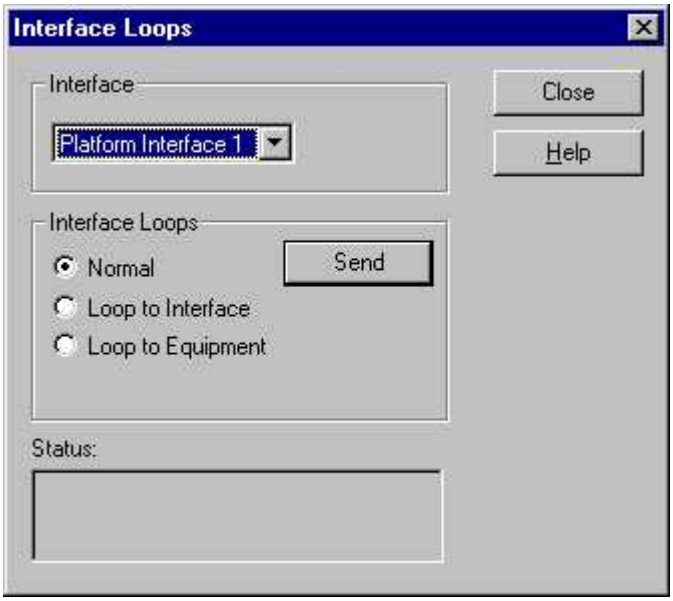

Figure 6. Interface loops dialogue box in the FXC RRI manager

2. In the Interface Loops window, select loop types for particular Flexbus, Flexbus Channel, Platform Interface, or Outdoor Unit, as required.

Select loop types for a particular **Flexbus** interface as required:

- Flexbus**Loop to Equipment** is a near-end loop. The signal is looped back from the Flexbus interface to the cross-connection section. In the TX direction the signal is passed through.
- Flexbus**loop to interface** is a far-end loop. The signal to the 2M Flexbus channel from another interface (NE) is looped back. The whole signal in the Flexbus channel is looped back, synchronising it to the incoming signal. The RX direction is forwarded as AIS. This loop does not work with a direct Flexbus cable connection.

Note

The connection to the outdoor unit is cut when 'Flexbus loop to interface' is activated. The Flexbus BER measurement does not work and this generates the following irrelevant Flexbus alarms: *99 Error rate E-3*' and '*81 Loss of frame alignment*'.

Caution

Setting a Flexbus loop cuts the connection to the outdoor unit until the loop is cancelled or it expires. This includes all data and management information. The interface loopback in FlexiHopper stays active until the loopback timeout expires.

Select loop types for a particular **FB Channel** interface as required:

- Flexbus channel **loop to interface** is a far-end loop. The signal to the 2M Flexbus channel from another interface (NE) is looped back. The whole signal in the Flexbus channel is looped back, synchronising it to the incoming signal. The RX direction is forwarded as AIS.

Select loop types for a particular **Platform Interface** as required:

- Platform interface **loop to equipment** is a near-end loop. The signal from the platform interface to the node cross-connection section is looped back. The TX direction is forwarded as AIS.
- Platform interface **loop to interface** is a far-end loop. The signal to the platform interface from another interface (NE) is looped back. The whole signal in the unit's interfaces is looped back, synchronising it to the incoming signal. The RX direction is forwarded as AIS.

Select loop types for a particular **OU Radio Interface** as required:

- Outdoor unit **loop to interface** is a far-end loop. The incoming radio signal is looped back to the other end of the radio hop. In the RX direction the signal is passed through.

Note

The connection to the outdoor unit is cut, when 'Outdoor unit loop to interface' is activated.

- Outdoor unit **loop to equipment** is a near-end loop. The incoming Flexbus signal is looped back to the indoor unit. In the TX direction the signal is passed through.

Note

This loop may cause an irrelevant alarm: '*60 No incoming radio signal*' or '*59 Incoming signal level incorrect*'.

3. **Click Send to apply the loop(s).**

Note

Traffic is cut when you apply loops in the related interfaces, channels or Flexbuses.

3.4 Using loopbacks to test the FXC STM-1 transmission unit

Purpose

You can set interface loops manually to test the FXC STM node interface loops. These are 2M loops to SDH or PDH.

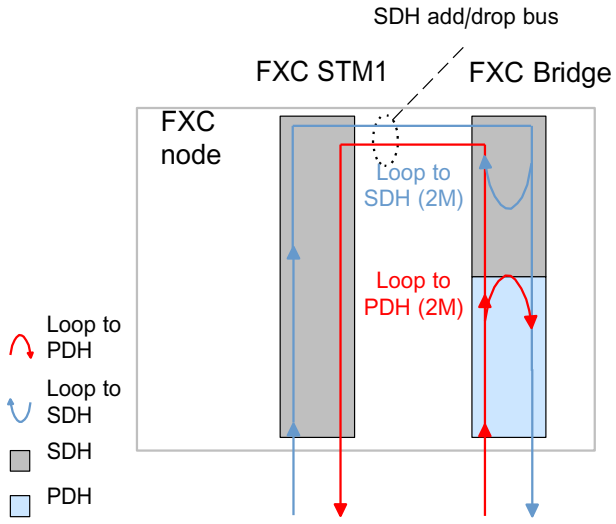

Figure 7. FXC STM node 2M loops

Through the **Loops** window, you can view and modify FXC STM node interface loops for SDH-PDH channels. You can modify one or several channels at a time.

Steps

1. **Click FXC STM-1 → Loops to open the Loops window.**

   The **Loops** window opens, showing the SDH-PDH Channels.

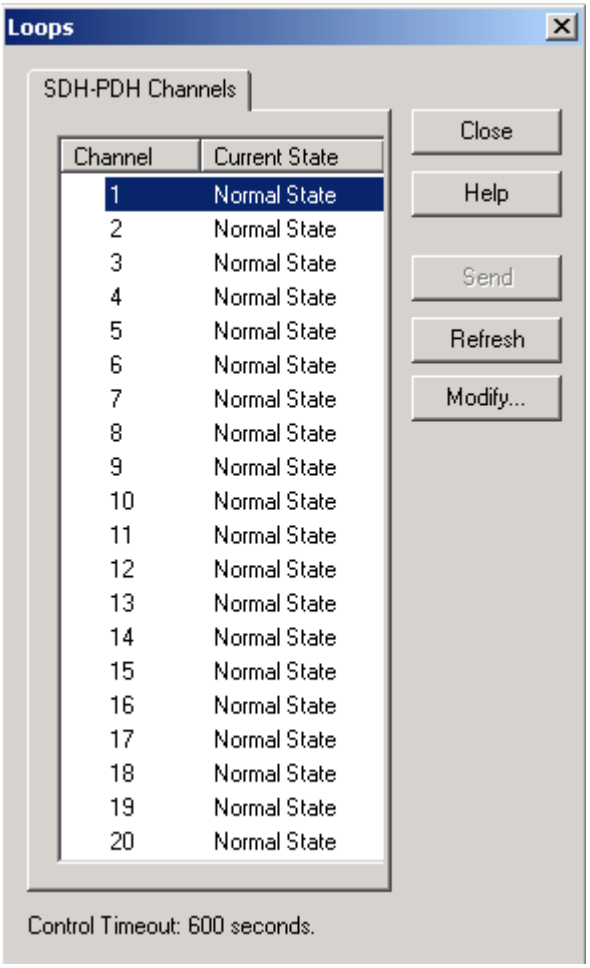

Figure 8. The Loops window, SDH-PDH Channels

2. **Select a channel from the list by clicking on it.**

3. **Click Modify.**

   The **Modify** dialogue box opens.

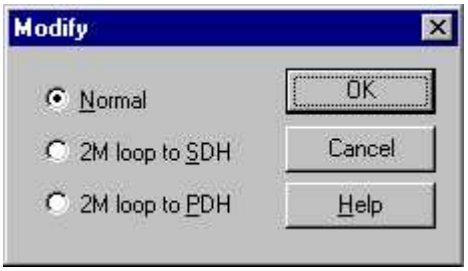

Figure 9. The Modify dialogue box

4. Select/clear the desired states.

Select/clear the desired states. **2M loop to SDH** means that the channel is looped to the SDH part of the STM-1. **2M loop to PDH** means that the channel is looped to the PDH part of the STM-1.

5. Click OK.

Further information

Control Timeout shows the time for which the loops will be sustained unless you set them manually back to normal state. You can change the FXC STM-1 Control Timeout value in the **Service Interface** dialogue box.

3.5 An example of loopback usage during a traffic cut

Purpose

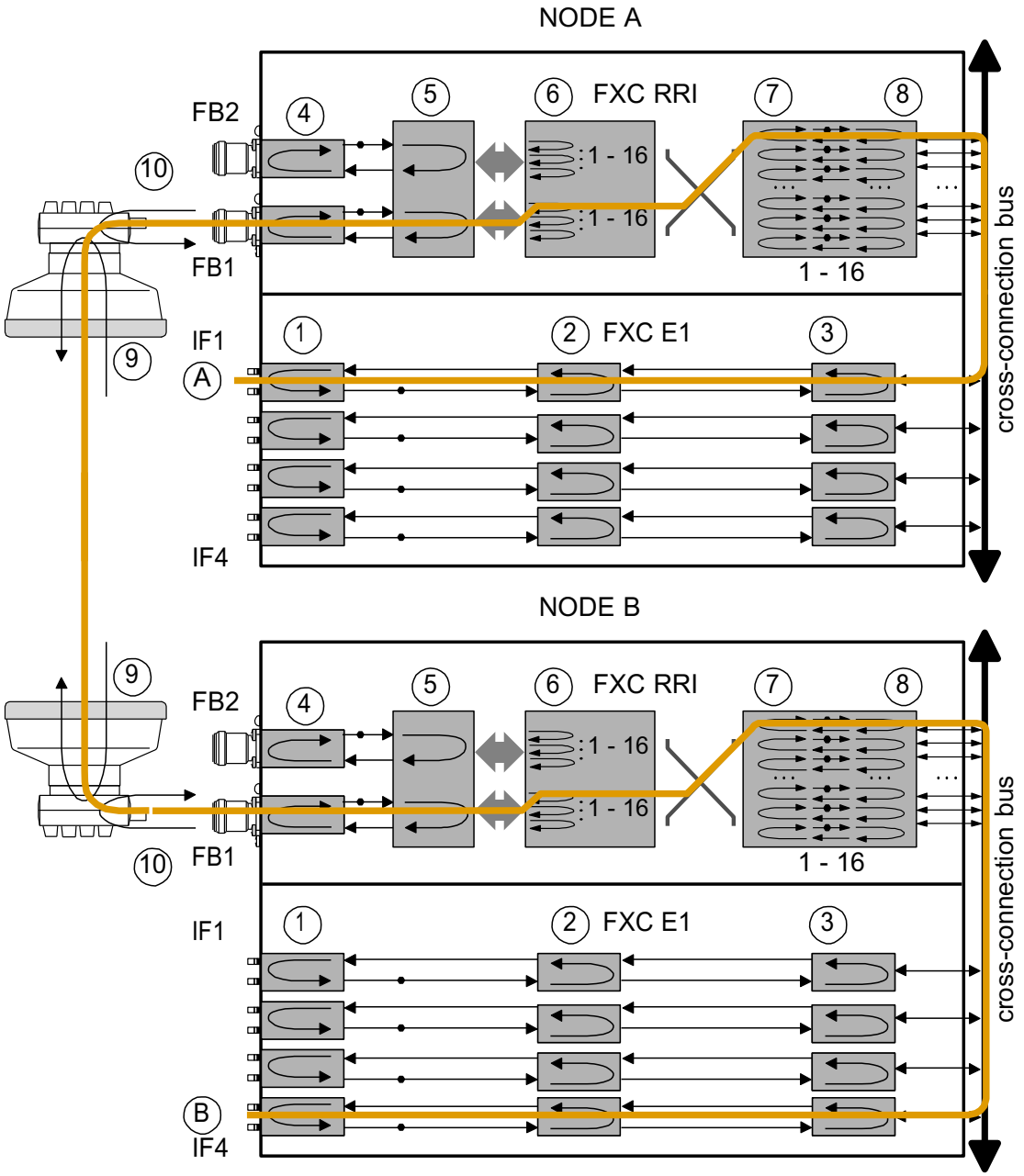

Figure 10. Example of loopback usage during a traffic cut

Let us assume that there is traffic cut between interface (A) in node A and interface (B) in node B. The signal path is presented in the figure *Example of loop usage during a traffic cut*. Loopbacks can be used to find where the cut is located. There are several approaches to the problem, but the principle is the same in all of them, which is looping the signal back at different positions in the signal path and thus ensuring that the signal is acceptable from the measurement point to the loop position. One possible approach is presented below.

Steps

1. **Connect an external BER tester to the IF 4 in node B, FXC E1, denoted here as (B).**

2. **Activate FlexiHopper loop to equipment in node B (10).**

3. **Check the value on the BER meter.**

   If the signal is acceptable, the traffic cut is not located inside node B or in the Flexbus connection between the FXC RRI unit and Nokia FlexiHopper in node B. Let us assume here that the signal is acceptable.

4. **Remove the loop to equipment in Nokia FlexiHopper, in node B.**

5. **Activate FXC E1 loop to equipment in node A (1).**

   Let us assume that the signal is not acceptable, which indicates that the break is between FlexiHopper in node B and the FXC E1 in node A.

6. **Remove the loop to equipment in FXC E1, in node A.**

7. **Activate FlexiHopper loop to interface, in node A (9).**

   Let us assume that the signal is acceptable, which indicates that the signal path up to that point is working.

Note

Adjust the timeout to a sensible value before activating the FlexiHopper loop to interface.

---

8. **Wait for the control timeout to expire, after which the FlexiHopper loop to interface, in node A, is removed.**

9. **Activate FXC RRI Flexbus loop to interface, in node A (5).**

Let us assume that the signal is not acceptable, which indicates that the break is between FlexiHopper in node A and the Flexbus interface of FXC RRI, in node A. This indicates that the failure is in the FXC RRI unit in node A, the Flexbus cable or in FlexiHopper in node A.

Related Topics

Testing with the Commissioning Wizard

Instructions

Commissioning the transmission node with the Commissioning Wizard

Configuring with the Commissioning Wizard

Running a TRX test

Instructions

Running an Abis loop test for UltraSite EDGE BTS

Running an Abis loop test

Instructions

Running a TRX test for UltraSite EDGE BTS

Overview of using loopbacks to test the transmission node

Instructions

Using loopbacks to test the FXC E1(T1) transmission unit

Using loopbacks to test the FXC RRI transmission unit

Using loopbacks to test the FXC STM-1 transmission unit

Reference

21 Loop to interface

22 Loop to equipment

Using loopbacks to test the FXC RRI transmission unit

Reference

99 Error rate E-3

81 Loss of frame alignment