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FXC RRI Transmission Unit Description

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Nokia FlexiHopper and Nokia MetroHopper

CE Hereby, Nokia Corporation, declares that these Transmission Node units measured in either Nokia MetroHub, MetroSite BTS, UltraSite BTS, ConnectSite 10 or ConnectSite 100 are in compliance with the essential requirements of the Directive 1999/5/EC (R&TTE Directive) of the European Parliament and of the Council.

Contents

Summary of changes

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Document	Date	Comment
DN00111315 Issue 1-0 en	11 Feb 2000	
DN00111315 Issue 1-1 en	14 Apr 2000	Editorial change.
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DN00111315 Issue 2-1 en	30 June 2003	Updated.

1 About this document

This document gives an overview of the main functions and features of the FXC RRI transmission unit. It also describes the functional blocks and the external interfaces of the unit.

Contents

This document contains the following information about FXC RRI:

- Chapter 2 General description
- Chapter 3 Interface description
- Chapter 4 Technical specifications

Readership

This document is intended for readers who want detailed information about FXC RRI. Nokia recommends that you have basic knowledge of base station systems and equipment.

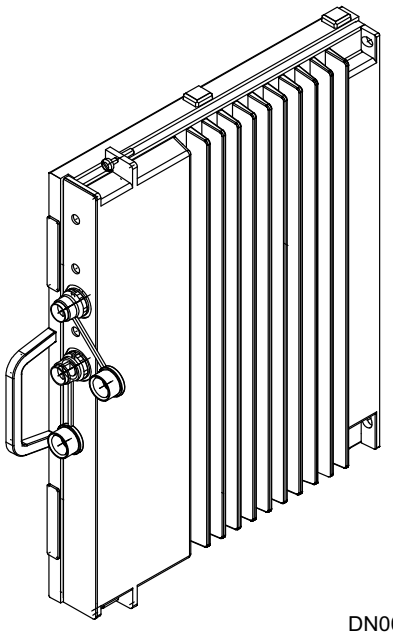

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Figure 1. FXC RRI

2 General description

The traffic routes via the network elements are defined by using the cross-connection functions available in the network elements. Thus, traffic routing means managing the cross-connections in the network elements.

FXC RRI transmission unit features the cross-connection function, allowing the traffic to be groomed so that transmission paths are fully utilised. This will help to reduce transmission costs.

2.1 Features

The main features of FXC RRI transmission unit are:

- two Flexbus interfaces, which give support for two radio outdoor units or any other network elements with Flexbus interfaces
- supports two operating modes, single use and Hot standby protected use. Hot standby (HSB) is a method of equipment redundancy in which the transmitters of two radio outdoor units are kept ready (switched on), so that if one fails, the other one immediately picks up where the first one left off
- a separate short circuit protection in both Flexbus interfaces. This ensures that a short circuit in either of the interfaces does not affect the other Flexbus interface.
- capacity bypassing possibility at 2M level from one Flexbus interface to another
- up to 16 x 2 Mbit/s add/drop capacity (platform interfaces)
- cross-connections with the following granularities: 8k, 16k, 32k, 64k, n x 64k, and 2M
- support for several cross-connection types
- grooming, branching, and loop protection support
- ability to operate as a loop network master or slave

- interface statistics collected in compliance with ITU-T G.826
- easy management of settings and transmission configurations both remotely and locally, using the Nokia Q1 management protocol. The management is carried out with a Nokia NMS compatible node manager software.
- advanced testing features: the transmission unit"s internal tests and loopbacks can be started with the node manager.

2.2 Main blocks

FXC RRI units are encased plug-in units constructed on a printed circuit board. The unit connects to other units in the base station or transmission node cabinet via its backplane connectors. It can be connected to a radio outdoor unit or another Flexbus compatible network element through the Flexbus interfaces.

In the block diagram FXC RRI is divided into the backplane and the application part. The backplane takes care of the cross-connections and interfaces to other transmission units within a node. The application part interfaces to either to radios or other RRI-units (see Figure *FXC RRI block diagram*).

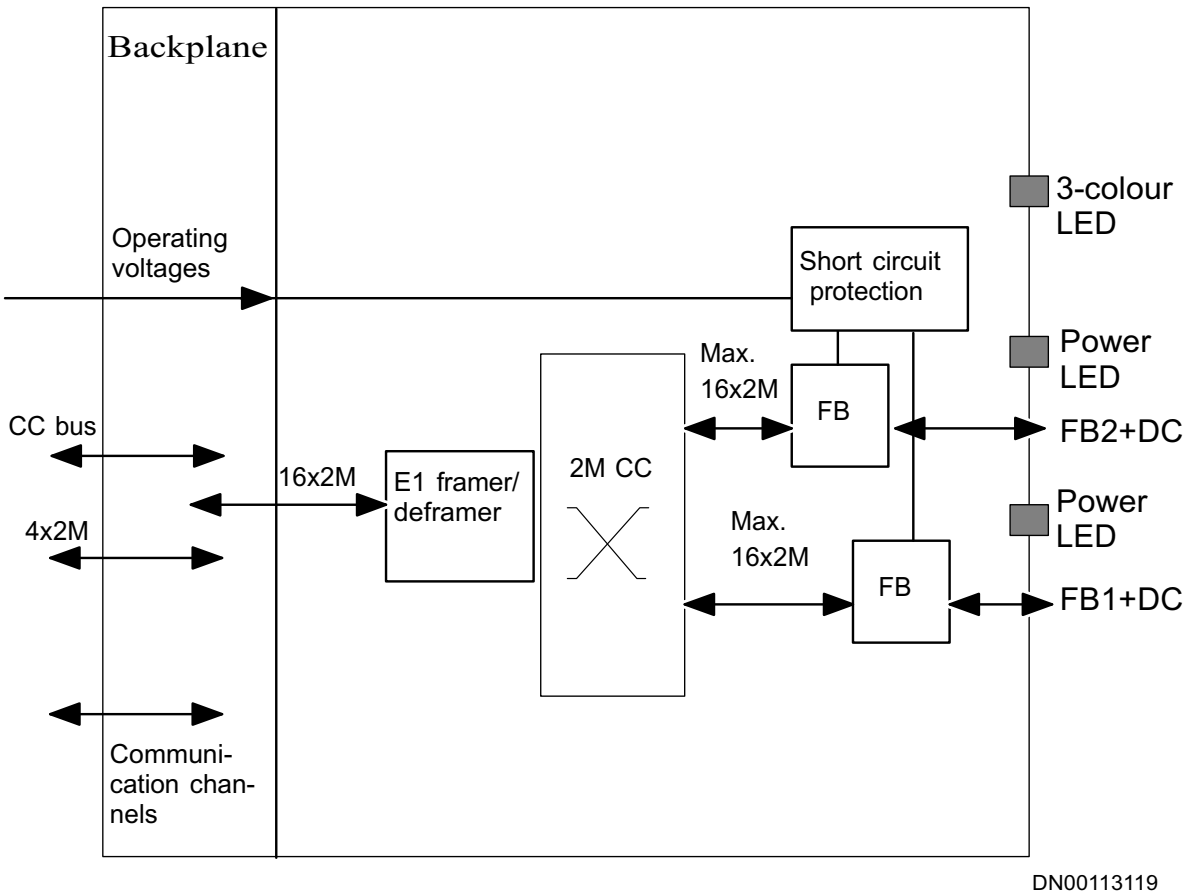

Figure 2. FXC RRI block diagram

2.2.1 Flexbus interfaces

The Flexbus interfaces handle the communication between the FXC RRI and the radio or another indoor unit.

- radio power feed (55 V_{DC})
- separate short circuit protection for both radios
- overvoltage protection

2.2.2 2M cross-connect

- cross-connection of data signals at 2 Mbit/s granularity
- data rate adaption between 2M line interfaces and Flexbus interfaces
- capacity bypassing from one Flexbus interface to another
- alarm indication signal (AIS) detection
- elastic buffers for signal justification/dejustification
- clock regeneration

2.2.3 E1 framer / deframer

- 16 x 2M framer/deframer
- 2M line termination

3 Interface description

The FXC RRI has two Flexbus interfaces on the front panel and a cross-connection bus interface on the backplane. Through the Flexbus interfaces, the FXC RRI can be connected to any radio unit with a Flexbus interface. This requires a Flexbus cable. For example, it is possible to connect FXC RRI to:

- Nokia MetroHopper radio with 4 x 2 Mbit/s capacity
- Nokia FlexiHopper radio with 2 x 2, 4 x 2, 8 x 2 or 16 x 2 Mbit/s capacity
- another radio indoor unit with a Flexbus interface

In case the Flexbus interface is connected to an outdoor unit, power (55 V_{DC}) can be fed through it to the outdoor unit.

If the total Flexbus interface traffic in one FXC RRI is more than 16 x 2 Mbit/s, the extra traffic can be bypassed from one Flexbus interface to another in a separate 2 Mbit/s cross-connection field.

FXC RRI does not have a separate management connector, as it is managed via the Local Management Port (LMP) of the base station or the transmission node, or via Nokia Q1 bus.

3.1 Connectors

Table 1. FXC RRI connectors

Flexbus interfaces 1 and 2 (FB 1, FB2)	TNC connectors, 50 Ω
Local Management Port, LMP	BQ connector in the BTS or the transmission node

3.2 Front panel LEDs

FXC RRI has a tri-colour LED on the front panel indicating the operational status of the unit. Both Flexbus interfaces have a green LED indicator for power feed.

Table 2. FXC RRI status LED

Indicator	Static	Slow flashing	Fast flashing
GREEN	Operation	Upon master"s command[1] ; no alarms active	Software is downloading
YELLOW	Major or minor alarm active	Upon master"s command; major or minor alarm(s) active	Software is downloading
RED	Critical alarm active	Upon master"s command; critical alarms active	Software is downloading

Table 3. FXC RRI Flexbus LED

Indicator	Situation
No light	No power feed or TX signal.
Flashing GREEN	DC power feed to the outdoor unit active, TX signal not active.
Static GREEN	DC power feed to the outdoor unit and TX signal active.

[1] When the master unit sends the functional entity indication command

4 Technical specifications

This chapter lists the technical specifications of the FXC RRI transmission unit.

4.1 Dimensions and weight

Table 4. FXC RRI dimensions and weight (metric and imperial values)

Height	254 mm (10 in.)
Width	28 mm (1.10 in.)
Depth	187 mm (7.4 in.)
Weight	1.35 kg (3 lb.)

4.2 Electrical data

Table 5. FXC RRI power supply and power consumption

DC supply voltage	Powered through the backplane by the BTS or transmission node
Power consumption	< 8 W

4.3 Flexbus cable

Table 6. Flexbus cable requirements

Cable type	Coaxial cable, double-shielded or semi-rigid
Characteristic impedance	50 ± 2 Ω
DC resistance	< 4.6 Ω (sum of inner and outer conductor)
Data attenuation	< 9.0 dB at 19 MHz
Flexbus signals	-DC power supply -Bidirectional data (37 Mbit/s, NRZ code, 1.4 V pulse amplitude)

Note

Overvoltage protection and cable equalizer are integral parts of the Flexbus interface. Primary overvoltage protection is a 90 V gas-arrester. External gas-arresters can be used as well.

Table 7. Recommended cable type

RG-223	Maximum length 140 m (459 ft.)
RG-214	Maximum length 300 m (984 ft.)

4.4 International recommendations

Table 8. International recommendations

ITU-T G.704 (10/94)	Synchronous frame structures used at primary and secondary hierarchical levels.

Table 8. International recommendations (cont.)

ITU-T G.706 (1991)	Frame alignment and cyclic redundancy check (CGC) procedures relating to basic frame structures defined in Recommendation G.704.
ITU-T G.823 (03/93)	The control of jitter and wander within digital networks which are based on the 2048 kbit/s hierarchy.
ITU-T G.826 (08/96)	Error performance parameters and objectives for international, constant bit rate digital paths at or above primary rate.
ITU-T G.921	Digital sections based on the 2048 kbit/s hierarchy.