Contents

1 General

This document defines the content and properties of the RNC 3810 Product Package of Hardware Release 5 in WCDMA RAN P6. It also defines the hardware impact of WCDMA RAN P6 on previous hardware releases.

WCDMA RAN P6 introduces

- 20% capacity increase.

  A new software solution will increase the capacity in the extension subracks with 20%. The solution applies to RNC 3810 of hardware release R4 and R5.

  The capacity increase is made available as a licensed option and is activated on node level.

  The capacity increase can be applied on new nodes and expansions but also on R4 and R5 nodes in field operation.

- Support for Iub over IP.

  Two new transmission interface boards are introduced, ET-MFX12 and ET-MFX13. Both boards include an Ethernet switch, used to build the node internal network for Iub traffic distribution within the RNC. Connection to the external access network can be made from any subrack on two redundant GE connections. An electrical interface is standard for the external connection but an optical interface can be used as an alternative option.

  ET-MFX12 is the standard board used for RNC 3810. ET-MFX12 has 6 electrical interfaces and one optical interface.

  ET-MFX13 has 6 optical interfaces and one electrical interface. ET-MFX13 is used for direct connection of base stations and base station clusters on optical fiber. ET-MFX13 is delivered for on-site installation only.

  ET-MFX12 and ET-MFX13 use a circuit board plug-in hardware driver modules to implement optical interfaces.

1.1 Document structure:

- New nodes and expansions using Hardware release 5 ? six configurations sizes and five packages for expansions. Capacity licensing enables the choice of 11 capacity steps.

- Transmission variants - how and in what way transmission interfaces are configured in the Main and Extension subracks and how these subracks can be combined to form a complete RNC 3810 node.

- RNC 3810 with WCDMA RAN P6 provides extensive possibilities for transmission reconfiguration and expansion. The document describes how not only Hardware release 5 benefits from this but also the impact on the previous hardware releases.

- *RNC 3810 capacity can be expanded in three ways that can be applied one-by-one or in combination:*

  - *Capacity increase by hardware expansion*
    Description of expansion paths using Hardware release 5 Extension subracks. Both for Hardware release 5 but also how R5 Extension subracks can be used for expansion of previous hardware releases.

  - *Capacity increase by hardware modernisation*
    Description of hardware RNC 3810 upgrade from a previous hardware is made to obtain Hardware release 5 properties.

  - *Capacity increase by applying licenses for enhanced capacity*
    A 20% capacity increase can be obtained on R4 and R5 nodes by applying licenses for enhanced capacity.

- RNC characteristics ? both for a given traffic model but also certain maximum properties are specified.

- In service performance ? Node availability, Maintainability, Reliability and Resilience are specified.

- Definition and interpretation of Installation and Commissioning.

- Physical data and Environmental conditions.

- Compliance and conformance to public standards and regulations

- The hardware content of RNC 3810 on circuit board/unit level.

- A reference to Core Network site products portfolio and a brief orientation of the product packages that supports RNC 3810 installation at site.

For readability, some short forms are used throughout this document:

Short form	Interpretation
HW R2/3	Hardware release 2 and/or 3
HW R4	Hardware release 4
HW R5	Hardware release 5
P3	WCDMA RAN P3
P4	WCDMA RAN P4
P5	WCDMA RAN P5
P6	WCDMA RAN P6
STM-1/VC4	Also including OC-3c frame format
STM-1/VC12	Also including STM-1/VC11 and OC-3/VT1.5 frame formats
E1	Also including T1 and J1
E3	Also including T3 (DS3)
GEe	Gigabit Ethernet, electrical interface (1000BaseT)
GEo	Gigabit Ethernet, optical interface (4 types)

The complete list of acronyms and abbreviations standards compliance is found in chapter 17 and information on transmission in Table 30.

1.2 Revision history

Revision	Date	Change
B	2007-09-27	First ?Commercial in confidence? issue
C	2008-03-25	1) HW release requirements for using Iub over IP are relaxed and now apply only to subracks. No longer, any particular requirements on node level with respect to mix of HW releases. See section 3.4.4 2) The option of including a subrack dust filter is added. See section 15.8.4

2 Configurations

The RNC 3810 of Hardware release 5 is equipped with one main subrack and up to five extension subracks in one or two cabinets. In combination with capacity add-on licenses, it altogether encompasses 11 capacity steps. For more information on the characteristics of the configurations, please see chapter 10.

Table 1   RNC types

RNC type (size)	No. of Subracks	No. of cabinets	Physical configuration size
RNC 3810 type 50	1	1	A
RNC 3810 type 175	2	1	B
RNC 3810 type 200	2	1	B
RNC 3810 type 300	3	1	C
RNC 3810 type 350	3	1	C
RNC 3810 type 425	4	2	D
RNC 3810 type 500	4	2	D
RNC 3810 type 550	5	2	E
RNC 3810 type 650	5	2	E
RNC 3810 type 675	6	2	F
RNC 3810 type 800	6	2	F

It is possible to expand from any physical size to anyone larger. 10 expansion options are defined for this purpose.

Table 2   Expansion options for RNC 3810 nodes with enhanced capacity in operation.

RNC expansion type	No. of Extension Subracks
RNC 3810 expansion type 150	1
RNC 3810 expansion type 300	2
RNC 3810 expansion type 450	3
RNC 3810 expansion type 600	4
RNC 3810 expansion type 750	5

Table 3 Expansion options for RNC 3810 nodes without enhanced capacity in operation.

RNC expansion type	No. of Extension Subracks
RNC 3810 expansion type 125	1
RNC 3810 expansion type 250	2
RNC 3810 expansion type 375	3
RNC 3810 expansion type 500	4
RNC 3810 expansion type 625	5

A second cabinet may be included depending on the size of node to expand from and the size of the expansion.

3 Transmission

An RNC 3810 configuration is equipped with transmission interfaces boards on a per subrack level. This can be done at order time in two ways:

1. Selection from a number of predefined subrack transmission variants

2. One by one selection of transmission interface boards.
   This is implemented as a transmission port selection for ATM interfaces and IP interfaces towards the core network while IP interfaces towards the access network are selected as subrack IP termination points.

Chapter disposition:

- Transmission board overview. A brief orientation on the transmission boards that are part of the R5/P6 product package.

- Transmission variants. General preconditions for how a subrack can be equipped with transmission boards, board-by-board configuration of subracks and as an alternative to this, predefined transmission variants.

- ET board positions in the subracks and placement when delivered from factory.

- IP interfaces for access network connection. A description of the interface boards and how they are used in RNC 3810.

3.1 Transmission interface boards overview

The table below lists the ET boards that are used in RNC 3810 transmission variants. For additional details, see Table 28 and Table 30.

Table 4

ET Board	Interface	No. of ports	Comment
ET-MFG	GEe	1+1	Two ports for redundant operation as option. Only for use in the Main subrack.
ET-MF4	STM-1/VC4, OC-3c	4	MSP 2+2 operation as option.
ET-MC41	STM-1/VC12, OC-3	1	The ET-MC41 board uses 2 subrack slots.
ET-MC1	E1, T1, J1	8	
ET-M3	E3, T3	2	
ET-MFX12	GEe GEo	6 1	5-6 ports are dedicated for internal connections. The optical port can be used for main external access network connection as option to the electrical interface
ET-MFX13	GEe GEo	1 6	Up to 5 optical ports can be used for direct RBS connection. One electrical port and one optical port are used for internal connection.
SFP optical driver module	SFP GE MMF 0,55 km SFP GE SMF 10 km SFP GE SMF 40 km SFP GE SMF 80 km	1 1 1 1	SFP optical driver modules are used to implement the optical interface on ET-MFX12&13. SFP drivers are available for Single and Multi Mode Fiber and for different transmission ranges.

3.2 Subrack transmission variants

The following preconditions apply for ET board allocation:

- Each subrack, Main and Extension, can be equipped with one (1) to six (6) ET boards.

- The Main subrack has six (6) slots reserved/defined for ET boards.

- The Extension subrack has eight (8) slots reserved for ET boards.

- Any ET position can be equipped with any ET transmission interface board type.

- Each subrack can have any amount, any type and any mix of ET boards.

- No requirement on ET board placement other than to use a slot that is reserved for ET boards.

- ET-MFG is used to provide an IP interface towards the Core Network. ET-MFG is only used in the Main subrack.

- Any Main subrack transmission variant can be combined with any Extension subrack transmission variant in a node configuration.

- Any Extension subrack transmission variant can be combined with any other in a node configuration.

- Unused ET slots must be equipped with dummy boards.

The choice of transmission boards is based on access network type, core network connection and how the network is dimensioned.

3.2.1 Board-by-board configuration

With WCDMA RAN P6, it is possible to tailor the ET board content in an RNC 3810 order on a board-by-board basis with the preconditions above.

Practically any subrack transmission variant can be created in this way to provide a highly optimized transmission interface set-up for any particular need.

3.2.2 Predefined subrack transmission variants

RNC 3810 Hardware release 5 provides a number of predefined subrack types as an option to the board-by-board configuration of ET boards described in section 3.2.1.

Main subrack types

The following Main subrack transmission variants are available:

Table 5   Main subrack transmission variants ? Number of ports

MS type	Number of ports					
	STM-1/VC4	STM-1/VC12	GEe to CN	GEe to RBS	E1	E3
MS type 1B	16 or 8+8	0	0	0	0	0
MS type 3	8 or 4+4	0	2+2	0	0	0
MS type 5B	8 or 4+4	2	0	0	0	0
MS type 7B	8 or 4+4	0	0	0	8	0
MS type 8	0	0	2+2	1+1(*)	0	0

(*) Each subrack with IP connected RBS can be point of connection to the external network but only one subrack per node or, in some cases, one per cabinet is used for this.

Table 6: Main subrack transmission variants ? Number of ET boards

MS type	Number of ET boards					
	ET-MF4	ET-MC41	ET-MFG	ET-MFX12	ET-MC1	ET-M3
MS type 1B	4	0	0	0	0	0
MS type 3	2	0	2	0	0	0
MS type 5B	2	2	0	0	0	0
MS type 7B	2	0	0	0	1	0
MS type 8	0	0	2	2	0	0

No restrictions apply for how the different Main subrack types are used in different transmission topologies. However, the designs of the subrack types are optimized for certain applications as shown in the table below.

Table 7   Applications for main subrack types.

MS type	Main application
MS type 1B	Iu, Iur and Iub connection on STM-1/VC4.
MS type 3	Iu and Iur connection on STM-1/VC4. Iu-PS and/or SIGTRAN on GbE. Iub connection on STM-1/VC4
MS type 5B	Iu and Iur connection on STM-1/VC4 Iub connection on STM-1/VC12
MS type 7B	Single subrack node for demo and small networks.
MS type 8	IP connection only to CN and RBS access network

Extension subrack types

The following Extension subrack transmission variants are available:

Table 8   Extension subrack transmission variants ? Number of ports

ES type	Number of ports				
	STM-1/VC4	STM-1/VC12	GEe to RBS	E1	E3
ES type 3B	8 or 4+4	0	0	0	0
ES type 3B/EE1	8 or 4+4	0	0	16	0
ES type 3B/EE2	8 or 4+4	0	0	0	4
ES type 3B/EE3B	16 or 8+8	0	0	0	0
ES type 4	0	2	0	0	0
ES type 4/EE1	0	2	0	16	0
ES type 4/EE2	0	2	0	0	4
ES type 4/EE3B	8 or 4+4	2	0	0	0
ES type 4/EE4	0	4	0	0	0
ES type 8	0	0	1+1(*)	0	0

(*) Each subrack with IP connected RBS can be point of connection to the external network but only one subrack per node or in some cases, one per cabinet is used for this.

Table 9 Extension subrack transmission variants ? Number of ET boards

ES type	Number of ET boards				
	ET-MF4	ET-MC41	ET-MFX12	ET-MC1	ET-M3
ES type 3B	2	0	0	0	0
ES type 3B/EE1	2	0	0	2	0
ES type 3B/EE2	2	0	0	0	2
ES type 3B/EE3B	4	0	0	0	0
ES type 4	0	2	0	0	0
ES type 4/EE1	0	2	0	2	0
ES type 4/EE2	0	2	0	0	2
ES type 4/EE3B	2	2	0	0	0
ES type 4/EE4	0	4	0	0	0
ES type 8	0	0	2	0	0

Optimal RNC performance is obtained if Extension subracks are connected to the access network only (Iub). Apart from this, no restrictions apply for how the different Extension subracks are used in different transmission topologies. However, the designs of the subrack types are optimized for certain applications as shown in the table below.

Table 10   Extension Subrack types

ES type	Main application	
ES type 3B	Basic STM-1/VC4 configuration	ES Type 3B is primarily intended for access network on STM-1/VC4 connection.
ES type 3B/EE1	E1 extension For connection of nearby RBS?s on direct E1 connections	
ES type 3B/EE2	Extension with E3	
ES type 3B/EE3B	Extension with STM-1/VC4. This will double the STM-1/VC4 transmission capacity.	
ES type 4	Basic STM-1/VC12 configuration	ES Type 4 is primarily intended for access network on STM-1/VC12 connection.
ES type 4/EE1	E1 extension For connection of nearby RBS?s on direct E1 connections	
ES type 4/EE2	Extension with E3	
ES type 4/EE3B	Extension with STM-1/VC12. Special applications with RXI 820 used as an STM-1/VC12 RNC port expander. RXI-to-RNC connection on STM-1/VC4.	
ES type 4/EE4	Extension with STM-1/VC12. This will double the STM-1/VC12 transmission capacity.	
ES type 8	IP connection to access network. 2 GE connections to the external network on node or cabinet level.	

3.3 ET board positions and placement

3.3.1 Main subrack ET positions:

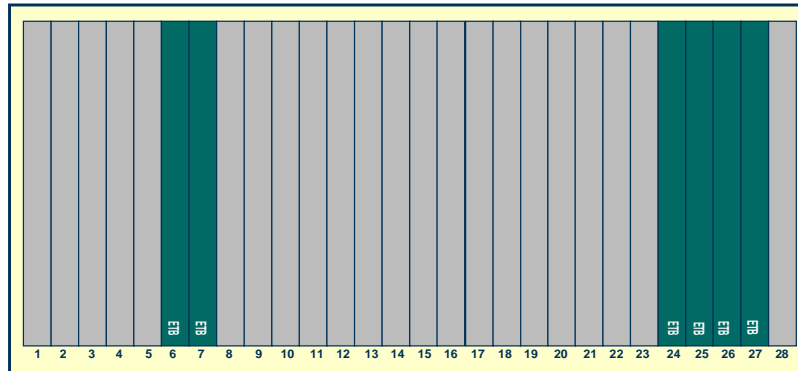The Main subrack has 6 slots reserved/defined for transmission interface boards.

Figure 1   ET positions in the Main subrack

Figure 2: RNC 3810 ? the Main subrack

3.3.2 Extension subrack ET positions:

The Extension subrack has 8 slots reserved/defined for transmission interface boards. The subrack can be equipped with max. 6 ET boards.
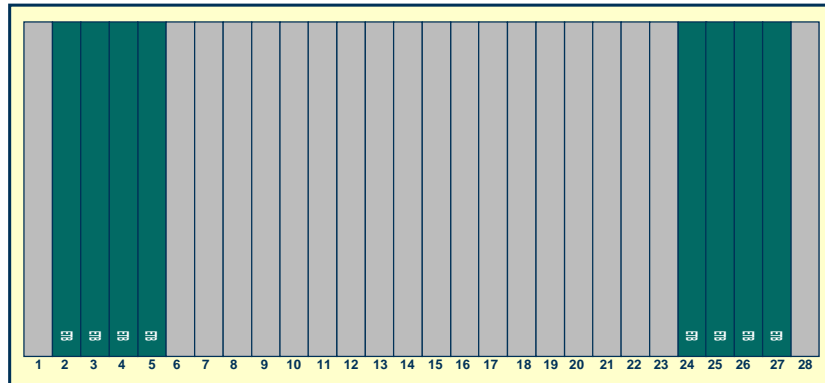

Figure 3   ET positions in the Extension subrack

Figure 4 RNC 3810 ? the Extension subrack