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Hardware Changes between Releases (S9 and S10; S10 and S10.5)

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Contents

Summary of changes

Changes between document issues are cumulative. Therefore, the latest document issue contains all changes made to previous issues.

Changes between issues 1-0 and 2-0

This is the second issue of DN0196377. The name has been changed to *Hardware Changes between Releases S10 and S10.5* because this issue has been updated to include information on S10.5 Release.

There are no hardware changes in TCSM2 in Release S10.5.

The M92 mechanics - i.e. the BSCE, BSC2and BSC2E, BSCi and BSC2i - contains the following changes in the BSC2i first deliveries: new plug-in unit PCU-T, connector panels CPLAN-S installed in the top structure of the BCBE and BCEE racks and PCM cabling needed (not connected to the PCU plug-in units yet).

The S10.5 Release introduces a new member to the BSC product family, i.e. the BSC3i built in M98 Mechanics.

Issue 1-0

This is the first issue of DN0196377, or *Hardware Changes between Releases S9 and S10*.

1 Hardware Changes between Releases S9 and S10

The hardware changes discussed here cover the various DX 200 BSC applications only as there are no hardware changes in the TCSM2. For detailed information on the changes as well as mandatory and optional upgrades, please see the *HW Technical Notes* delivered by product line. See also the *Engineering for BSC*.

1.1 S10 options

In general, BSC S10 NE HW supports all existing functionalities and their implementation principles. BSC S10 does not require any cabling or cartridge changes to the basic configurations of BSCE, BSCi, BSC2E, BSC2A and BSC2i. All modifications to the HW cabling or cartridge are related to the following S10 optional features: Second PCU for GPRS/EDGE feature to the BSC2A, BSC2E and BSC2i and SMLC features for all BSC network applications:

- Second PCU for GPRS/EDGE: by the implementation of EDGE new service such as Enhanced GPRS (EGPRS) can allow higher data rates than current GPRS configurations. EGPRS can be implemented for the BSC with the S9 level GPRS PCUs. However, new configuration is created with the possibly to add 2nd PCUs (PCU-S plug-in units) per each BCSU units (8+1) to further increase packet processing capacity. The implementation of 2nd PCU requires also GSWB extension from 192 to 256 PCMs. Correspondingly the number of ETs can be extended from 112 to 144 in BSC2s.
- Serving Mobile Location Center (SMLC): SLMC implements location calculation function for the BSC. This allows a GSM subscriber and/or valid mobile equipment to be positioned with MS location Services. Requires new, more powerful CPU unit CP6MX to be implemented for MCMU units. This SMLC unit requires also MBIF-UA (24 plug-in unit's) upgrades for all computer units (OMU, MCMU and BCSU) for the old BSCE/BSC2E/A models. In new BSC deliveries SMLC is included.

New hardware for the Second PCU for GPRS/EDGE

The new hardware for the second PCU for GPRS/EDGE consists of

- PCU-S plug-in unit and DMCT2-S terminator if not already installed
- Two additional ET5C-cartridges
- Fourth SW64B PIU and the SWBUS4 connector to the GSWB.

New hardware for the SMLC feature

The new hardware for the SMLC feature consists of

- Processor unit CP6MX in the MCMU and DCMT2-S connector if not already installed
- Message bus units must be MBIF-UA for adequate performance.

Other new hardware for BSC

AS7-X plug-in unit replaces AS7-V and AS7-VA in first deliveries.

1.2 New S10 hardware products

All functional units that were used in release S9 will also be used in release S10.

PCU-S, Packet Control Unit

The PCU-S variant has same features as the PCU, but has a higher capacity 233MHz PQII processor

PCU-S is a new PCU variant, which implements both Gb and RLC (Radio Link Control) / MAC (Medium Access Control) interface in the BSC. One PCU is installed into every BCSU. One PCU can be configured to a maximum of 64 cells and/or BTSs and up to 256 radio interface channels in GPRS use.

The PCU unit receives and transmits TRAU frames to the Base Stations and Frame Relay packets (Sub-network Service) to the SGSN (Serving GPRS Support Node).

For internal connections the unit interfaces to the 16-bit DMC bus and 4 Mbit/s PCM line.

In the front panel of the PCU, there is an Euroconnector for the PCM interface. There are also three RJ45 connectors: one for the RS232 interface and two for the LAN (Ethernet) interfaces. Other signals are in the backplane connectors.

CP6MX, Control Processor

The CP6MX board is a Mobile Pentium III Microprocessor based, single board computer, with an onboard PCI bus and interface to DMC bus, max. 512 MB of SDRAM is accommodated via the DIMMs.

One connection provides option for two lines for the serial port or the service terminal. The use of the two service terminals requires a special cable Stada C100533.

The DMCT2-S is a Bus Terminator, which limits the DMC-bus signal voltage level to 3.5V. The PCU-S, CP6MX and AS7-X units require lower the voltage level.

AS7-X, Adapter for CCC7 signalling

The AS7-X is a multichannel signalling link terminal for data or signalling using the HDLC format. The capacity of the AS7-X is same as the AS7-V and AS7-VA.The memory architecture in AS7-X pre-processor units' is based on the SRAM.

Capacity of the AS7-X is as follows:

- 16 CCS7 links or
- 64 LAPD channels or
- digital X.25 or
- with Combi functionality, the capacity is 4 pcs. CCS7 links and 32 pieces LAPD channels

AS7-X replaces AS7-V and AS7-VA in new deliveries.

SWBUS4

When the GSWB is extended with the fourth SW64B plug-in unit. GSWB must have front panel connector SWBUS4. GSWB is configured with four SW64B units in new BSC deliveries

2 Hardware Changes between Releases S10 and S10.5

The hardware changes discussed here cover the various BSC applications only as there are no hardware changes in the TCSM2. For detailed information on the changes as well as mandatory and optional upgrades, please see the *HW Technical Notes* delivered by product line. See also the *Engineering for BSC3i*.

2.1 BSC built in M92 mechanics and TCSM2

S10.5 Release of BSC built in M92 mechanics, i.e. the *BSCE, BSC2and BSC2E, BSCi and BSC2i*, contains mandatory memory upgrades for all BSCs (to 128 Mbytes in MCMUs and OMU functional units).

There are no hardware changes in TCSM2 in Release S10.5.

2.1.1 S10.5 M92 options

The following options are available:

- PCU-T plug-in unit (GPRS/EDGE option)
- NEBS kits for BSC2 variants and TCSM2.

2.1.2 New S10.5 M92 hardware products

The BSC2i first deliveries include the following new products:

- new plug-in unit PCU-T (GPRS/EDGE option)
- 24 port LAN panels (CPLAN-S).

PCU-T, Packet Control Unit

The Packet Control Unit (PCU-T) is a general-purpose data stream processing plug-in unit which can be used for a number of different purposes in various Nokia network elements. This document presents the Nokia Base Station Controller (BSC) as an example. In the BSC, the PCU-T implements General Packet Radio Service (GPRS) packet control functions.

The microprocessor of the PCU-T plug-in unit is the Motorola 300 MHz MPC 8260 (PowerQUICC II). The processor's 256-Mbyte system memory consists of four 32 M x 16 SDRAM components. The processor boots up from a 1 M x 16 Flash memory. Both the system memory and the boot-up memory are connected to the 60x bus. Single microprocessor mode is used. The system memory is connected to the SDRAM machine and the boot-up memory to the General-purpose Chip Select Machine (GPCM) of the MPC 8260. The port size of the system memory is 64 bits and that of the boot-up memory 16 bits. The system memory uses Chip Select 1 (CS1) of the MPC 8260 and the boot-up memory Chip Select 0 (CS0).

The MPC 8260 processor has also an integrated LAN (Ethernet) controller which controls the two LAN connections (10/100BaseTx LAN interfaces).

The PCU-T plug-in unit consists of a mother board and a daughter board. The mother board is constructed on a double Euro size 233.4 mm x 160 mm board.

The front panel contains one 3 x 16-pin male Euroconnector for PCM interface (P2). It also has three RJ45 connectors - one for the service terminal (RS232 UART interface; J2) and two LAN (Ethernet) connectors (10/100BaseTx LAN interface; J3, J5) - and six LED indicators.

The PCU-T is connected to the mother board of the cartridge via two 3 x 32-pin male Euroconnectors, P1 (DMC interface) and P3.

The daughter board is constructed on a 85 mm x 120 mm board. It is fastened onto the mother board with three 8-mm metal bushings. Signals are connected between the mother board and the daughter board via a 400-pin PGA connector (J1).

Connector panels CPLAN-S

In S10.5 Release BSC2i first deliveries, new CPLAN-S panels are introduced. They are installed in the top structure of the BCBE and BCEE racks in preparation for the forthcoming 'GP over IP' functionality. The PCM cabling (CNI cable) needed is included in the delivery. However, the cables are not connected to the front connectors of CPU and PCU plug-in units yet.

2.2 BSC built in M98 mechanics

The S10.5 release introduces a new member to the Nokia GSM/EDGE BSC product family: the high capacity *BSC3i*. The BSC3i is based on modular software and hardware structure, and because of exact specifications for the interfaces between the modules, new functions can easily be added without changing the architecture of the system.

The BSC3i uses a number of modules used in the DX 200 i-series, for example the BSC3i's BSCC cabinet is installed in an M98 mechanics IC209-A cabinet. Also the PDFU-A units and Fan Trays as well as the CC3CC-A and CC4C-A cartridges are the same as in the i-series.

2.2.1 S10.5 M98 options

The S10.5 optional modules are:

- Base Station Controller Signalling Unit for 110 TRX (BCSU)
- Packet Control Unit for GPRS/EDGE (PCU-B)
- Cover Plate for empty CC3C-A cartridge (COP48T)
- Digital X.25 interface for NMS (AS7-B)
- Analog X.25 interface, V.24/V.24 restricted/V.35/X.21 for NMS (AC25-A)
- Side Cable Conduit (SCC) in installations on raised floor.

2.2.2 New M98 hardware products

New BSC3i specific products included in BSC3i S10.5 first deliveries are presented below.

SCC, Side cable conduit

If there is a raised floor in the equipment room, the incoming and outgoing cables are placed under the floor and entered to the equipment cabinet through a Side cable conduit (SCC) which is designed to M98 mechanics based BSC3i. The power supply cables must also be brought in through the side cable conduit.

COCC, Cover for cable conduit

The Cover for cable conduit, COCC, is placed on the top of the BSCC cabinet to protect the power supply equipment.

CPGO, Earth comb panel for lead-in of external cables

Two Earth comb panesl (CPGO) are used for lead-in for external station cables (ET cables, X.25 cables). The sheaths of all external cables (E1/T1 trunk cables and X.25 cables to NMS) are grounded at the CPGO when they leave or enter the cabinet. The cables are stripped, and the EMC gasket clamps the cable sheaths against to the panel body. The CPGOs are located in the left-hand and right-hand side holes on top of the cabinet.

CPRJ45, Cabling panel for LANs and serial interfaces

The Cabling panel for LANs and serial interfaces is a

- 24-port RJ45 connector
- 4- port optical LC-LC adapter
- 2 x BNC connector
- 2 x D25 connector panel CPRJ45 for for LAN interface cables, V.24 and V.11 serial interface cables, external alarm output cables, external alarm input cables and external synchronisation input cables.

RJ45 type connectors, optical LC adapters and BNC connectors are used on both sides of the panel. 2 x RJ45 connector ports horizontally are located in the same 'box'. One 2 mm Hard Metric connector with a printed board is located on the backside of the panel. It is used for cabling of external alarm inputs & outputs to HWAT-A (in OMU).

The CPRJ45 panel located in the middle hole on top of the cabinet.

CLOC-B, Clock and Synchronization Cartridge

New Clock and Synchronisation cartridge variant with fire safety. Meets the NEBS requirements. The motherboard is same as with older variant CLOC-A. The plug-in units are not changed.

CM2C-A, Computer and Mass Memory Cartridge 2

CM2C-A cartridge serves as an operation and maintenance unit (OMU) in the BSC3i Network Element. CM2C-A is a $^{1}/_{2}$ shelf wide cartridge and it can be used in the cabinet based on M98 mechanics. CM2C-A is like CC3C-A cartridge added with equipping places for two hard disks and one optical disk. Also the power supply for no PCI compatible slot (Slot 2) is enhanced to correspond the power supply of standard PCI slot.

Cartridge mechanics for CM2C-A is M98 compatible. Cartridge mechanics is 76 TE wide. The cartridge is equipped with Eurocards (6U, 233 mm) of double height, whose depth is 220 mm.

ET4C-B, Exchange Terminal Cartridge 4

New Exchange terminal cartridge 4 variant with fire safety. Meets the NEBS requirements. The motherboard is same as with the older variant ET4C-A. The plug-in units are not changed.

SW1C-C, Switching Cartridge 1

New bit oriented switching cartridge for 256 PCMs for BSC3i M98 mechanics. NEBS 3 compliant cartridge; fire safety included.

COP48T, Cover Plate for CC3C-A cartridge

Cover Plate for CC3C-A cartridge (COP48T) is used to achieve sufficient cooling capacity as an upward air flow-through in the cabinet is necessary. Therefore the non-equipped cartridges (BCSU units) need to be covered with cover plates, i.e.with COP48T.

SHIM4T, Shim Plate 4T wide

SHIM4T is needed for preventing airflow pass round the hot plug-in units in cartridges. SHIM4T has front panel with shim plate for 4T wide slot.

CP710-A

The CP710-A board is a Mobile Pentium®III with 800 MHz frequency. The unit is connected to the backplane via a CompactPCI bus.The CP710-A can be used only in an IC209-A cabinet with forced cooling.

The 7th generation Central Processor (CP710-A plug-in unit) is used as the Central Processing Unit (CPU) in the microcomputer units of the i-series DX 200 system exchanges.

The plug-in unit provides the HW required by the operating system DMX and application software such as the boot memory, SDRAM, real time clock, interrupt handling, process timing and V.24/V.28 based serial interfaces for service terminals.

CP710-A supports standard external interfaces like Wide Ultra3 SCSI (backward compatible to current Ultra2) and two 10 Base-T /100 Base-TX / 1000 Base-T Ethernet. The unit is connected to the back plane CompactPCI bus. However, it can be used without the CompactPCI connection.

EXAU

External Alarm Unit (EXAU) is a small device that indicates alarms with indicator lights and a buzzer. EXAU is located on the wall in the control room of the network element.

PCU-B

The Packet Control Unit (PCU-B plug-in unit, PCI backplane) is a PCU based plug-in unit variant with a PCI mother board bus. Logically, it contains two PCU functions integrated in one plug-in unit.

The PCU-B is a general-purpose data stream processing plug-in unit and can be used for a number of purposes in various Nokia network elements. This document presents the PCU-B as it is used GPRS implementation of BSC3i network element. Depending on application, the PCU-B can be used with or without PCI mother board bus interface:

- The PCI mother board bus interface is used when the PCU-B is equipped in a cartridge with a CPU as a host.
- The PCU-B can be equipped in a special cartridge without a CPU unit as a host. Should this be the case, the PCI bus must be terminated.

The PCU-B has two microprocessor blocks. The blocks are identical and work independently

The block uses the Motorola PowerQuicc II family processor MPC 8260A (HiP4) at 300MHz for the 603ev PowerPC core. The communications processor module (CPM) is clocked to 208 MHz frequency. The block processor has 256 Mbytes of system memory implemented by four 32M x 16 SDRAM components. The processor boots up from a 1 M x 16 Flash memory. Both the system memory and the boot memory are connected to the 60x bus. Bus frequency is 83 MHz.Single PowerQuicc II mode is used. The SDRAM is connected to the SDRAM machine, the boot up memory to the GPCM. Port size for the SDRAM is 64 bits, for the boot up memory 16 bits. The boot up memory uses the chip select 0 and the SDRAM the chip select 1.

One PQII block is connected to two 10/100BaseTx Ethernet PHY interfaces, and the other block shares the same interfaces for redundancy reasons. Ethernet PHY interfaces are connected to the backplane of the cartridge. The LAN interfaces are implemented using the PowerQuicc II integrated Ethernet controller.

HDPU-A, Hard Disk Plug-in Unit

The Hard Disk Drive (with an embedded SCSI controller) is assembled onto the Hard Disk Plug-in Unit (HDPU-A). The Hard Disk Drive is a non-volatile, non-removable mass memory device for program code and data. The suitable Hard Disk Drives for the plug-in unit HDPU-A are standard 3.5-inch diameter (1-inch high form factor) Hard Disk Drives with embedded SCSI controller. The SCSI-connector has to be 68-pins.

Maximum supported data transfer rate at the SCSI-bus is 80 MB/s (40 Megatransfers/s).

The CompactPCI-bus is *not* in use in the HDPU-A. Only 5V and GND signals are in use.

HDPU-A has a power switch and red LED combination for power shutdown of the hard disk. If the Hard Disk must be changed, the power shutdown, using power switch before disconnection of the HDPU-A and Hard Disk combination, avoids damage of the surface of the disk.

ODPU-A, Optical Device Plug-in Unit

The Magneto-Optical Disk Drive, which uses 8-bit SE-type SCSI-bus, is assembled onto the Optical Device Plug-in Unit (ODPU-A).The Magneto-Optical Disk Drive is a non-volatile mass memory device with removable media disk for data backup and file transfer. The ODPU-A matches the Magneto-Optical Disk Drive's 8-bit SE-type SCSI-bus to the 16-bit LVD-type SCSI-bus (the External SCSI-bus) when 16-bit LVD-type SCSI-bus can be used

The ODPU-A is used in the Computer cartridges of the M98-mechanics' cabinets equipped with fans.

The Internal SCSI-bus on the ODPU-A is the 8-bit SE-type SCSI-bus. The External SCSI-bus comes to the ODPU-A through back connectors and this bus is also looped back (branched) on the ODPU-A to the back connectors. Branching is made on the ODPU-A's SE/LVD-converter IC's pins. The External SCSI-bus's termination is done by external termination components.

ODPU-A has also a power switch and red LED combination for power shutdown of the MO drive. If the MO drive must be changed, the power shutdown, using power switch before disconnection of the HDPU-A and MO drive combination, avoids damage of the surface of the disk.