PRODUCT DESCRIPTION

DXX BASIC-6C NODE

DOCUMENT INFORMATION

Current Version

Document No/Date	Document Name
1551-ZFE 30102/2 Rev B	DXX Basic-6C Node Product Description

Replaced Document

Document No/Date	Reasons for Update
1551-ZFE 30102/2 Rev A	New document lay-out

Document Checking and Approval

Controlled by **(Kjell Sundberg)** Date 1998-03-10
Kjell Sundberg

Approved for Ericsson by **(Anders Eriksson)** Date 1998-03-10
Anders Eriksson

Table of Contents

1 INTRODUCTION 6

2 DESCRIPTION 6

2.1 STRUCTURE OF THE BASIC-6C NODE 6
2.2 THE CROSS-CONNECT EQUIPMENT 8
2.2.1 Power supply 8
2.2.2 Multi functional Control and Cross-Connection Unit 9
2.2.3 System Cross-connect Unit 9
2.2.4 System Control Unit 10
2.2.5 Interface Boards 10
2.2.6 EAE - PCM / ADPCM server unit 12
2.2.7 Management and fault handling 13

3 TECHNICAL DATA 14

3.1 ELECTRICAL SPECIFICATION 14
3.1.1 Interface modules 14
3.1.2 Cross connect 14
3.1.3 Switch delay 14
3.1.4 Power 14
3.2 SERVICE COMPUTER 15
3.3 ENVIRONMENTAL SPECIFICATION 15
3.4 MECHANICAL DIMENSIONS 15

1 INTRODUCTION

The BASIC-6C Node is a component within DXX, Ericsson Cellular Transmission System. It is a digital cross-connect equipment offering switching capabilities down to 8 kbit/s level. This makes the system ideal for Ericsson Radio Base Systems in cellular application and helps the operator to make full use of even fractions of a time slot. The node can be equipped with a number of different interface units. The BASIC-6C Node can have up to 14 trunk interfaces.

Key Features

- Flexible solution, 1 to 14 trunk interfaces.
- Powerful, 64 Mbit/s switching capability at multiples of 8 kbit/s.
- Redundant switching
- Redundant power supply
- Small size.
- Easy installation with Service Computer.
- Efficient transmission, embedded control channel.

2 DESCRIPTION

2.1 STRUCTURE OF THE BASIC-6C NODE

The BASIC-6C Node is built up of the following parts (see fig 1):

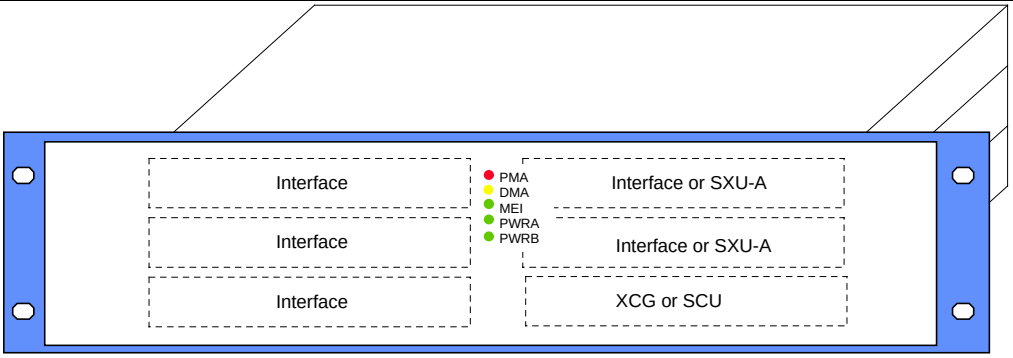

Fig 1 Principle mechanical design

A 2U (89 mm) height cage for 19” mounting or wall mounting.

- A mechanical construction containing the DXX cards and a backplane.
- Power supply with fans, mounted at the back.
- 6 card slots to be used.
- 1 to 5 x standard DXX interface cards (e.g. T1 or E1).
- 1 x XCG, Multi Functional Unit
  including X-connect and 4 x G.703 interfaces.
- **or** 1 x SCU System Control Unit and
- (1 or 2) x SXU-A System Cross-Connect Unit.

The common units always needed (XCG or SCU and SXU) are located to the right and the interface units to the left (1-2 i/f units can be on the right side), within the cage (see fig 2). All units are pushed in to the mechanical construction from the left and the right hand sides which means that all interface connectors and controls are situated on both sides inside the case. Therefore it is possible to slide out the housing for service purposes, without interruption of the traffic. It is also possible to slide out the housing, in order to connect the service computer. The power cables are connected at the back and the i/f cables are brought from the sides of the equipment to the front or the back.

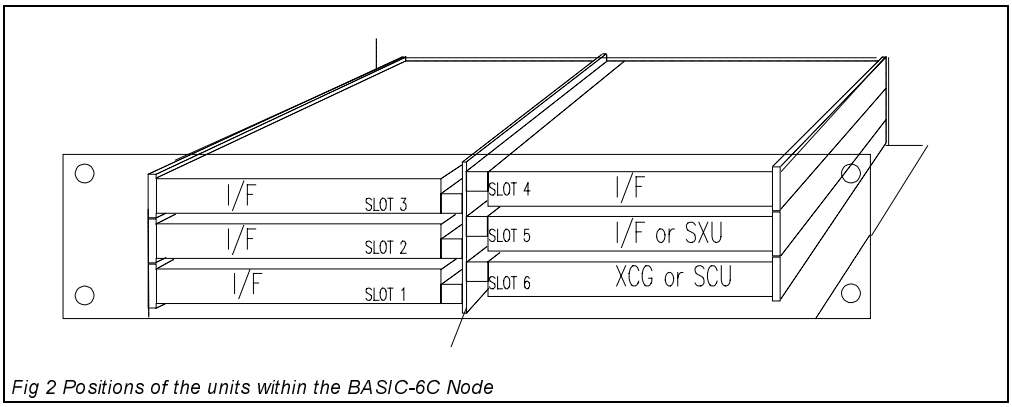

Fig 2 Positions of the units within the BASIC-6C Node

A typical block diagram of a BASIC-6C Node is shown in figure 3.

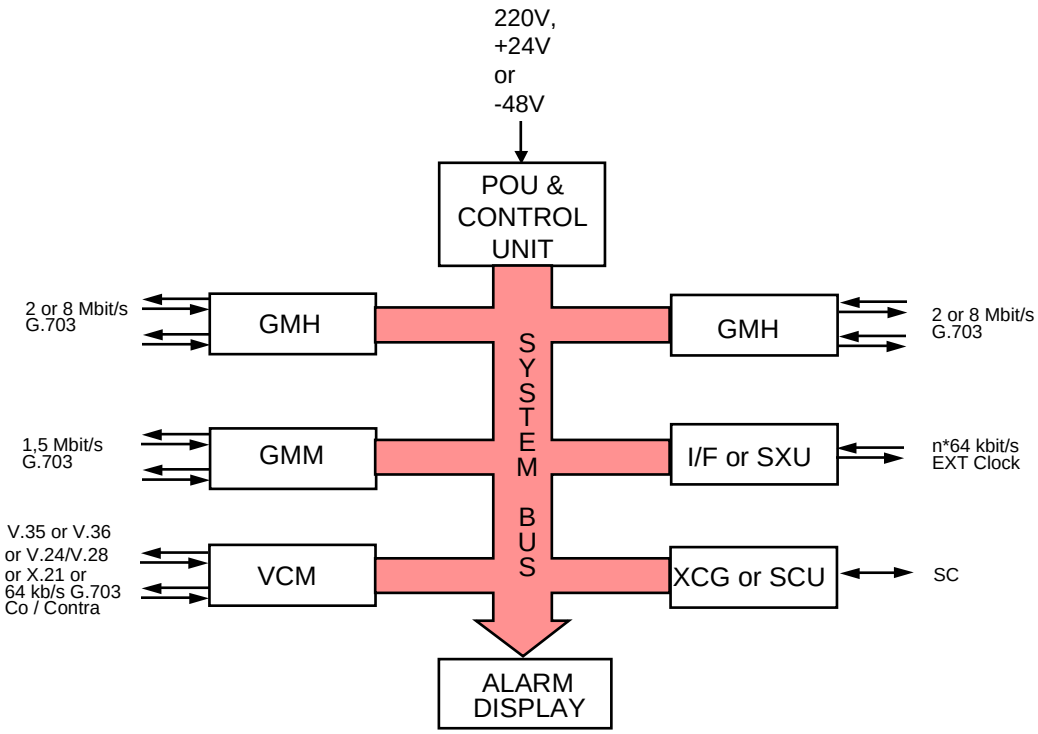

Figure 3 - Basic 6C block diagram

2.2 THE CROSS-CONNECT EQUIPMENT

In cellular applications, the cross-connect equipment is used to connect the trunk lines with the Radio Base Station (user interface) and to distribute incoming traffic to other base stations in the network (by using other trunk lines).

2.2.1 Power supply

The BASIC-6C Node is powered from the rear. 4 alternatives are available; 230 V AC, +24 V DC and -48 V DC and +/- 24 to 60 V DC.

The input battery voltage is protected by fuses and distributed via a battery bus to every DXX-unit in the BASIC-6C Node. Each DXX-unit has its own power supply converter. Which type of module is used depends on the battery input voltage.

2.2.1.1 Power Supply Modules

The Basic 6C node can be equipped with four different power supply options optimised for different use. The modules are always used in pairs, providing power redundancy. Except for the AC supply were one module is for AC/DC and one only contains a fan.

The modules are:

- +24 Volt DC filter module.
- -48 Volt DC filter module.
- Wide range +/-24 to 60V DC/DC module.
- 230 Volt AC/DC converter module, and fan module

Each Power Supply Module has a built in fan, providing cooling for the power module and the node through ventilation holes. Also in the power supply module is a fan control circuit, giving alarms for open circuit and over-current in the fan supply. The wide range DC/DC and the AC/DC modules are used together with -48V DXX units.

The fan control circuitry has following functions:

- takes the battery voltage and feeds the back-plane with 5V bus 1 and 5V bus 2.
- Supplies the fans with 12V
- Controls the fans and gives an alarm if the current in any fan is out of limits, thus indicating fan failure.

2.2.1.2 Alarm functions for power and fans

The alarm functions for power supply and fans are implemented in a certain way to avoid extra i/f cards and cabling. This will cause the XCG (or SCU) card to send DMA alarm. Dependent on different failures the buses for 5V are disabled in different ways according to following table:

Type of failure	5V Bus1	5V Bus2
Normal (no failure)	ON	ON
Power A failure	OFF	ON
Power B failure	ON	OFF
Fan failure	OFF	OFF

2.2.2 Multi functional Control and Cross-Connection Unit

The XCG is a highly integrated unit combining the main functions of an SCU control unit and an SXU-A cross-connect unit. Additionally, a G703-75-4CH or a G703-120-4CH interface module can be installed on the XCG base unit. When used, slot 6 is reserved for the XCG.
XCG has a cross-connection capacity of 64 Mbit/s. It cross-connects n x 64 kbit/s XB-channels with possible signalling (XD-channels) as well as a limited number of n x 8 kbit/s XB-channels.

The XCG has following functions:
- communication with the System Control Computer, internally over the HDLC-channel or externally via the SC-interface (9,6 kbit/s)
- communication with the local service computer, SC
- node supervision and alarms via the control bus
- test signal transmit and receive of the network cross-connect channels

The management functions of a node concerning the XCG are:
- collection of fault status of the node (PMA, DMA, MEI)
- control of the node's unit list (NMS Node Manager/Node Inventory)

2.2.3 System Cross-connect Unit

The System Cross-Connect Unit in the node is named SXU-A. Slot 5 is used for the SXU-A. If SXU-B is used, slot 4 is used for this. For the purpose of protected cross-connection an extra SXU-A can be inserted in slot 4.

The total switching capacity of the SXU-A is maximum 64 Mbit/s or 1043 cross-connectable 64 kbit/s time slots (TS), equal to the maximum capacity of the system bus. With the present types of interfaces there are no limitations for the cross-connect, the number of ports sets the limitation not the cross-connect capacity.

The SXU-A can cross-connect up to 95 bus time slots (64 kbit/s) on n x 8 kbit/s basis (bit level).

The SXU-A has two switching matrices on the board, one for 64 kbit/s switching and one for n x 8 kbit/s switching.

The SXU unit has the following main functions:
- cross-connection of n x 64 and n x 8 kbit/s
- control of the subrack's 64 Mbit/s cross-connect bus
- interface for external clock input and output
- node's master clock oscillator
- selection of a reference signal for the master clock oscillator
- selection of a clock signal for the external clock output.

2.2.4 System Control Unit

The System Control Unit is named SCU. Slot 6 is used for the SCU.

The SCU is the DXX node's master unit with the following functions:

- communication with the System Control Computer, internally over the HDLC-channel or externally via the SC-interface (9,6 kbit/s)
- communication with the local service computer, SC
- node supervision and alarms via the control bus
- test signal transmit and receive of the network cross-connect channels

The management functions of a node concerning the SCU are:

- collection of fault status of the node (PMA, DMA, MEI)
- control of the node's unit list (NMS Node Manager/Node Inventory)

2.2.5 Interface Boards

Each board consists of a base unit, a power module and two interface modules. The base units can be chosen freely, and there are 4 types available (GMH, GMM, VCM and CAE). Slots 1, 2, 3 and (4) are reserved for these units, and slot 5 can be used for an interface board if not used for other purpose. CAE can only be placed in slot 2.

Table 1 Interface type relations

INTERFACE TYPE	BASE UNIT	IF MODULE	No. of IF *) per IF MODULE	CONNECTOR TYPE
G.703 1,5 Mbit/s	**GMM**	T1	2	D-sub 15-pin female (100Ω)
G.703 2 Mbit/s	**GMH**	G703	1 1	SMB (75Ω) D-sub 9-pin female (120Ω)
LT HDB3 2 Mbit/s	**GMH**	LTE	1	D-sub 9-pin female (120Ω)
HDSL 2 Mbit/s	**GMH**	BTE 2048	1	D-sub 9-pin female
HDSL 4Mbit/s	**GMH**	BTE 4096	1	D-sub 9-pin female
LT-OPTO ') 2-8 Mbit/s	**GMH**	OTE-LED	1	FC/PC

INTERFACE TYPE	BASE UNIT	IF MODULE	No. of IF *) per IF MODULE	CONNECTOR TYPE
V.24/V.28 0,6 - 64 kbit/s DCE DTE	**VCM**	. V24-DCE V24-DTE	. 2 2	. D-sub 25-pin female D-sub 25-pin male
V.35 IEC-530 48, 56 or n × 64 kbit/s	**VCM**	V35-IEC	2	D-sub 25-pin female
V.36 IEC-530 48, 56 or n × 64 kbit/s	**VCM**	V36-IEC	2	D-sub 25-pin female
G.703 64 kbit/s Co/Contra	**VCM**	G703-64	2	D-sub 15-pin female
X.21 0,6 - n × 64 kbit/s	**VCM**	X21	2	D-sub 15-pin female
2/4-wire VF 600Ω PCM/ADPCM	**CAE**	ADPCM-10VF	2	D-sub 25-pin female
2/4-wire VF 600Ω PCM	**CAE**	PCM-10VF	2	D-sub 25-pin female

The GMM unit has only one IF MODULE
The GMH unit has two IF MODULES
The VCM unit has two IF MODULES. Each module has two interfaces i.e. the VCM has 4 interfaces.

The GMH and GMM unit provides the trunk interfaces between the nodes. All unit types can operate as user access ports. The actual interface type is defined by the changeable interface modules. The number of trunk interfaces used can be anything between one and six in the BASIC-6C Node.

The modular structure of the interface units is illustrated in Fig. 4:

- Base unit (e.g. GMH)
- Power supply module
- Interface modules

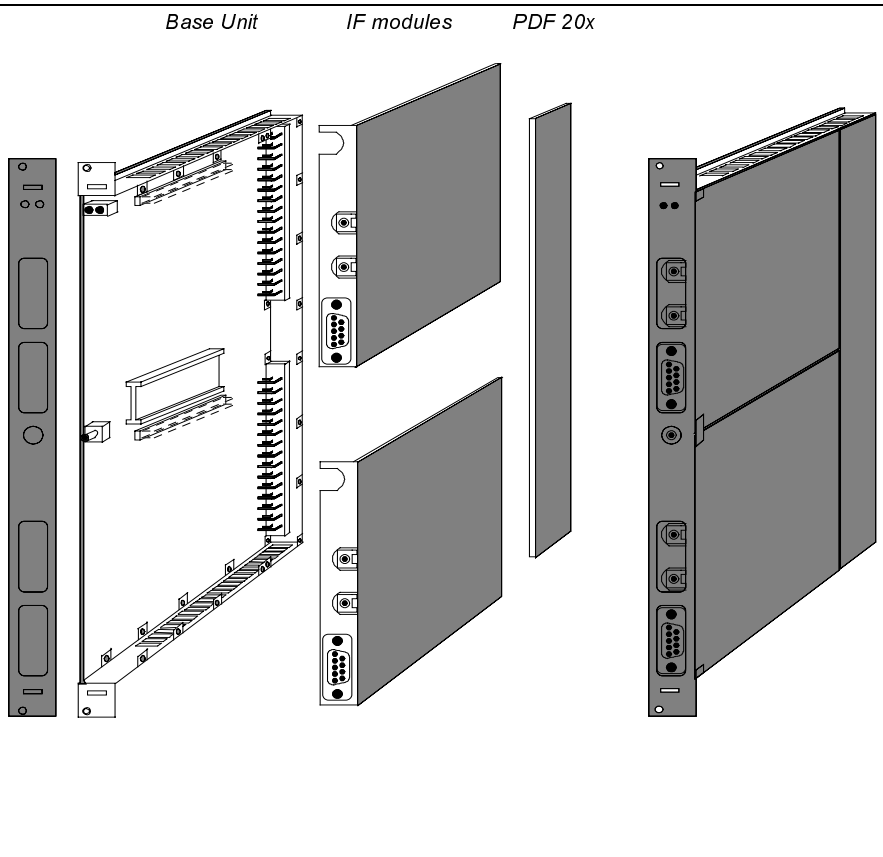

Fig. 4: The Modular Structure of the Interface Units

2.2.6 EAE - PCM / ADPCM server unit

When used the EAE-server unit replaces one of the interface boards in slots 1, 2, 3 or 4.

The EAE compresses 64 kbit/s voice channels (A-law coded) using ADPCM. One EAE-server unit can provide 30 PCM/ADPCM conversions. The ADPCM bit rates are 32 kbit/s (G.721/G.726), 24kbit/s (G.726) and 16 kbit/s (proprietary algorithm by Dallas Semiconductor).

2.2.7 Management and fault handling

The DXX network is managed by the Network Management System (NMS). It comprises either one computer for managing smaller networks, or many computers when the number of DXX nodes is higher. The management centre can be located at a single site, or management responsibilities can be shared between different locations.

The NMS computer communicates with the network nodes by using packet type protocol. The path of the message goes through the DXX network (HDLC links embedded in the trunk lines). Each trunk interface has its own HDLC controller. In the GMH units one usually uses the free bits of the frame, e.g. TS0/B5...8 (16 kbit/s), but any of the other time-slots 1 - 31 can be used as HDLC-link. In the GMM unit any of the time-slots 1 - 24 can be used as HDLC-link. Management messages going through the node do not load the SCU unit. They go directly from one trunk interface to another.

The Service Computer, SC, is used for lining up and for setting parameters of the interface units. The configuration is made by using the user friendly graphical interface in the Node Manager software.

Alarms from the node are all handled by the SCU and can be read by the SC. The SC will present a fault history report with time, date, type of fault and for how long time the fault occurred for each fault.

All configuration data is stored in non-volatile memories in the node. If an interface board is faulty and needs to be changed, the new board will automatically be loaded with the same configuration as the old board and directly be taken into service. In case of power failure, the node will keep its configuration and no new configuration is necessary.

Each interface in the node, trunk or user interface, can be cross connected to any other interface within the node. Individual TS within a 1.5, 2 or 8 Mbit/s frame can be connected to different ports in the node.

A clock source for each node and a fallback list with up to five sources can be defined. If all clocks, defined in the fallback list, are lost the node will use its own internal clock. An external clock input can be defined in the clock fallback list. The frequency of the external clock can be defined as n x 64 kHz where n = 1...132 (64...8448 kHz).

3 TECHNICAL DATA

3.1 ELECTRICAL SPECIFICATION

3.1.1 Interface modules

Below is a list of standard interfaces supported in the BASIC-6C Node.

Base unit	Interface module description	Max. number of IF/Base unit
GMM	1544 kbit/s G.703 IF module, T1-framed	2
GMH	2048 kbit/s G.703 IF module, G704-framed	2

Other interfaces are available as options, see table 1.

3.1.2 Cross connect

The total switching capacity of the cross connect in SXU-A and XCG is 64 Mbit/s or 1043 time-slots (64 kbit/s). 95 of the time-slots can be switched at nx8 kbit/s level.

3.1.3 Switch delay

Frame buffer delays:

Function	Delay frames	Max. delay
Cross connect	1 Fr	125 µs
MUX, DMUX etc.	-	20 µs
GMH IF board		
2 Frame Rx buffer	0...2 Fr	250 µs
Total delay IFm...IFn	1...3 Fr	395 µs

3.1.4 Power

Power supply nom. +24V DC / nom. -48V DC

Power dissipation:

Board	Typical power dissipation (W)
SCU	5,0
SXU-A	8,0
GMH	4,0 + 1,1 to 3,4*)
GMM	2,6 + 1,6
VCM-5T-A	3,5 + 1,5 to 3,0*)
EAE-PCM/ADPCM	7,0
CAE-PCM/ADPCM	5,0 + 3,0

*) depending on which and how many IF modules are used.

3.2 SERVICE COMPUTER

The SC is a portable PC (an IBM Thinkpad i486 DX4 is recommended) connected to the node via a 9600 b/s asynchronous V.24 interface (8 bits, no parity, 1 stopbit).

3.3 ENVIRONMENTAL SPECIFICATION

The system complies with the environmental operations according to:
ETS 300 019-1-3 Class 3.1.

Normal operating conditions:
Temperature +5 - +55 degrees C; Relative humidity < 85%
Safe operating conditions:
Temperature -5 - +60 degrees C; Relative humidity < 90%

3.4 MECHANICAL DIMENSIONS

Width:	19” standard
Height:	2U (89 mm)
Depth:	310 mm (DC power supply)
	345 mm (AC power supply)