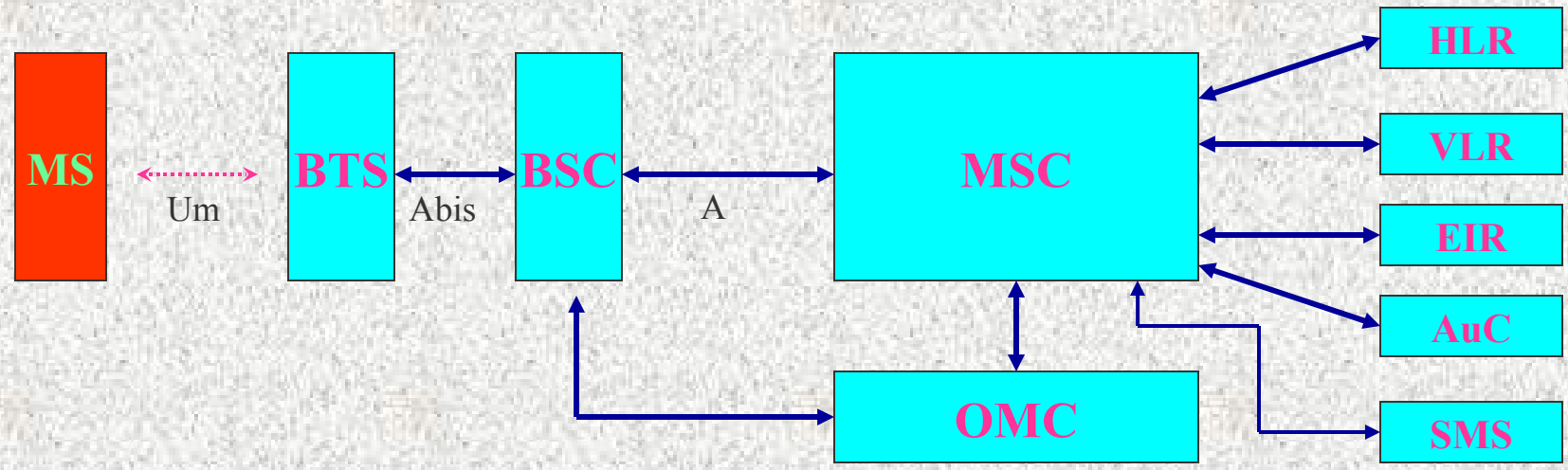
“EVOLIUM BTS A9100”
(Alcatel technology)

Manufactured by

M/s ITI Mankapur
&
M/s ITI Raebareli

GSM Network Elements



MS Mobile Station.
BTS Base Transceiver Station
BSC Base Station Controller
MSC Mobile Services Switching Center.

HLR Home Location Register.
VLR Visitor Location Register.
EIR Equipment Identity Register
AuC Authentication Center.
SMS Short Message Service.

2.1 General characteristics

G4 BTS – MBI	
Definition	
Network	GSM 850 or GSM 900, or GSM 1800, or GSM 1900, or Multiband 900/1800 & 900/1900.
Cabinet	MBI3 or MBI5
Number of sectors	Max. 3 in MBI3 cabinet, Max. 4 in a MBI5 cabinet.

EVOLIUM A9100

INDOOR-BTS

(MBI5)

EVOLIUM A9100

INDOOR-BTS

(MBI3)

The BTS A9100's has modular design which allows following configurations:

- **Omni Configuration,**
- **Sectorized Configuration and**
- **Multi Band Architecture.**

- Configurations are built from a small primary components.

Quality of BTS.(as per Alcatel version)

- Very high radio performances, in particular
  - * Reception sensitivity, -111 dBm,
  - * Improved Output Power, (Standard 45 W),
- Radio (synthesizer) Frequency Hopping,
- Antenna Diversity (as standards option),
- Minimum Service Interruption
- Very High BTS availability
  - Due to Module Reliability
  - Due to System Architecture,
- Optimized software release migration. (Simultaneously stores two software-versions).

Flexibility of BTS.

- Wide possibilities of extensions and sectorization, within the same cabinet, e.g., the MBO2 cabinet can accommodate up to six sectors with a twelve-TRX total capacity,

- Outdoor BTS modularity provides flexibility for other equipments (Transmission Equipment, Batteries, Microwave, DDF etc.),

- System Architecture and Cabinet for GSM 850, GSM 900, GSM 1800 and GSM 1900 remains the same,

- High modularity,

- Reduced set of modules and a common interface.

Future Proof BTS.

- GPRS Ready

- EDGE Ready by "add TRE" operation

- UMTS Ready: the MBI5 and MBO2 outdoor cabinet allow mixed configurations GSM + UMTS.

EVOLIUM A9100

INDOOR – BTS

(MBI3)

RACK & SUBRACK

- Rack Frame (1),
- Connection Shelf (1),
- STASR (3).

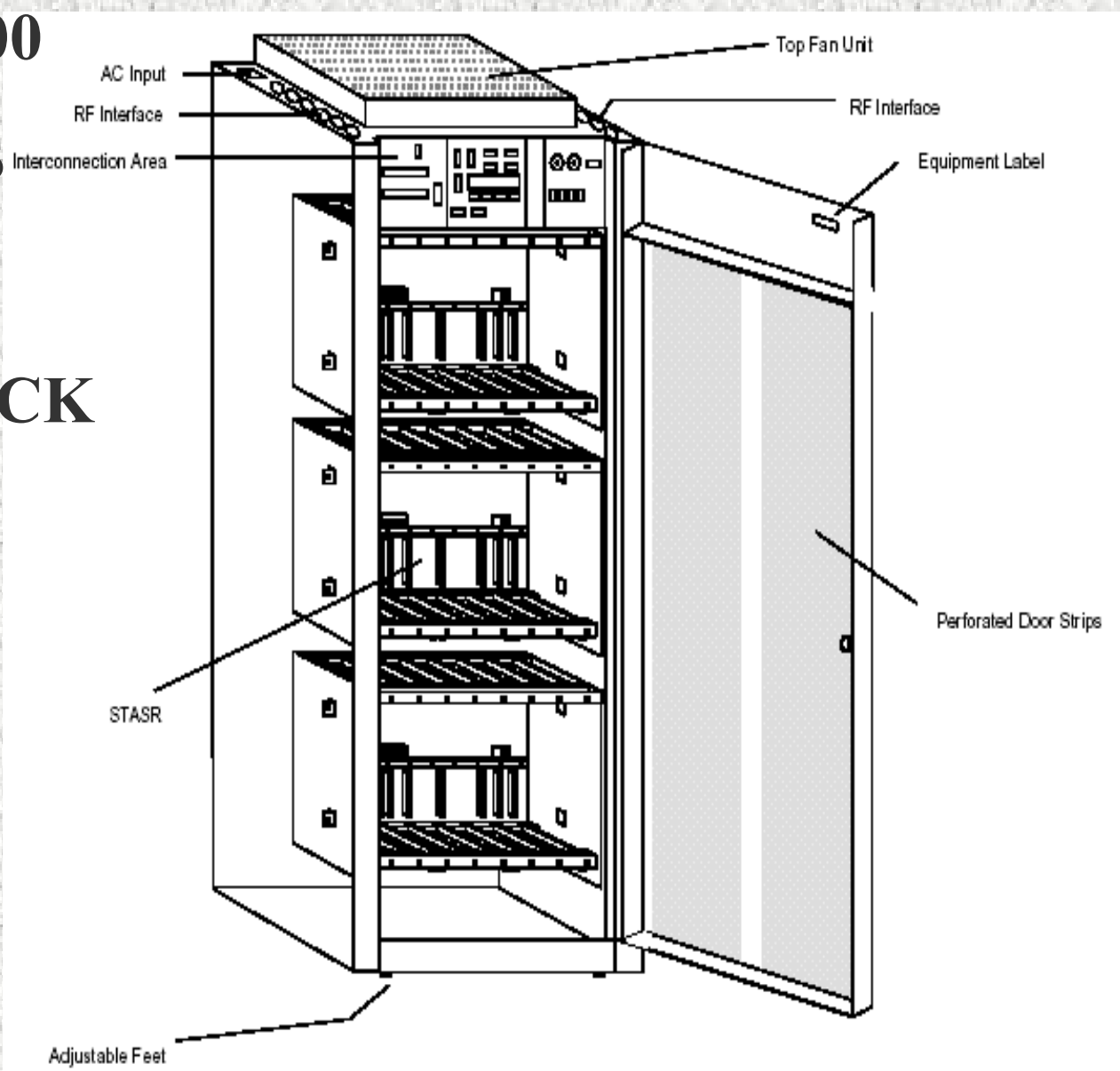


Figure 196: MBI3 Equipped with Empty Subracks

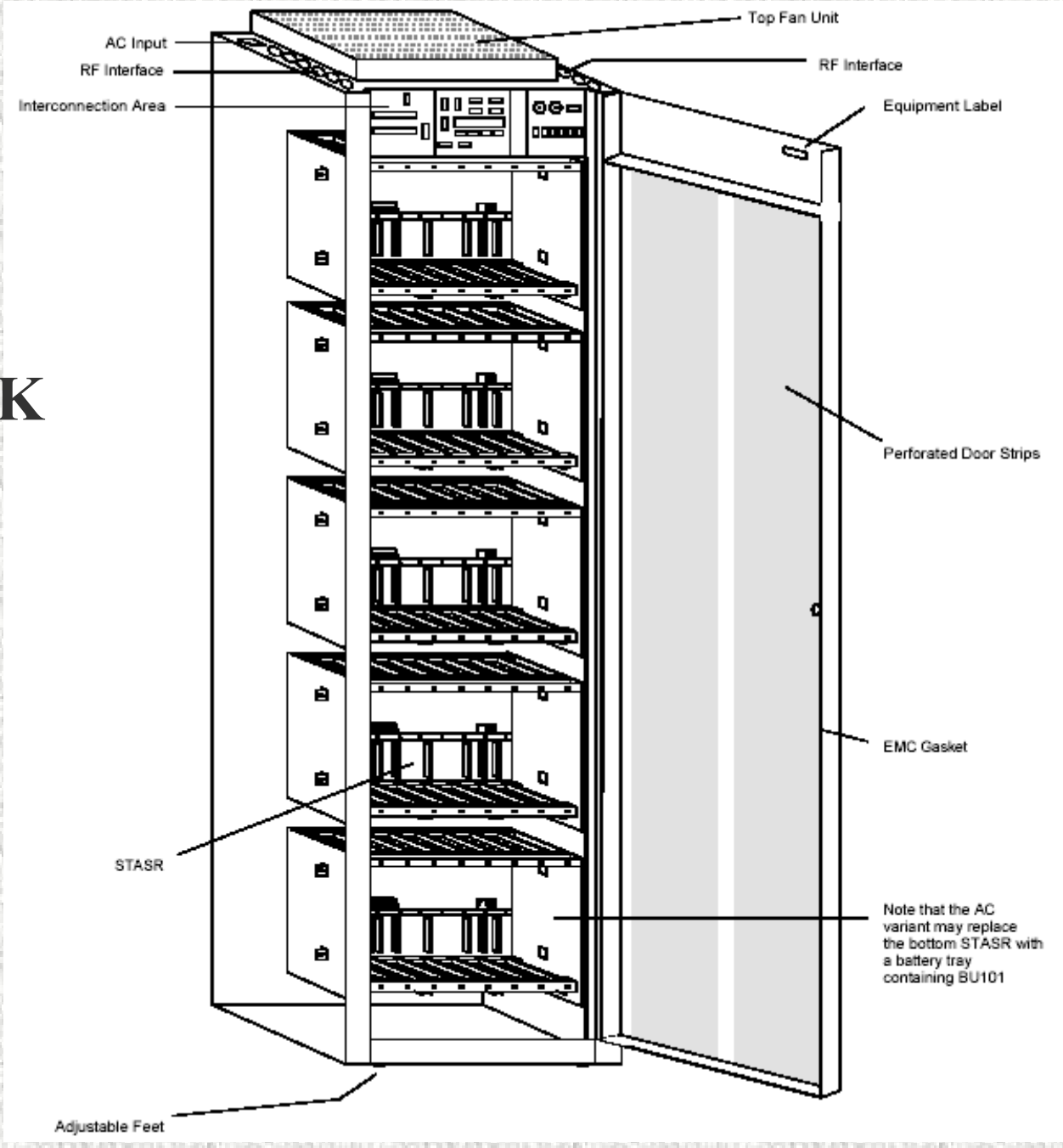
EVOLIUM A9100

INDOOR – BTS

(MBI5)

RACK & SUBRACK

- Rack Frame (1),
- Connection Shelf (1),
- STASR Shelf (5).



MBI5: Multistandard Base Station Indoor(5 shelves)

STASR: Standard Telecommunication Subrack

4. CABINET DESCRIPTION

4.1 Indoor cabinets description

Two types of indoor cabinets (also called racks) are available: the MBI3 cabinet, with three sub racks, and the MBI5 cabinet, with five sub-racks.

External dimensions	MBI3 BTS	MBI5 BTS
Depth	45 cm	45 cm
Height	130 cm	194 cm
Width	60 cm	60 cm
Max. TRX capacity	8 TRX	12 TRX

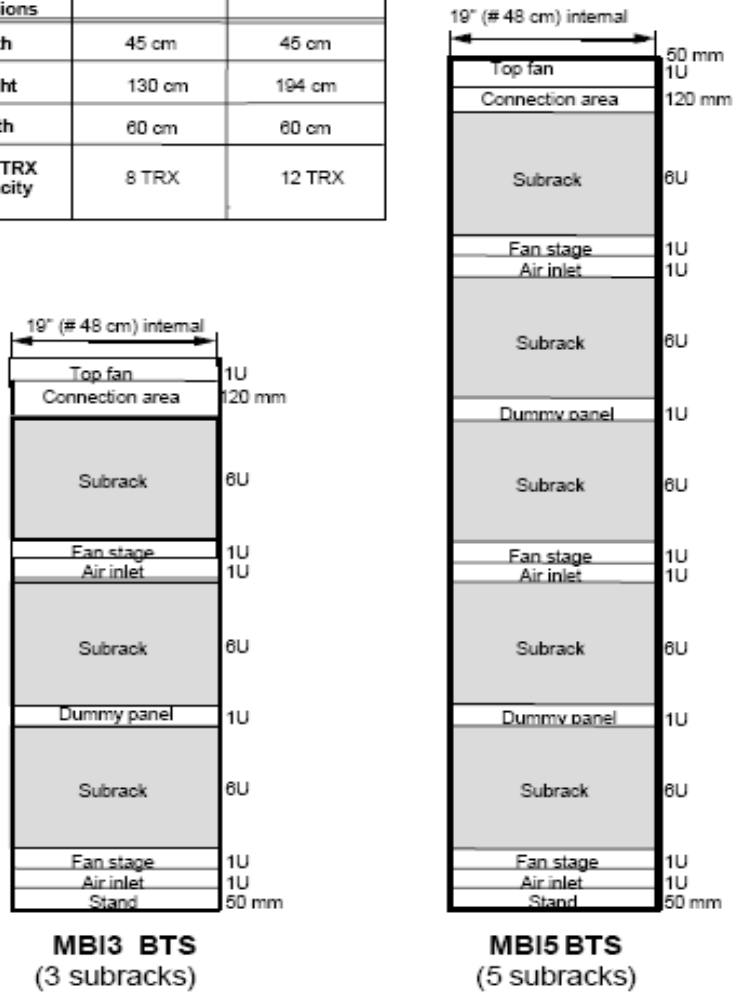


Figure 6: EVOLIUM™ indoor A9100 Base Stations

STASR Subrack Dimensions

Height (TEP/mm)	Width (TEP/mm)	Depth (mm)
7 HU/311.5 (= 6 HU for modules + 1 HU for fans)	84 WU/431.8	304.4

Units of Measurement Standard TEP units of measurement are used for BTS A9100 equipment. Metric and imperial equivalents for the TEP units are as follows:

- 1 HU = 44.45 mm (1.75 inches)
- 1 WU = 5.08 mm (0.20 inches).

Cabinet	Height Overall/Usable	Width Overall/Usable	Depth	Weight
MBI3	1300 mm/23 HU	600 mm/84 WU	450 mm	170 kg fully equipped (AC and DC)
MBI5	1940 mm/38 HU	600 mm/84 WU	450 mm	270 kg fully equipped (AC and DC)
MBO1/MBO1DC	1500 mm/24 HU	825 mm/84 WU	750 mm	95 kg not equipped w/o battery
MBO2/MBO2DC	1500 mm/24 HU	1500 mm/2 x 84 WU	750 mm	175 kg not equipped w/o battery

MBI3/MBI5 Module Positions

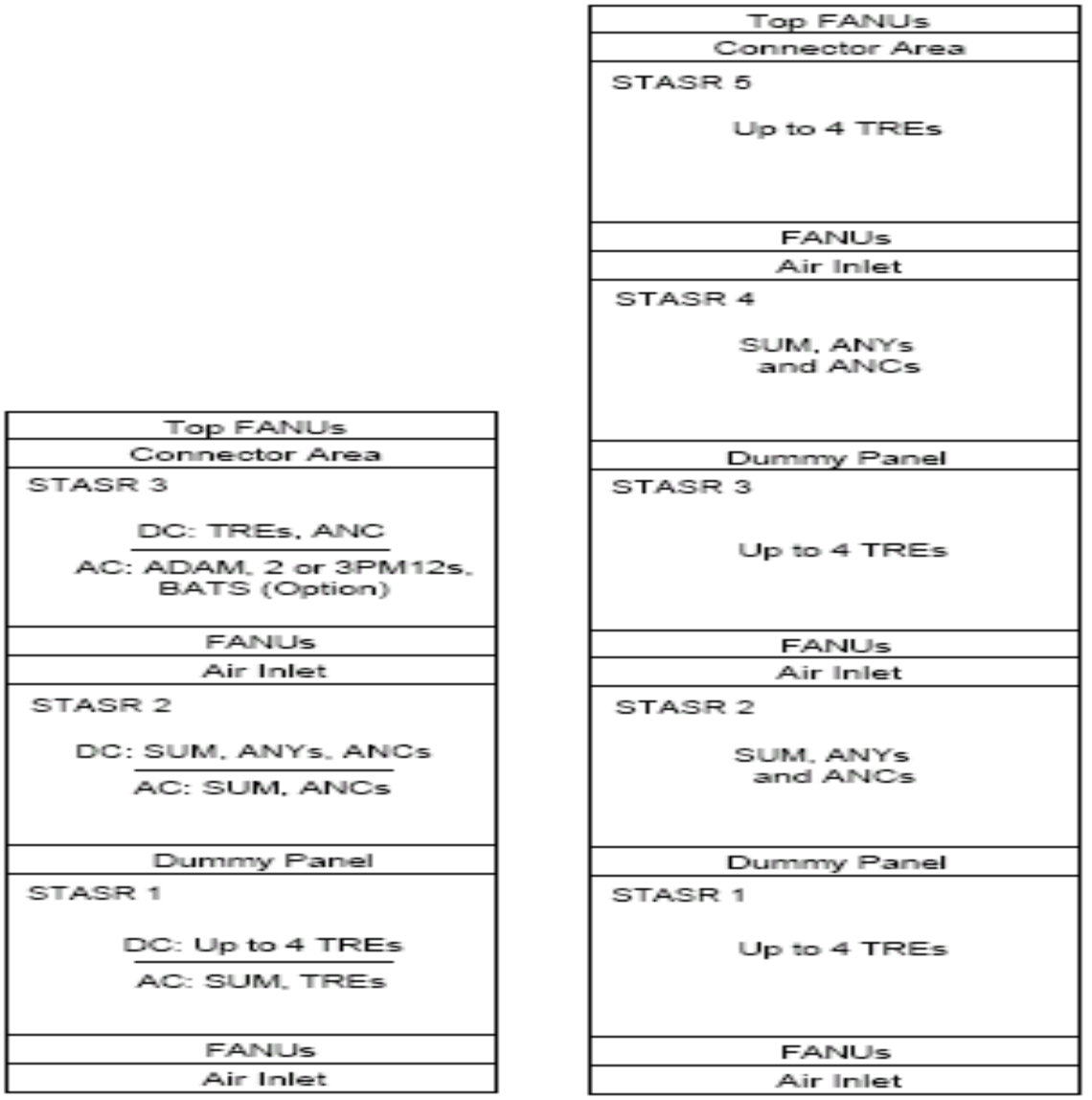


Figure 195: MBI3/MBI5 Module Positions

EVOLIUM A9100 OUTDOOR – BTS (MBO2)

- MBO1 is half of this rack.

OUTDOOR – BTS

MBO1

- Battery Unit (BU90),
- Air Con. Unit,
- STASR (3),
- OPTIONAL,
- PM12 (1200W) (2).

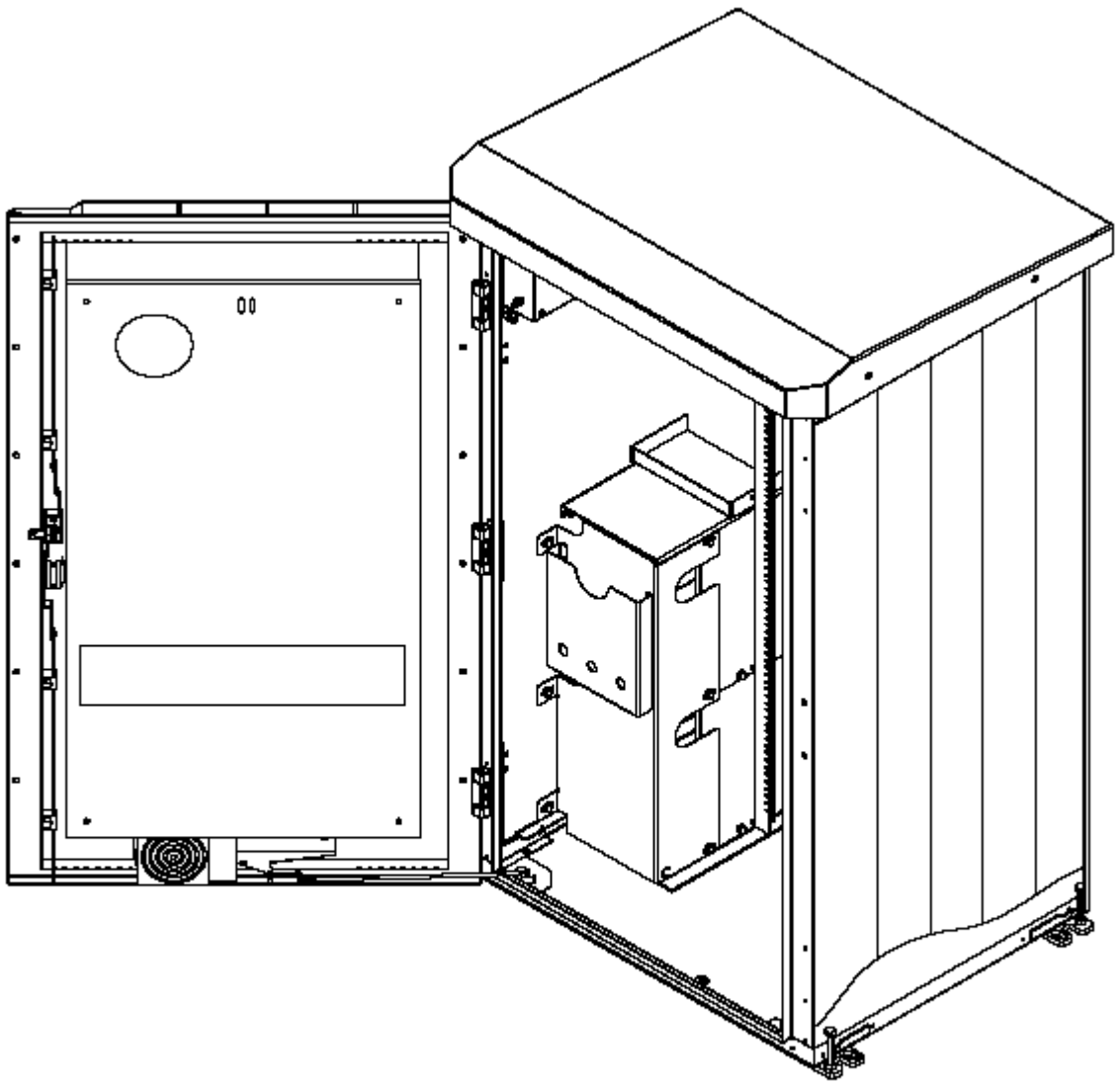


Figure 220: Multistandard BTS Outdoor Cabinet Construction MBO1/MBO1DC

OUTDOOR – BTS MBO2 (MBO1+MBOE)

- Rack Frame (MBO1+MBOE),
- Battery Unit (BU90),
- Heat Exch. Unit,
- STASR (6),
- OPTIONAL,
- PM12 (1200W) (3).

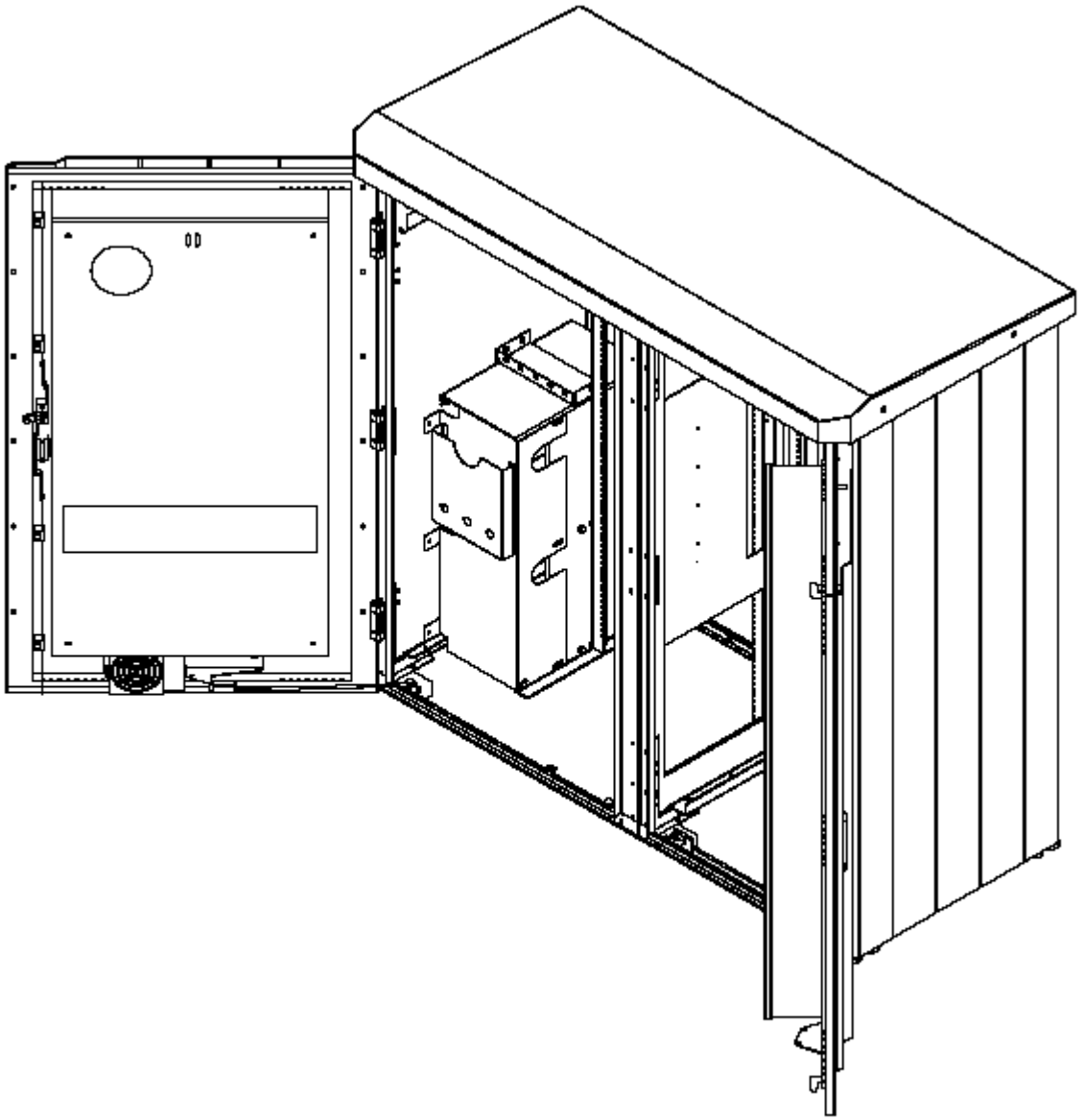


Figure 221: Multistandard BTS Outdoor Cabinet Construction MBO2/MBO2DC

Multi Standard BTS OUTDOOR

External dimensions	MBO1 BTS	MBO2 BTS
Depth	74 cm	74 cm
Height	149 cm	149 cm
Width	90 cm	152 cm
Max TRX capacity	8 TRX	12 TRX

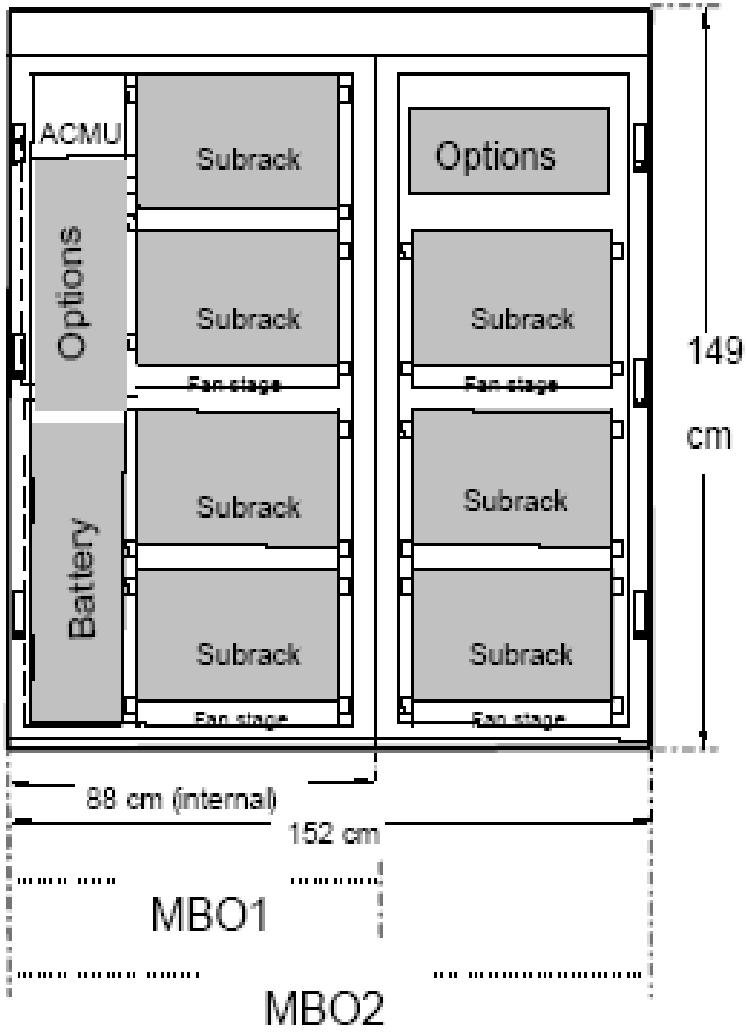
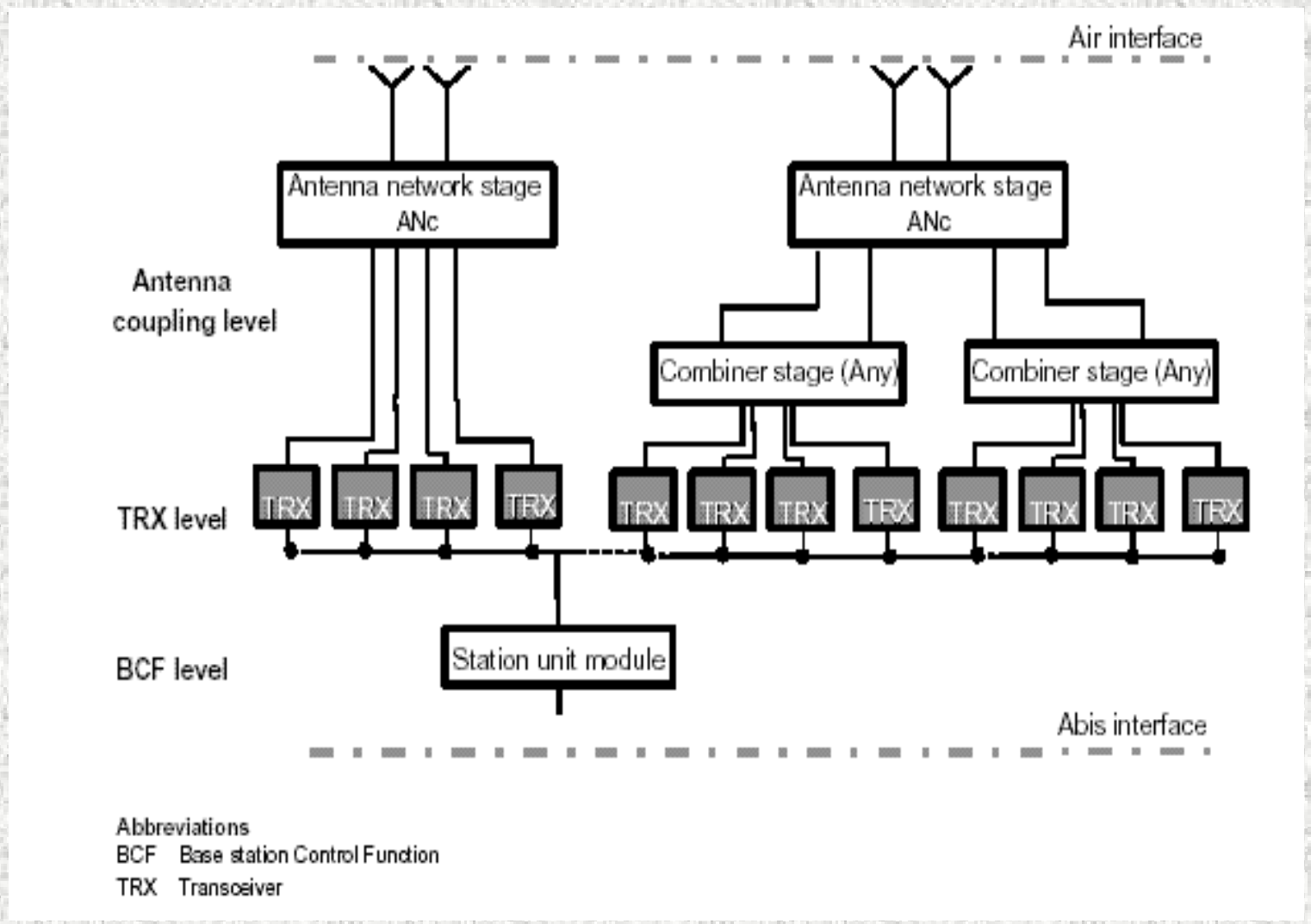


Figure 7: EVOLIUM™ outdoor A9100 Base Station

BTS A9100 MBI5 MODULES/ CABLES

S.No	MNEMO	MODULE PROD.CODE	ICS	ED_MOD
1	MBI5	3BK25965AAAB	01	
2	KMBI5	3BK25980AAAB		03
3	MSCA	3BK26014AAAB	01	02
4	XIBM	3BK26012AAAB	02	03
5	BTSRI5	3BK25974AAAA	02	03
6	DCBR5	3BK25978ABAA	01	03
7	MBU5	3BK25976AAAA		
8	STASR	3BK07193CAAB	01	01
9	TFBP	3BK07659AAAA	01	
10	FACB	3BK07202ABAA	01	01
11	FANU	3BK07205AAAA	01	
12	CS04	3BK07600AAAA	01	02A
13	CS05	3BK07199CAAB	02	01
14	SP2M	3BK08949AAAA	/	
15	FC1U	3BK07601AAAA	01	
16	CS03	3BK07599CAAA	01	01
17	L50N	1AB125380002		
18	SUMA	3BK08925AAAC	04	02
19	TRAG	3BK08967ABAC	02	04
20	ANCG	3BK08992AA	02	

A9100 Base Station Architecture (BTS)



View of Connection Area

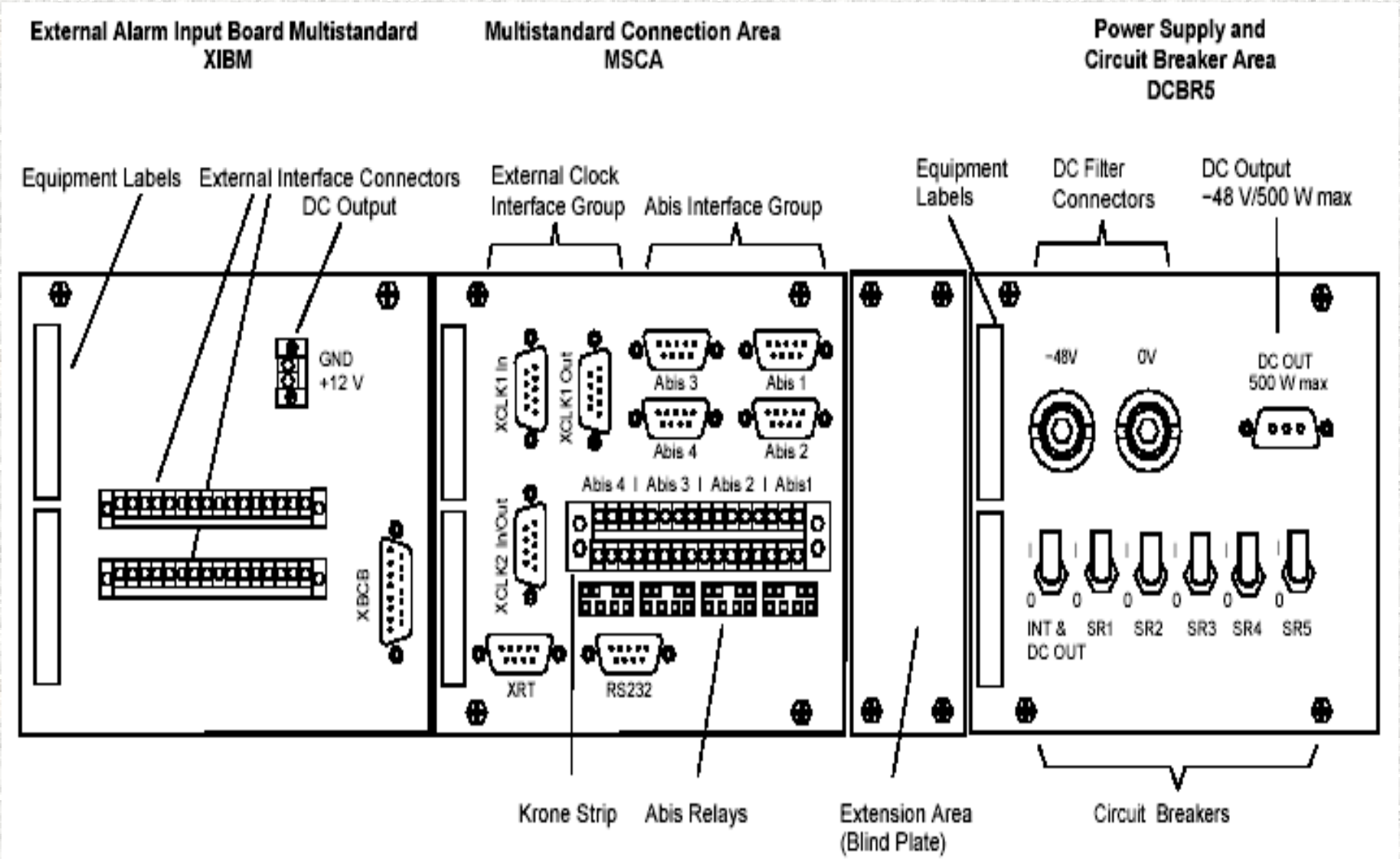
showing the boards

XIBM, MSCA and the Breakers

XIBM **MSCA** **DCBR5**

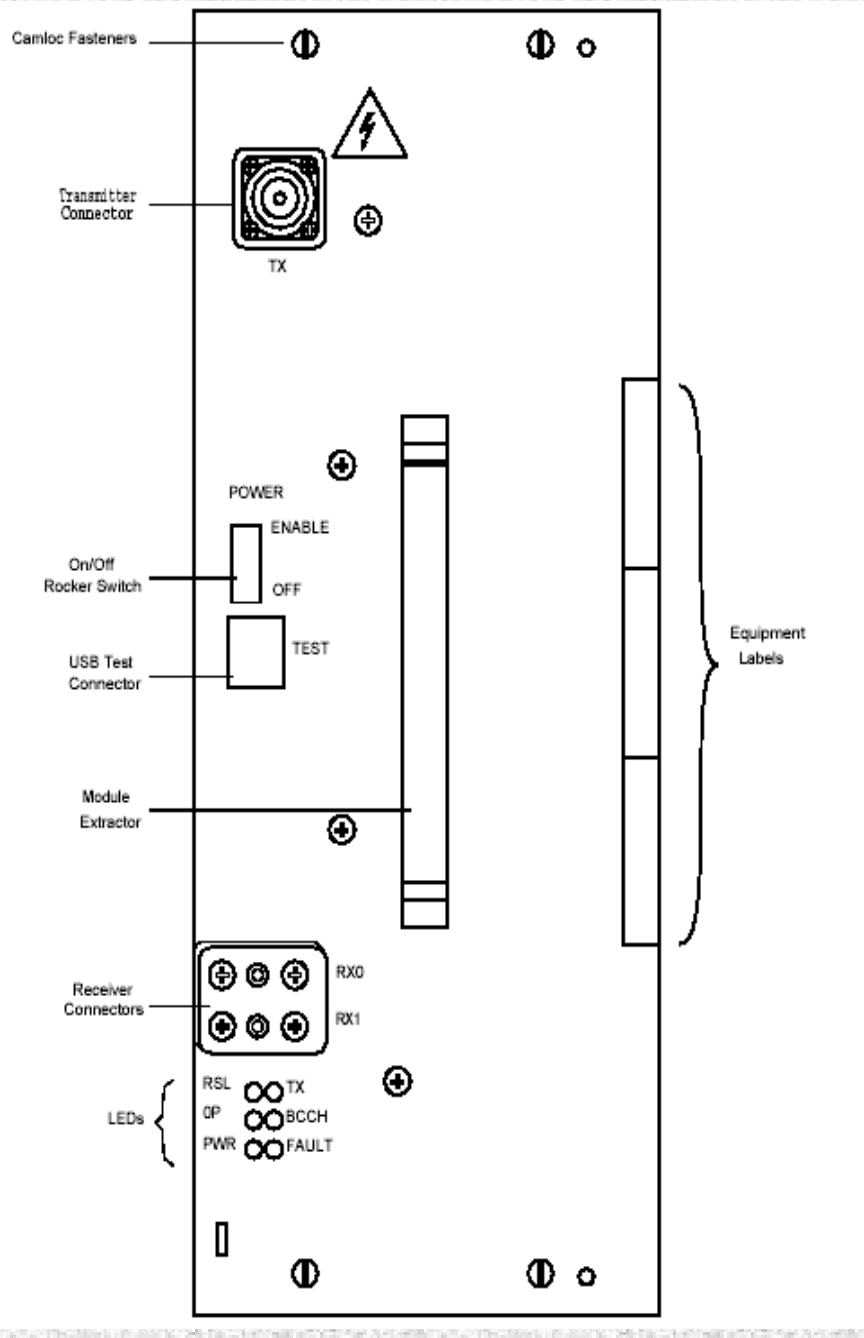
XIBM: External Alarm Input Board Multistandard
MSCA: Multistandard Connection Area
DCBR5: Power Supply & Circuit Breaker Area

MBI Interconnection Panel



TRE Front Panel

(Trans Receive Equipment)

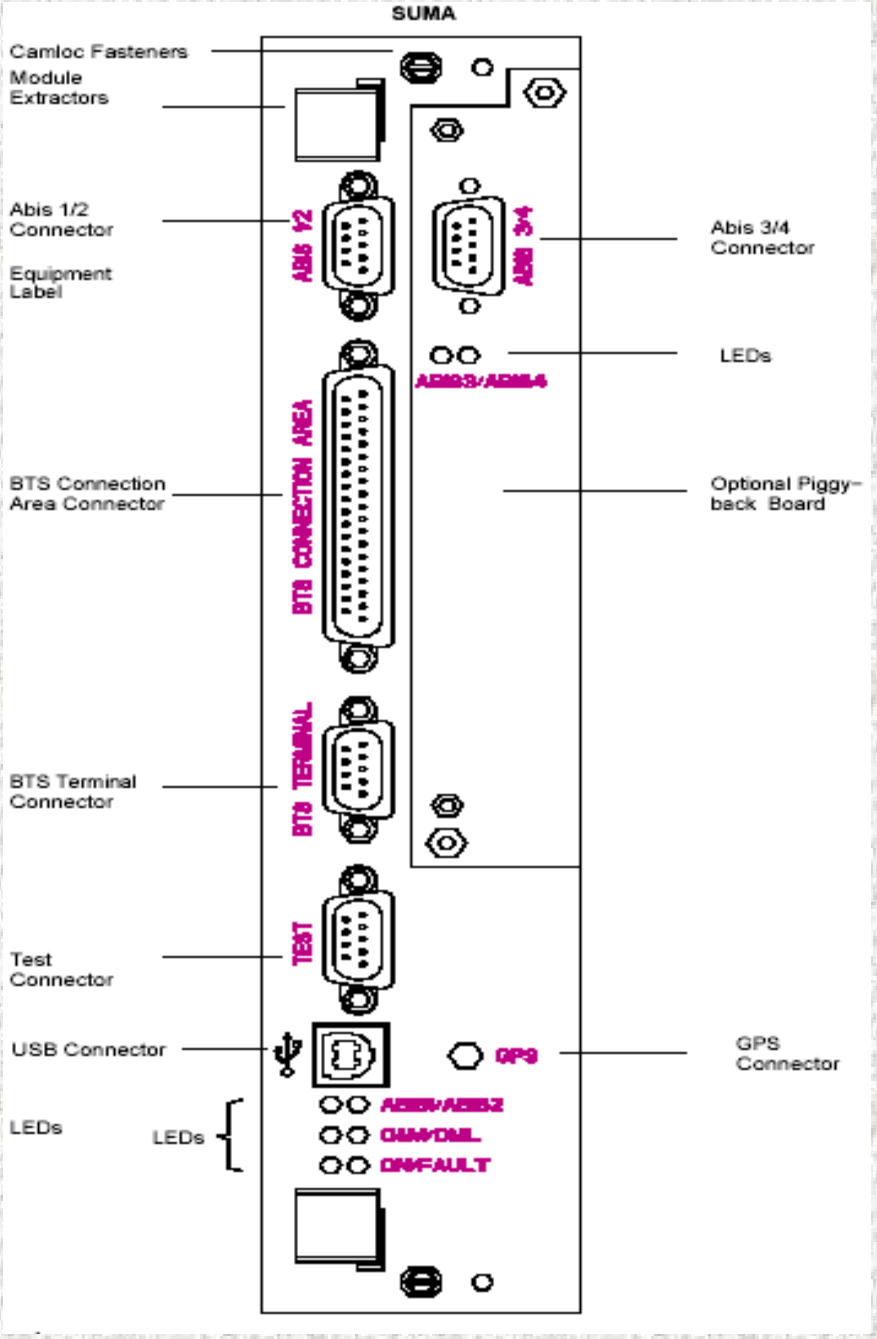


Transceiver (TRX) level

The transceiver (TRX) level covers GSM 850, GSM 900, GSM 1800 and GSM 1900 functionalities, including *full rate, half rate, enhanced full rate, antenna diversity, radio frequency hopping (synthesized hopping) and different iphering algorithms*. For each band, these functions are integrated into one single module. Inside each TRX module, an RF loop is implemented. The loop test is performed after downloading the frequencies to the BTS as a supplement to the autotest. The TRX module also handles the Radio Signaling Link (RSL) protocol.

SUMA Controller Card

(Station Unit Module Advanced)



2.1.3 Base station Control Function (BCF) level

This level is ensured by the Station Unit Module (SUM), which is the central unit of the BTS. There is only one such module per BTS, whatever the number of sectors and TRXs is; this common control function of the SUM is also called Station Unit Sharing. The main base station control functions performed are as follows:

- Generating the clocks for all other BTS modules; the clocks can be either synchronized to an external clock reference - e.g. A-bis link, GPS or another BTS - or generated in a pure free-run mode by an internal frequency generator.

- Ensuring central BTS Operation & Maintenance (O&M) application,

- Handling the A-bis transmission links (up to two A-bis interfaces),

- Handling Operation and Maintenance Link (OML) and Qmux (transmission equipment supervision) protocols,

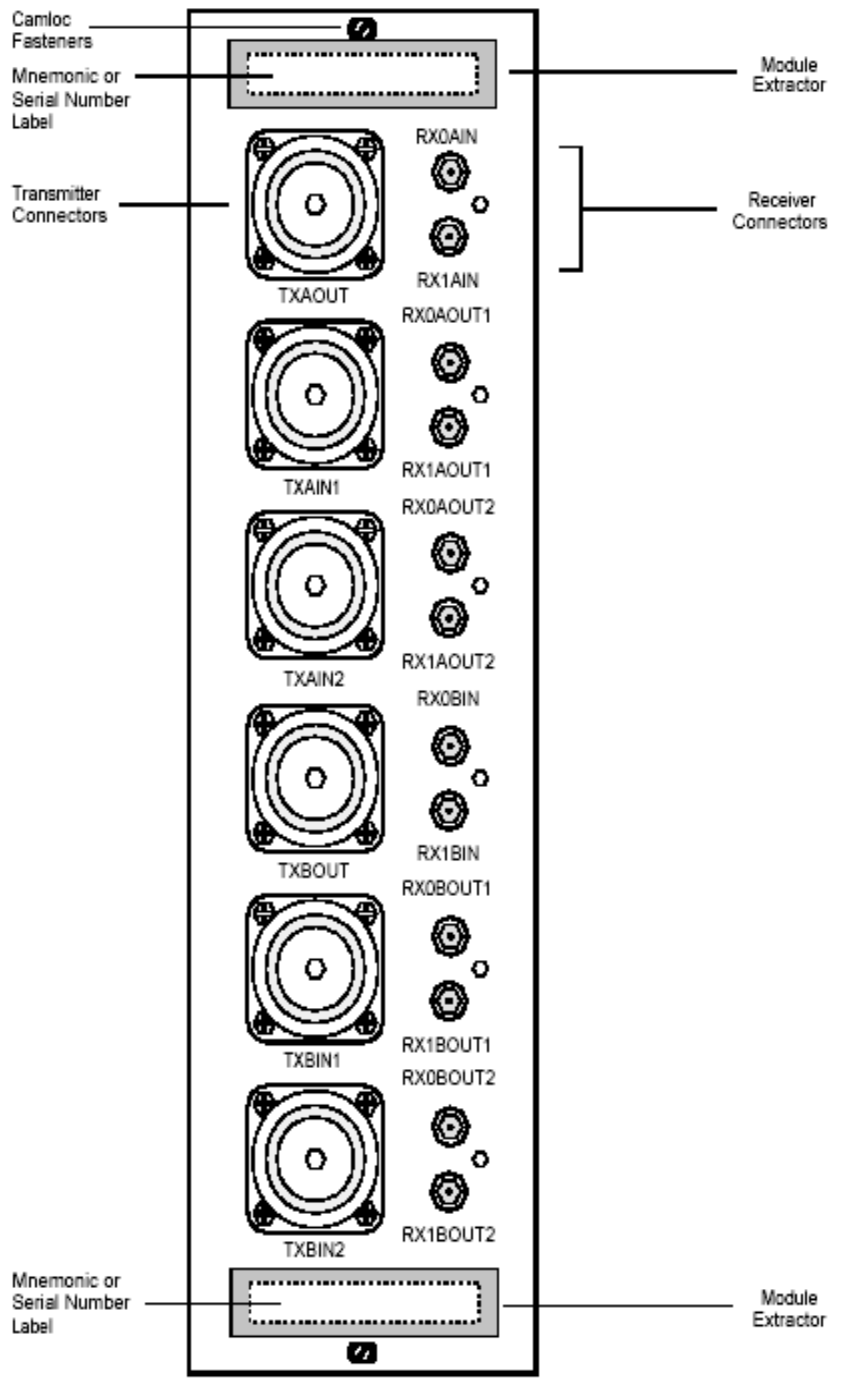
- Controlling the AC/DC function when integrated inside the BTS (Outdoor or Indoor AC configurations),

- Controlling the battery (capacity, voltage, temperature),

- Setting the optimal voltage and current for battery charging.

ANY Front Panel

(Twin Wide Band Combiner)



The Twin Wide Band Combiner (ANy) module

The Twin Wide Band Combiner stage (ANy) combines up to four transmitters into two outputs, and distributes the two received signals up to four receivers. This module includes twice the same structure, each structure containing:

- One wide band combiner (WBC), concentrating two transmitter outputs into one

- Two splitters, each one distributing the received signal to two separate outputs providing diversity and non-diversity path. The hybrid Wide-band combining technique is used, since it avoids tuning problems and is more reliable compared to remotely tunable cavities. Moreover it is compatible with the Synthesized Frequency Hopping (SFH) feature.

For standard configurations (for details please refer to dedicated chapter), for which each sector is connected to two antennas (or one cross-polarized antenna), the *Twin Wide Band Combiner* module

(ANy) is only necessary for sectors with five or more TRXs.

TWIN WIDE BAND COMBINER (ANY)

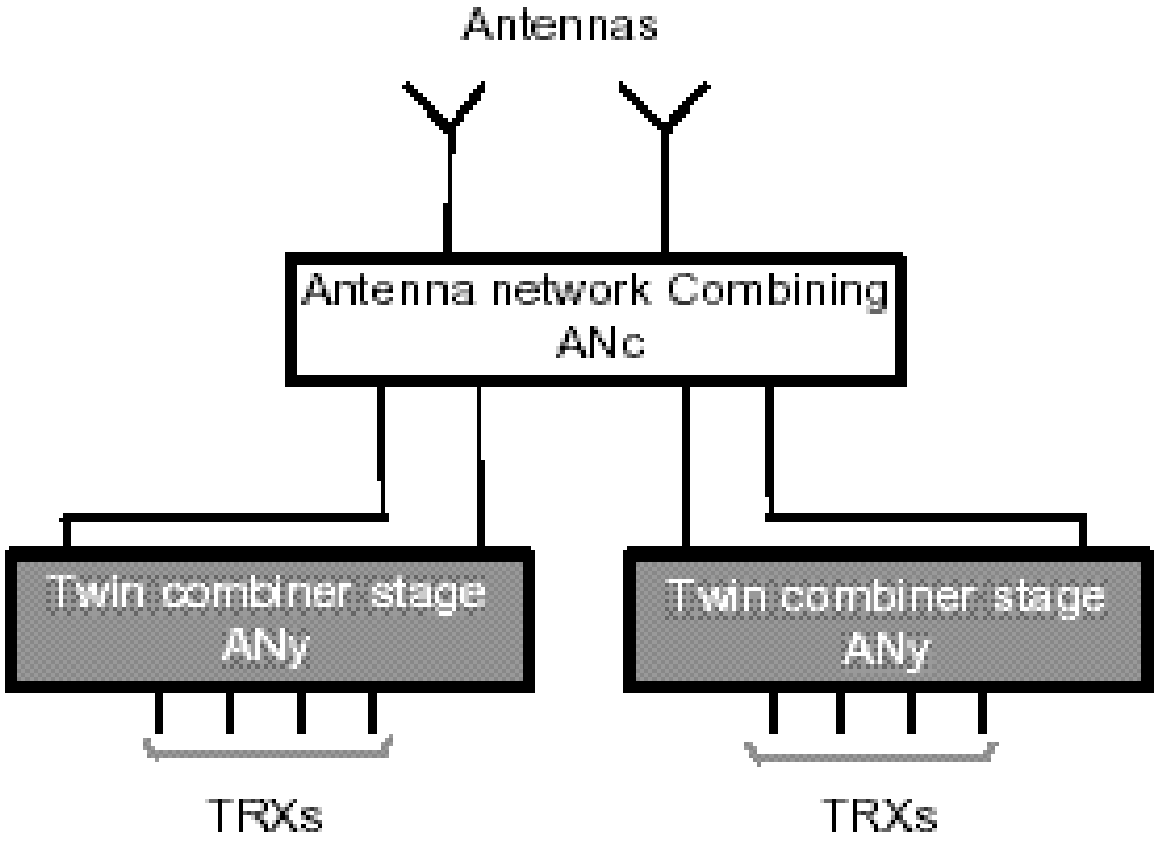


Figure 5: Configuration with 1x8 TRXs

TWIN WIDE BAND COMBINER (ANY)

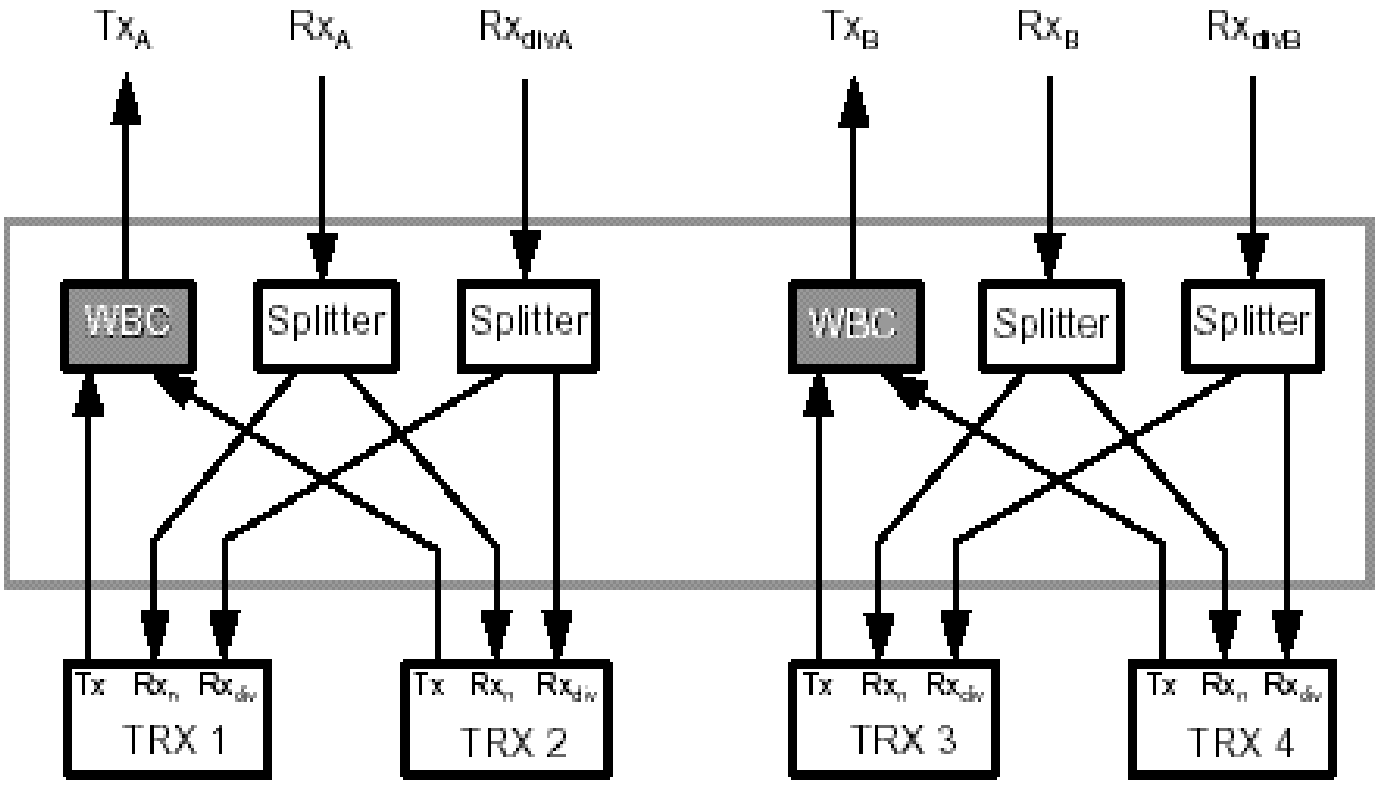
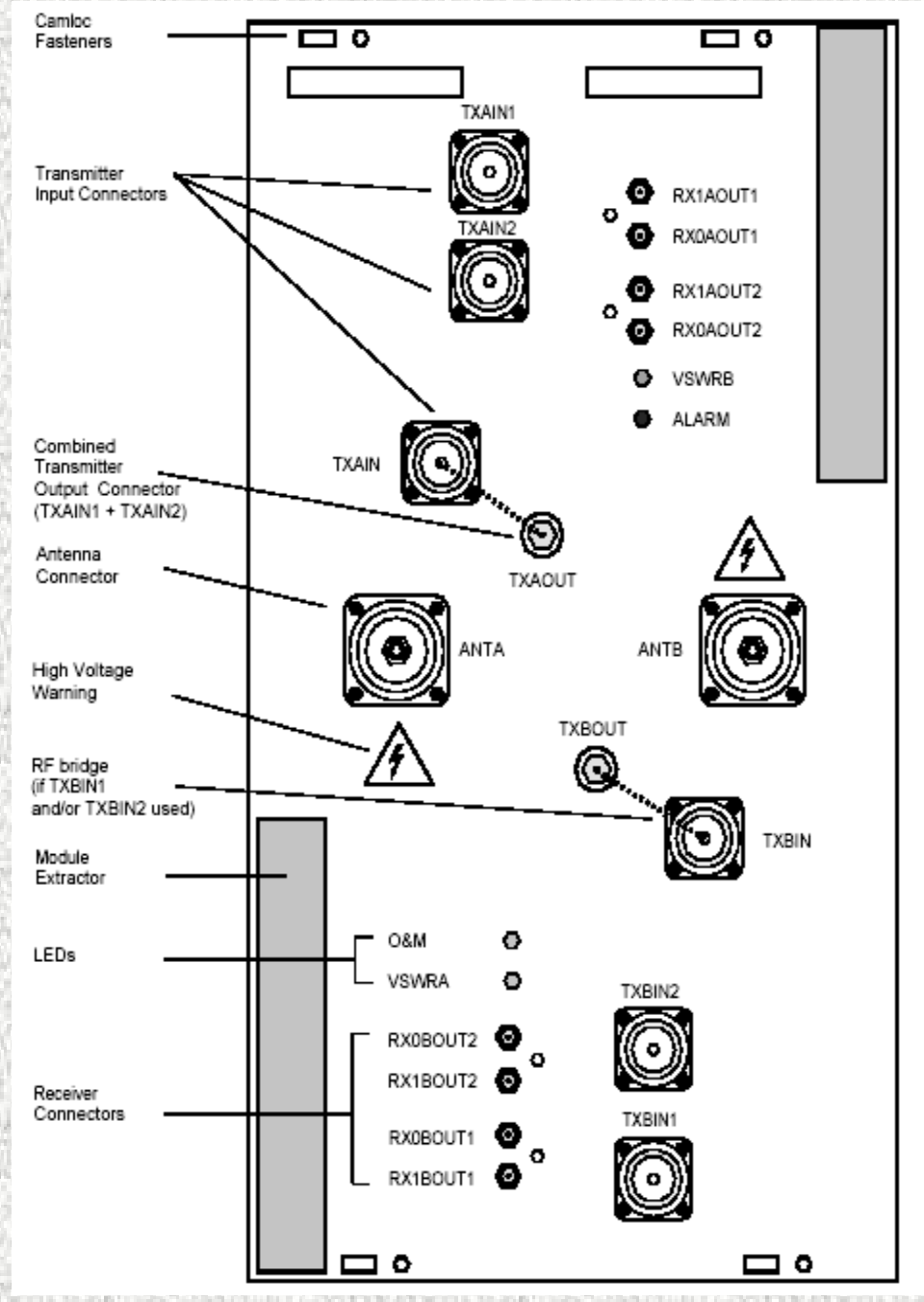


Figure 4: The twin Wide Band Combiner module (ANy)

ANC Front Panel

(Antenna Network Combiner)



ANC Architecture

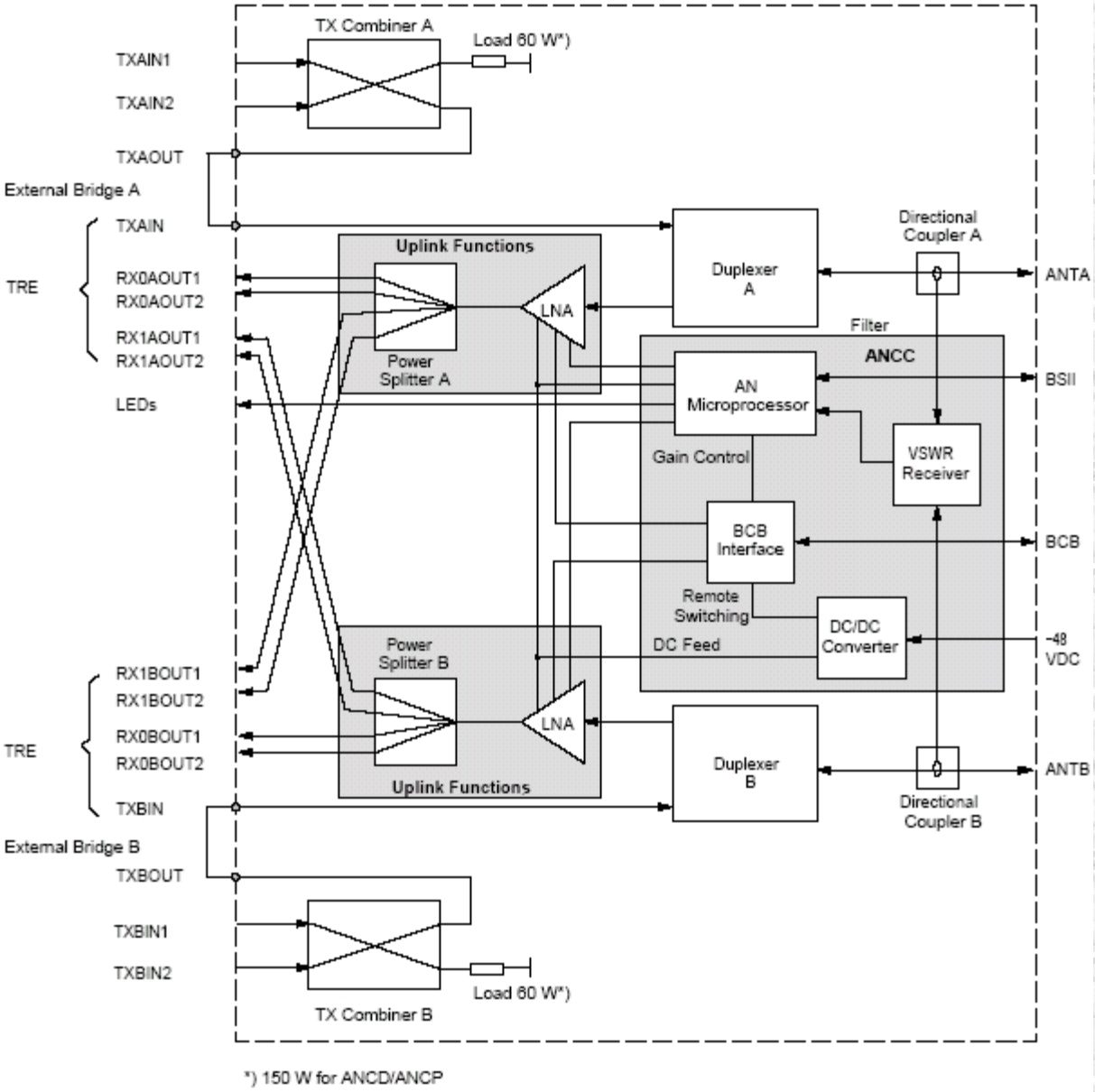


Figure 298: ANC Architecture

Antenna Coupling Level.

The antenna coupling level is the stage between the antennas and the TRX level; it handles the combining functions as well as the interface with the antennas. A single module called Antenna Network Combiner (ANc) performs these functions for up to 4 TRXs. For configurations of higher capacity, a Combiner stage can be added. Thanks to the ANc flexibility and this modular building, the antenna coupling level can be adapted to a wide range of requirements (reduction of attenuation losses, minimization of the number of antennas…).

The general functions performed at this level are:

- Duplexing transmit and receive paths onto common antennas;

- Feeding the received signals from the antenna to the receiver front end, where the signals are amplified and distributed to the different receivers (Low Noise Amplifier (LNA) and power splitter functions);

- Providing filtering for the transmit and the receive paths;

- Combining, if necessary, output signals of different transmitters and connecting them to the antenna(s);

- Supervising antennas VSWR (Voltage Standing Wave Ratio).

The Antenna Network Combiner (ANc) module

The Antenna Network combiner module (ANc) connects up to four transmit signals to two antennas, and distributes the received signals from each antenna to up to four receivers (for the normal and the diversity reception). This module includes twice the same structure, each structure containing:

- One duplexer allowing a single antenna to be used for the transmission and reception of both downlink and uplink channels- hence minimizing the number of antenna

- A frequency selective VSWR meter to monitor antenna feeder and antenna

- One LNA amplifying the receive RF signal, and giving good VSWR values, noise compression and good reliability

- Two splitter levels distributing the received signal to two or four separate outputs so that each output receive the signal from its dedicated antenna and from the second one (diversity)

- One Wide Band Combiner (WBC), concentrating two transmitter outputs into one, only for configurations with more than two TRX.

Each sector is equipped with at least one such stage, which features very high sensitivity reception, low attenuation, and minimum inter-modulation products.

The ANc can be manually configured (on site) in two modes depending on the number of TRX in the sector:

- The No-combining mode for configuration up to 2 TRX, for which the Wide Band Combiner is not needed therefore bypassed.

- The Combining mode for configuration from 3 up to 4 TRX, for which the Wide Band combiner is not bypassed.

Each sector is equipped with at least one such stage, which features very high sensitivity reception, low attenuation, and minimum inter-modulation products.

The ANc can be manually configured (on site) in two modes depending on the number of TRX in the sector

- The No-combining mode for configuration up to 2 TRX, for which the Wide Band Combiner is not needed therefore bypassed.

- The Combining mode for configuration from 3 up to 4 TRX, for which the Wide Band combiner is not bypassed.

Antenna Network Combiner (ANC)

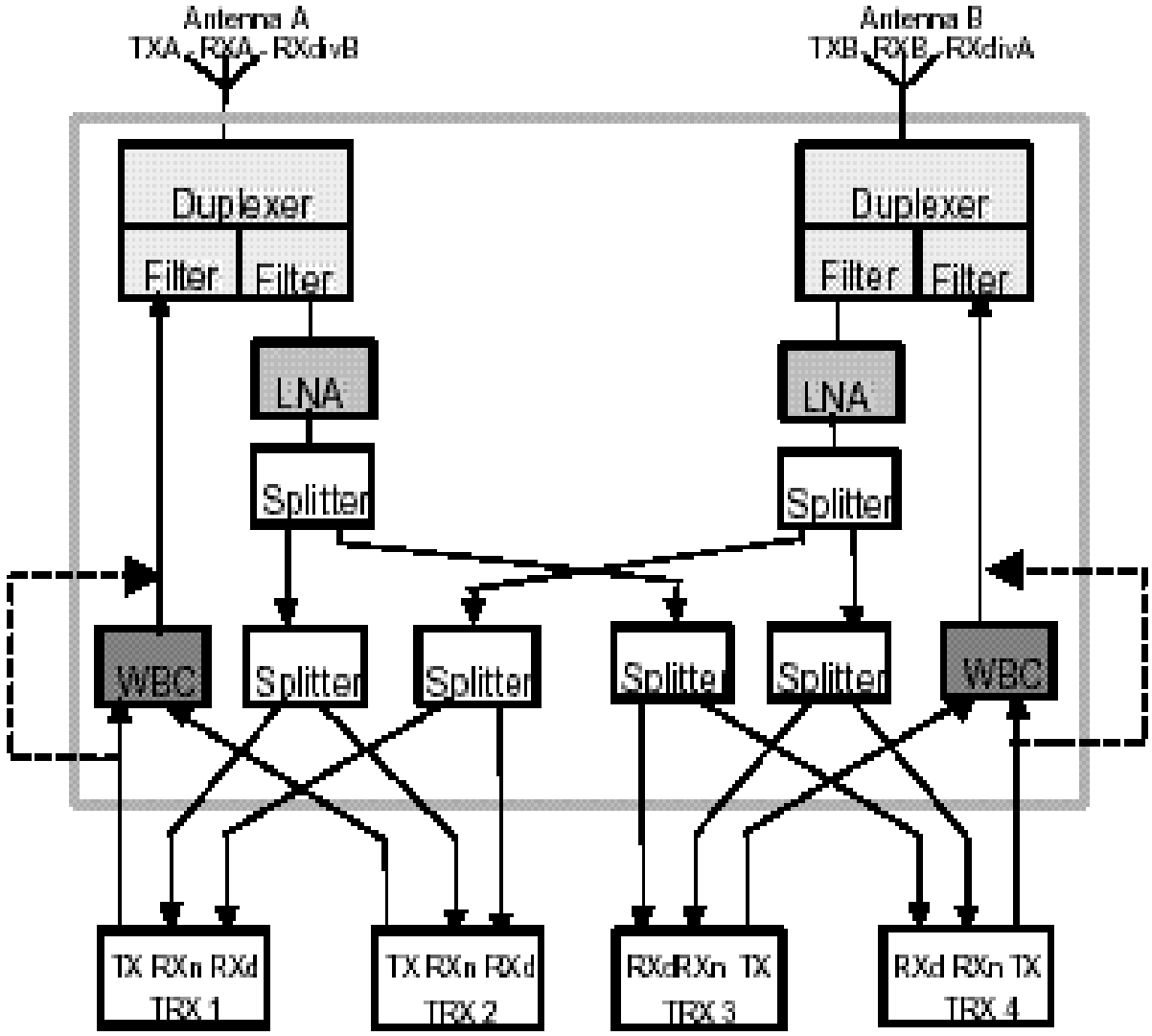


Figure 3: The Antenna network Combiner (ANc)- Combining mode

Weight of Physical Modules

5.10 Weight of modules and configurations

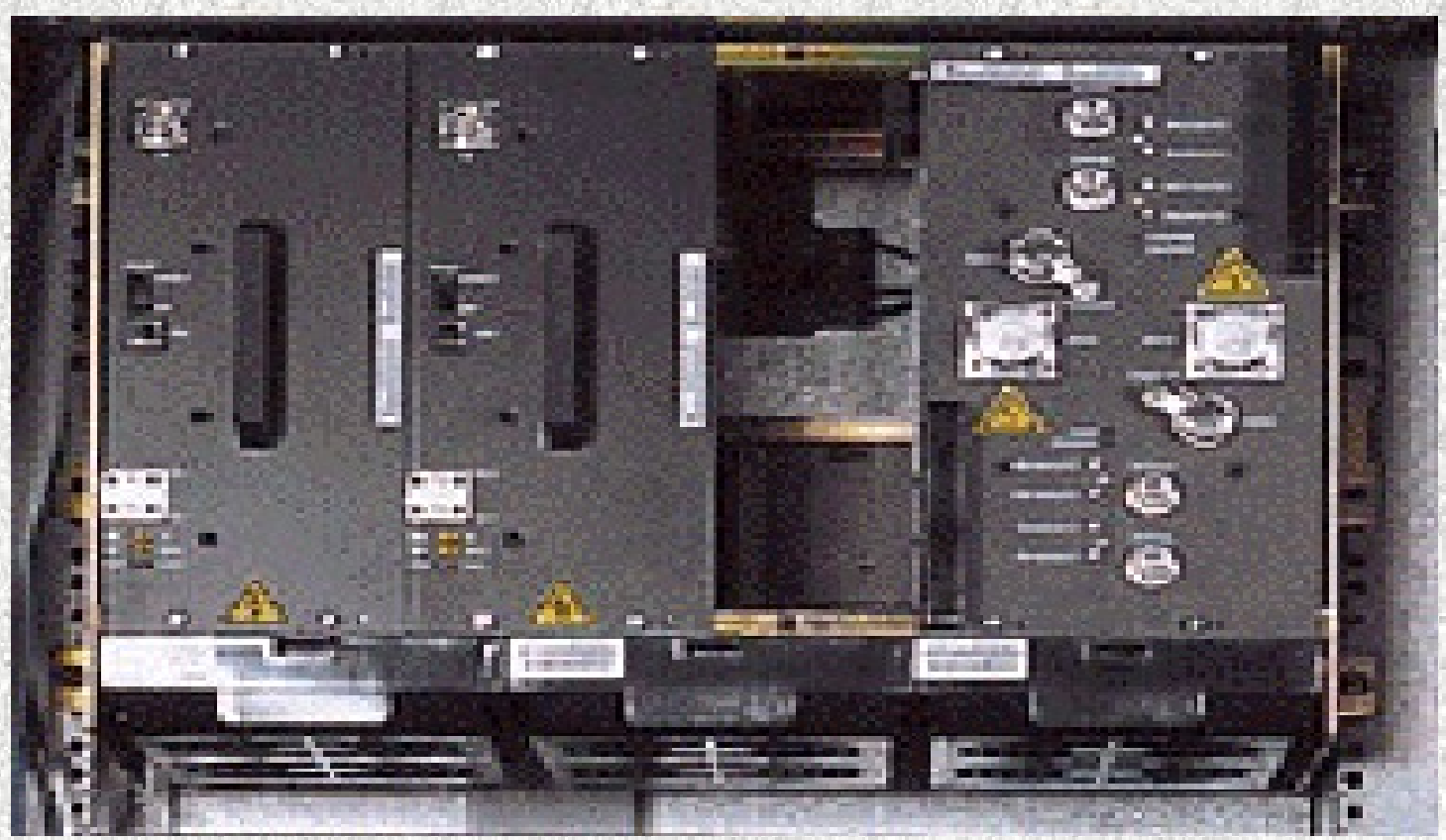
The following table gives the weight of main BTS modules; modules of which the weight is negligible and/or the number is the same whatever the configuration are not listed (their weight is included in that of cabinet or of other modules); also, weight of options such are microwaves are not listed:

Module	Weight (Kg)
TRX	7.2
ANc	8.5
ANy	3.5
CBO cabinet	104
MBO1 cabinet	188
MBO2 cabinet	316
MBI3 DC cabinet	86
MBI3 AC cabinet	97
MBI5 DC cabinet	131
MBI5 AC cabinet	142
BU5	15
BU90	140

These weights allow to estimate the weight of any configuration; as an example, the weight of MBI and MBO 3x4 are:

		Unit	Qty	Total (Kg)
MBO2 3x4 TRX-BU90				**567.6**
	MBO2 cabinet	316	1	316
	TRX	7.2	12	86.4
	ANc	8.5	3	25.5
	BU90	140	1	140
MBI5 AC 3x4 TRX-BU5				**393.9**
	MBI5 AC cabinet	142	1	142
	TRX	7.2	12	86.4
	ANc	8.5	3	25.5
	BU5	15	1	140

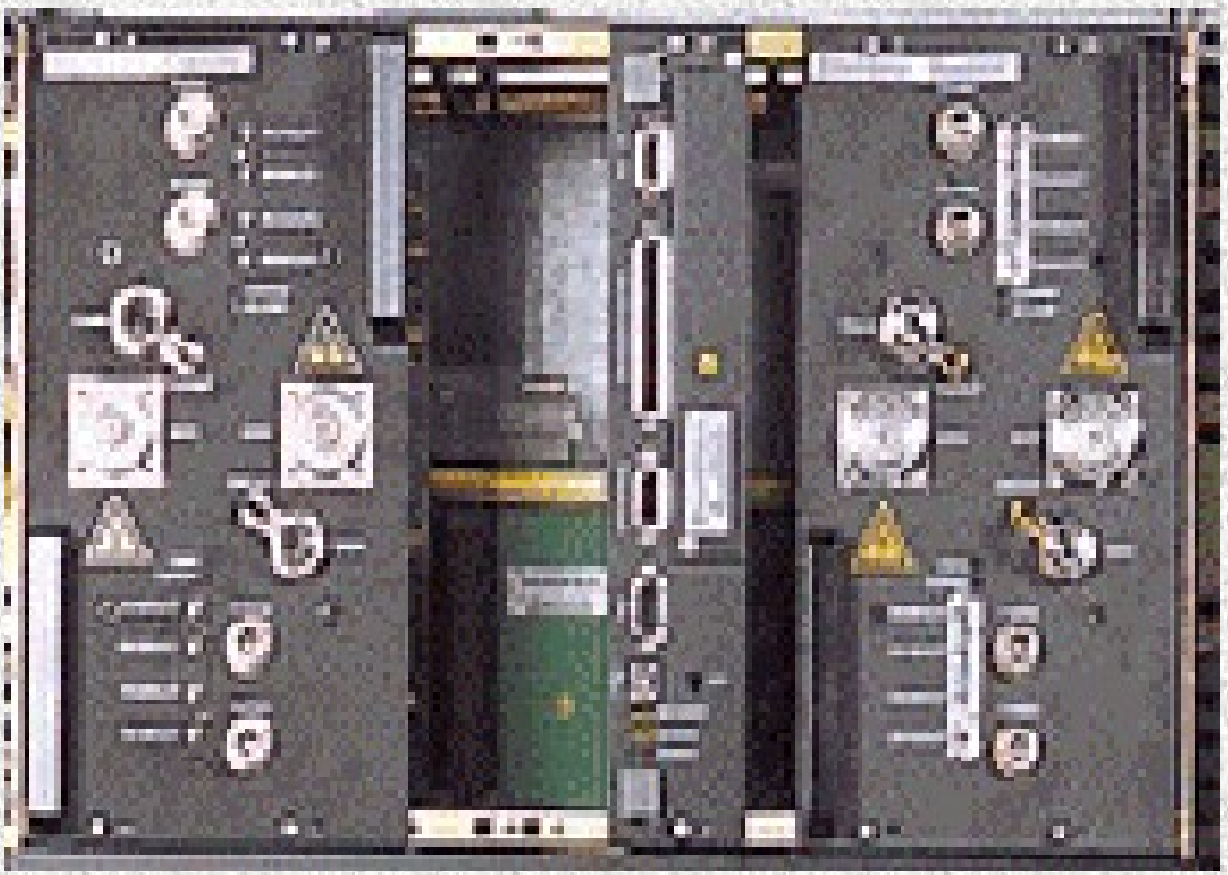
STASR Shelf showing 2 TRE's & 1 ANC



TRE: Trans Receive Equipment

ANC: Antenna Network Combiner(upto 4 TRE's)

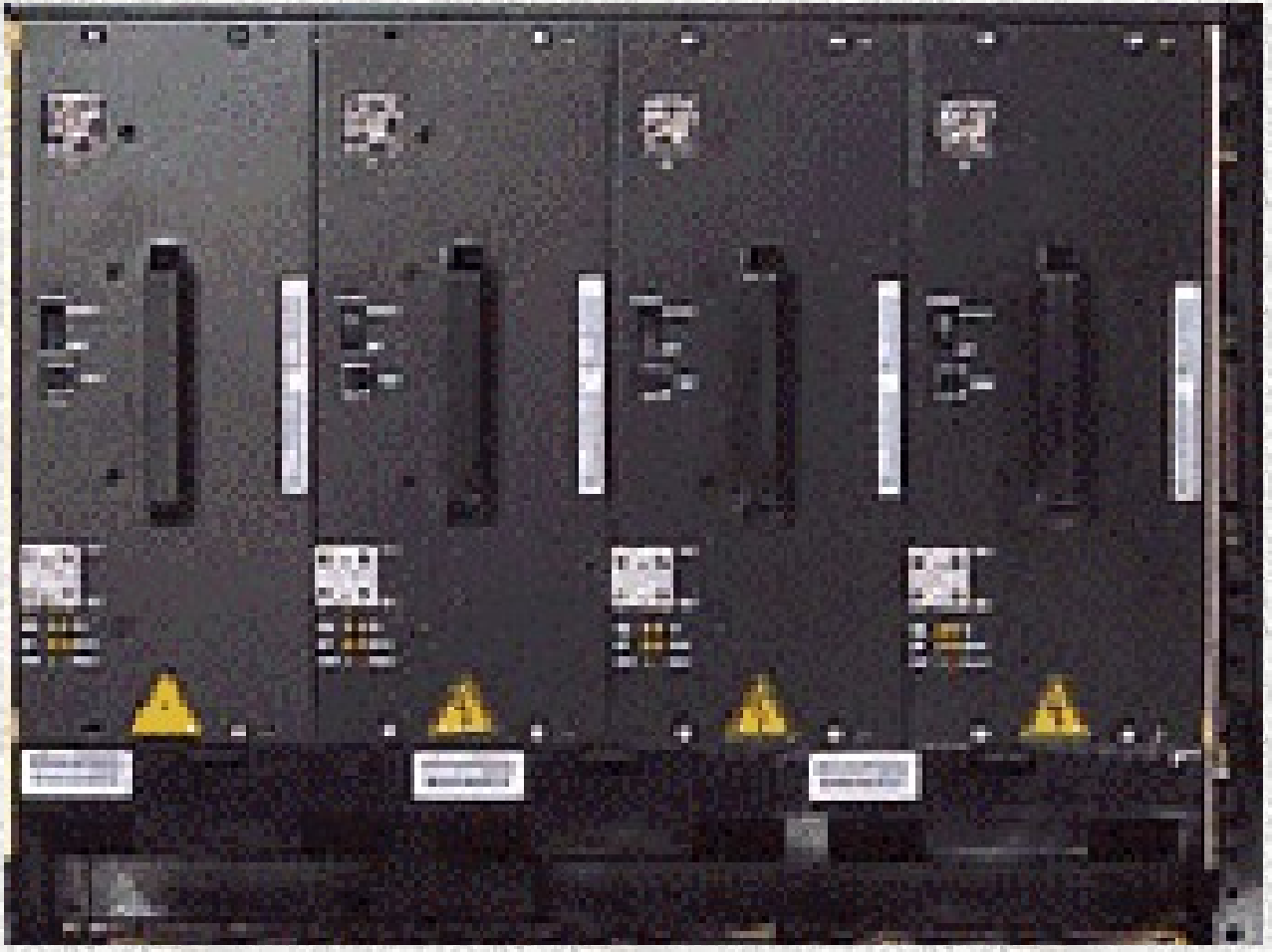
STASR Shelf showing SUMA and 2 ANC's



SUMA: Station Unit Module Advanced (Controller Board)

ANC: Antenna Network Combiner (upto 4 TRE's).

STASR Shelf showing 4 TREs

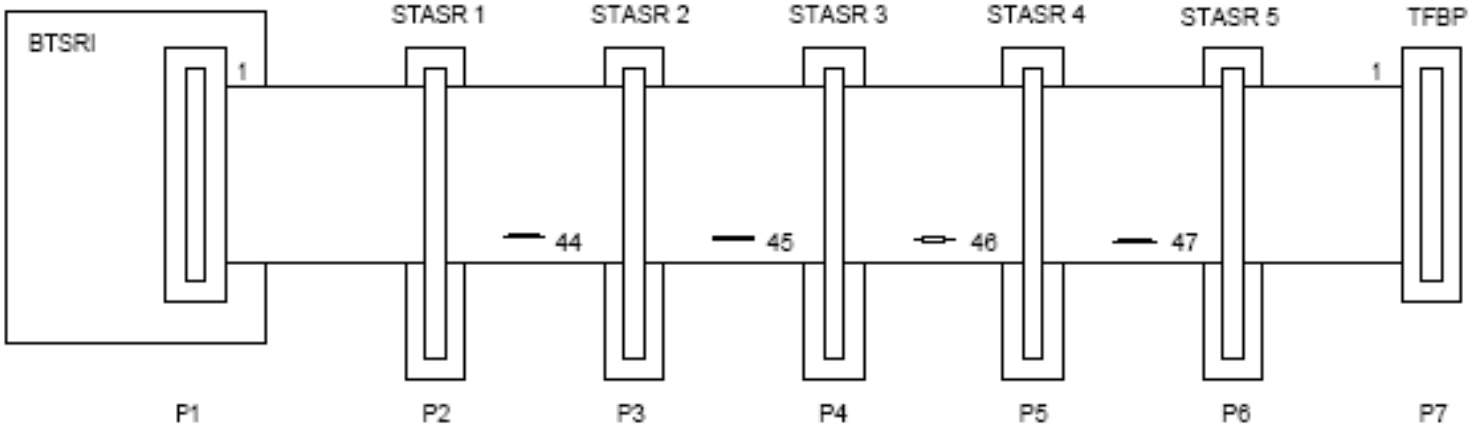


TRE: Trans Receive Equipment

BTSRI5

17.1.9 BTSRI5

The connections for the BTSRI5 (part number 3BK 25974) are shown in the following figure.



Break in wire for coding purposes

P1:	Non−removable, self cutting, 50 pins
P2 – P6:	DIN 41612, 64 pins, rows A and C only, female
P7:	Flat cable connector, 50 pins, female

Figure 456: BTSRI5 Connections

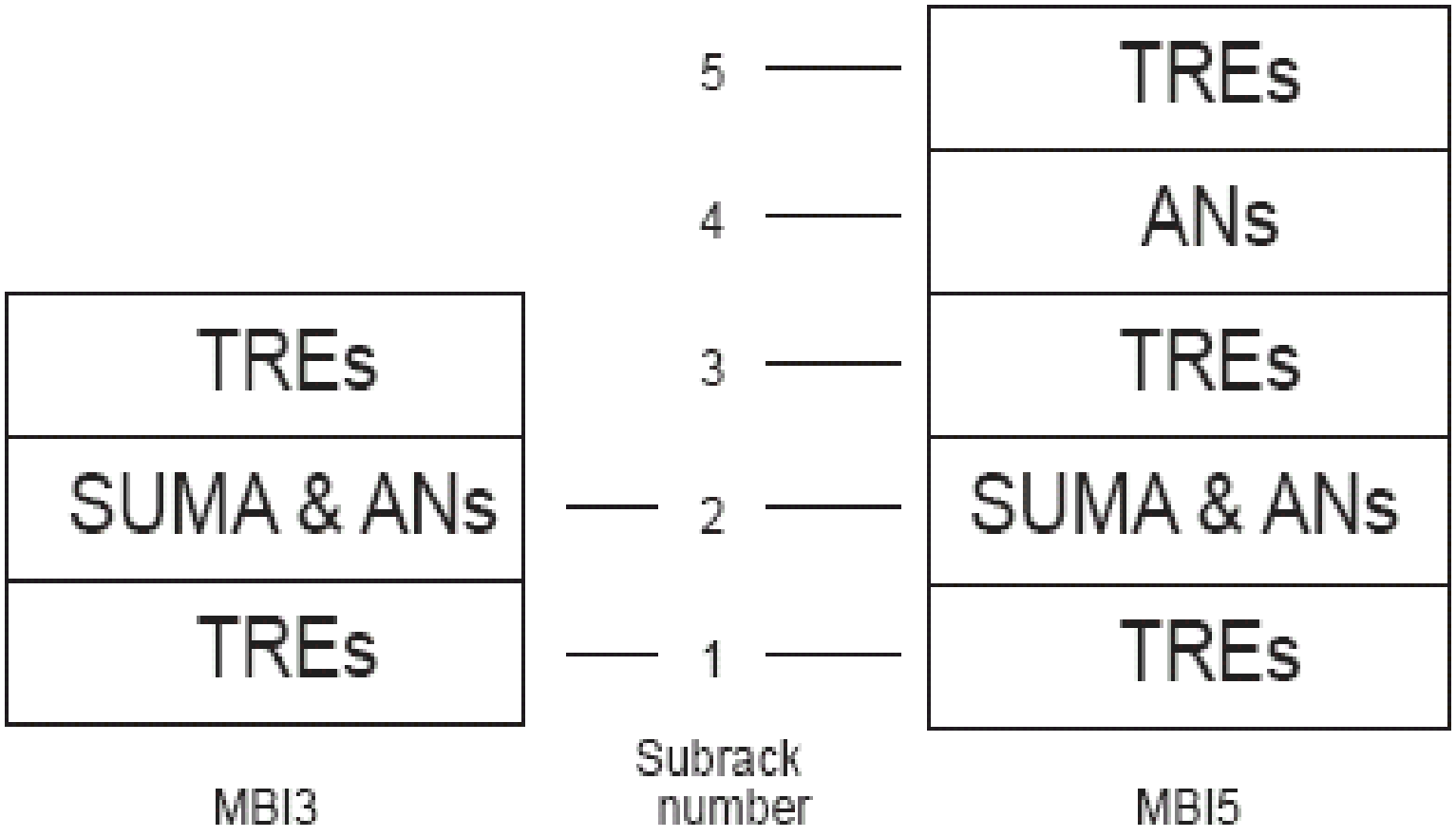
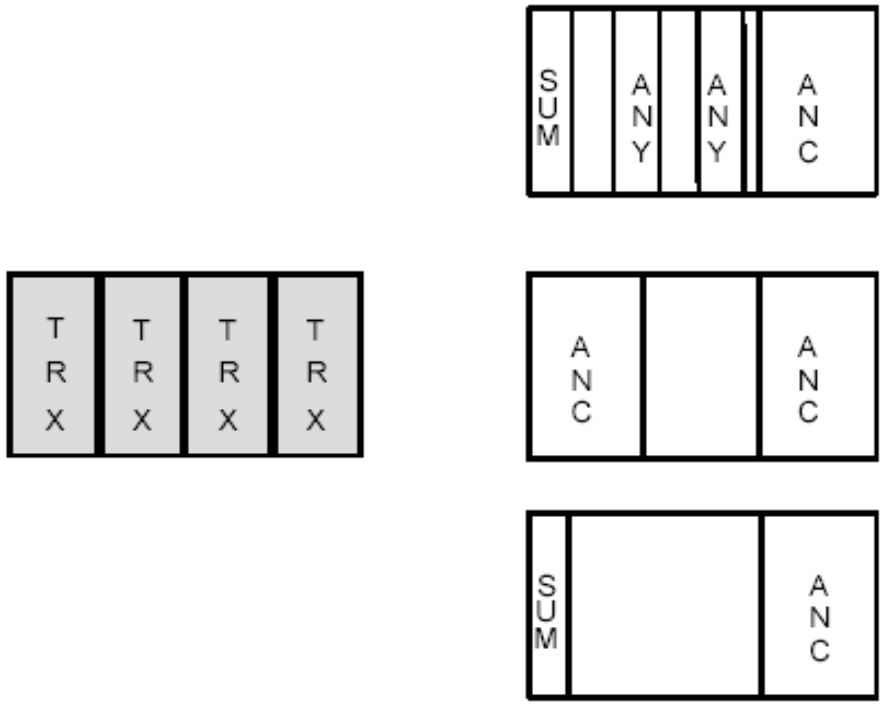


Figure 1. Subracks equipment in MBI racks

SUB-RACK CONFIGURATION

Different sub-rack organizations are given in figure below. The following widths hold true for the different modules (taken L for one sub-rack):

		Legend
SUM	L / 8	SUM
Antenna Network Combining	L / 3	ANC
Twin WBC stage	L / 8	ANY
TRX	L / 4	TRX



4.3 Sub-rack and modules organization

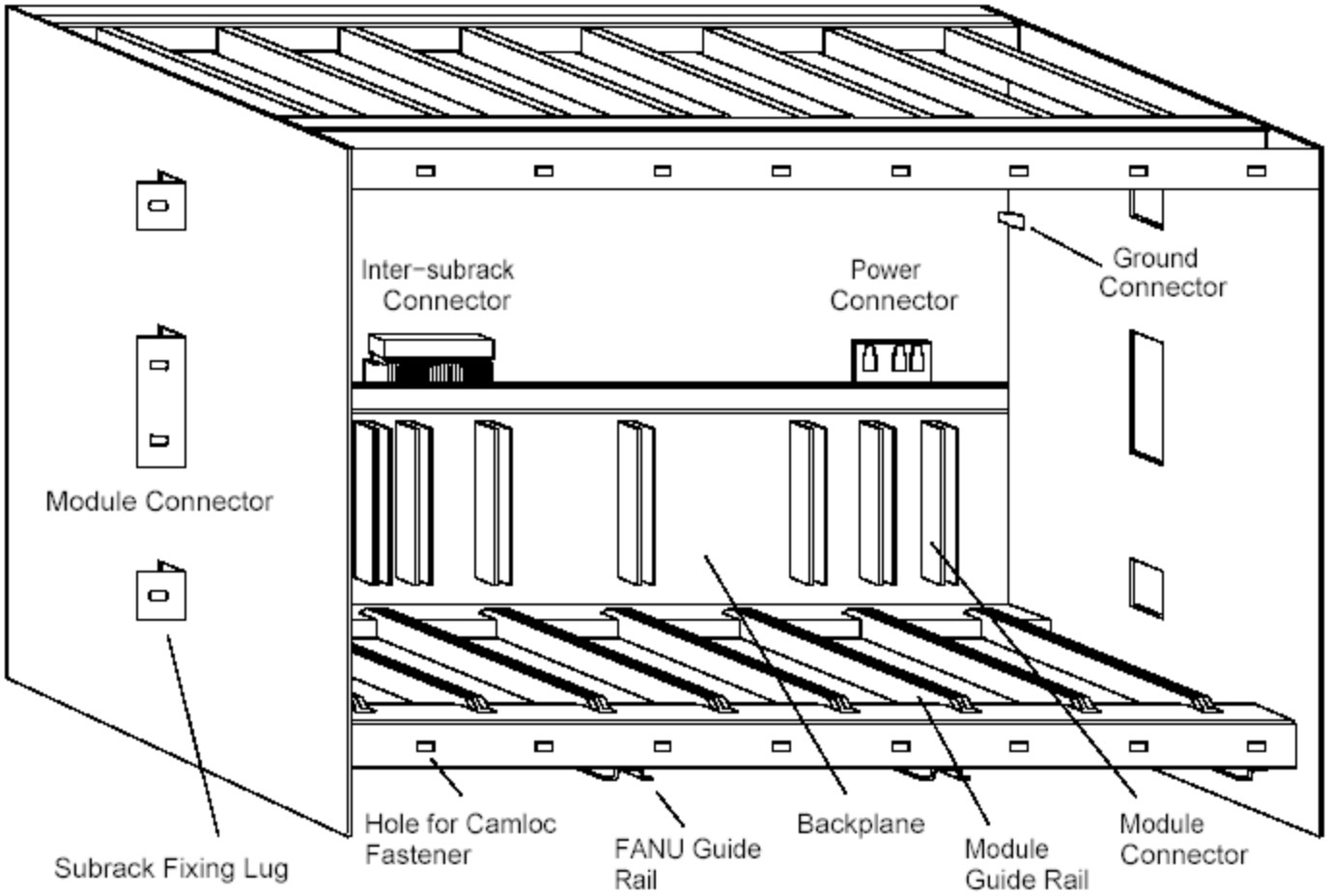
The following figure gives an example of indoor and outdoor 3*4 configuration:

Outdoor MBO2 3x4 **Indoor MBI5 3x4**

Figure 8: Sub-rack organization - configurations examples

STASR Shelf

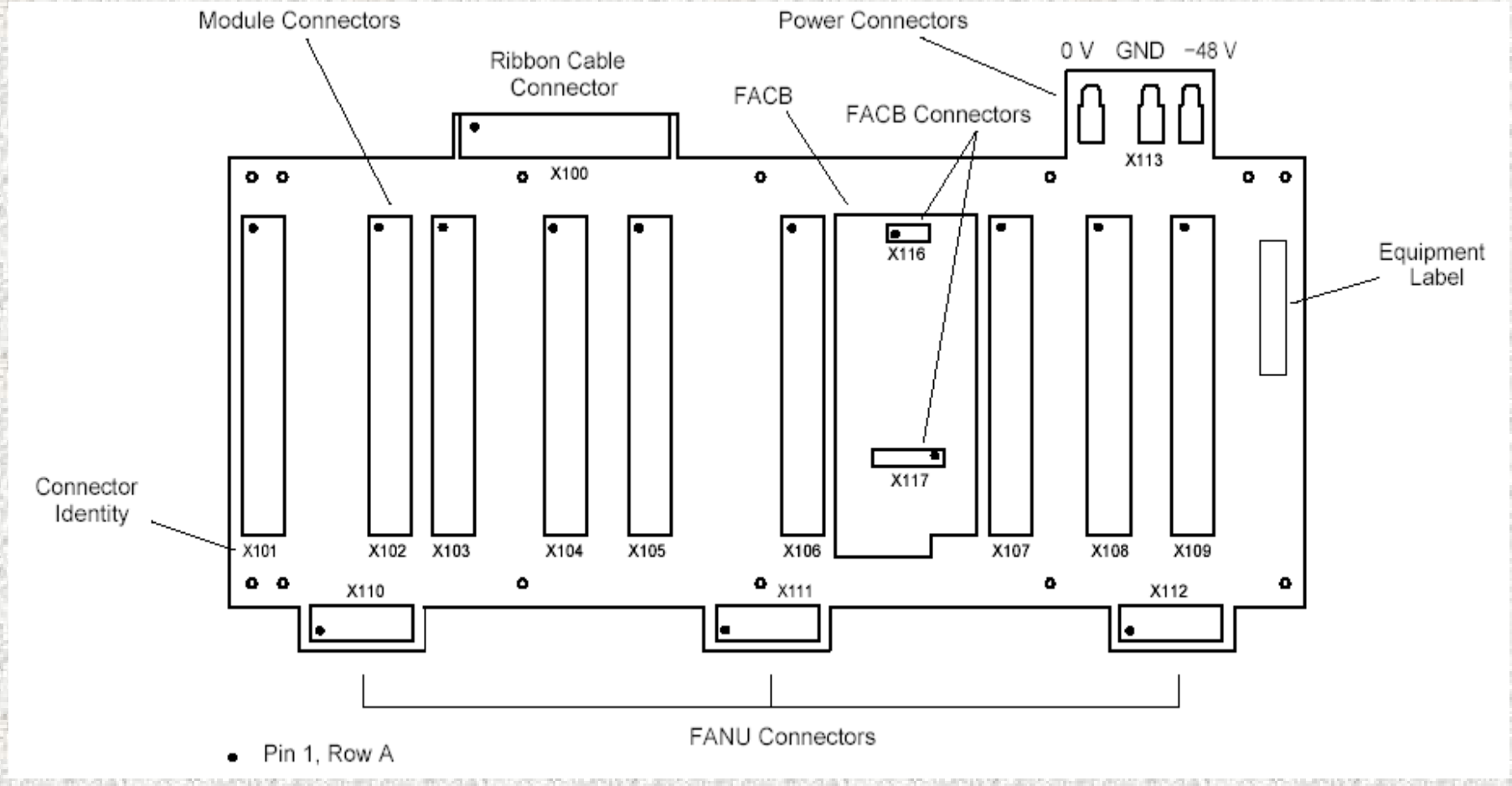
The following figure shows the STASR with no modules fitted.



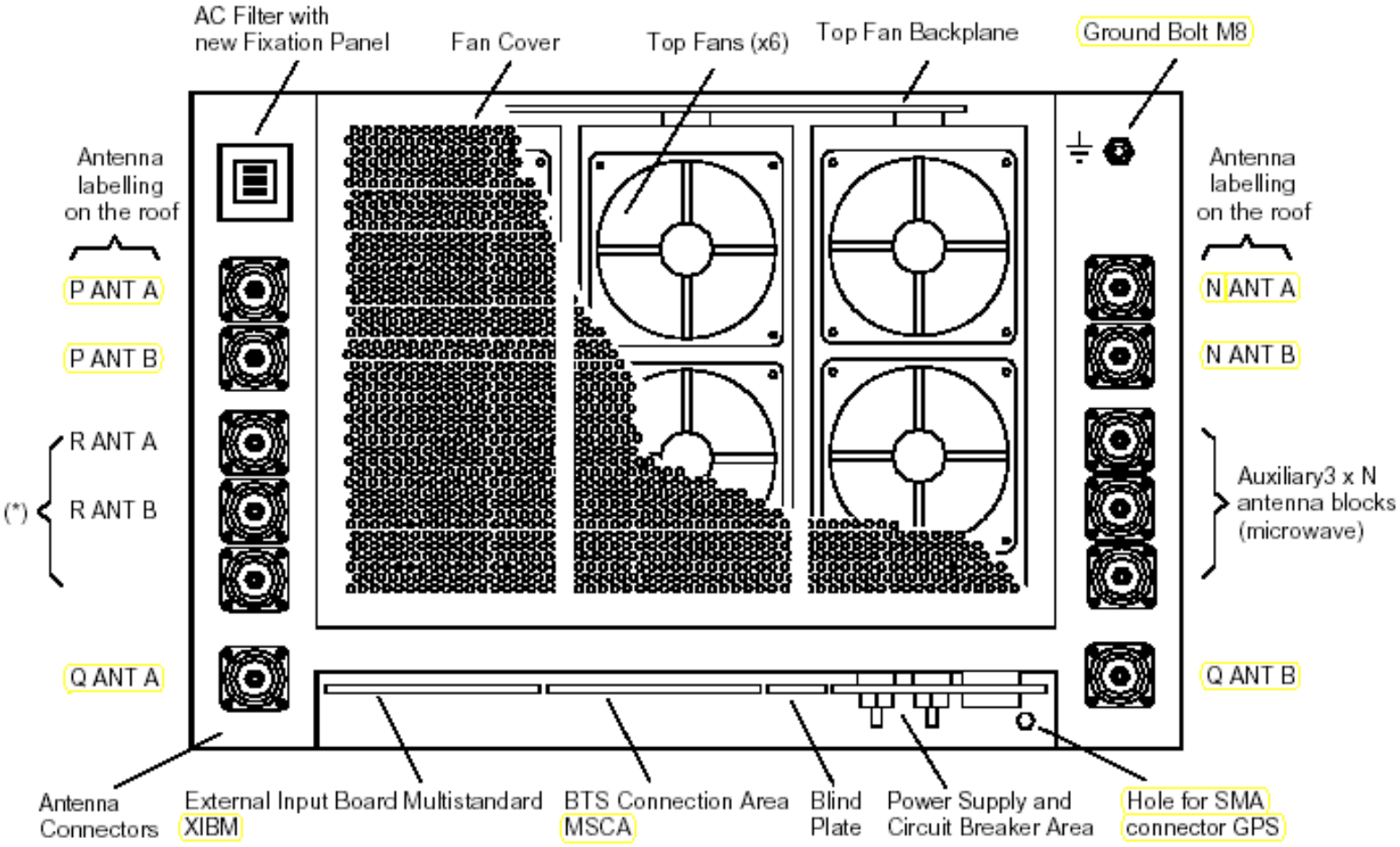
STASR: Standard Telecommunication Sub-rack

STASR BACK-PLANE

Connector Layout Front View



MBI Rack Top View

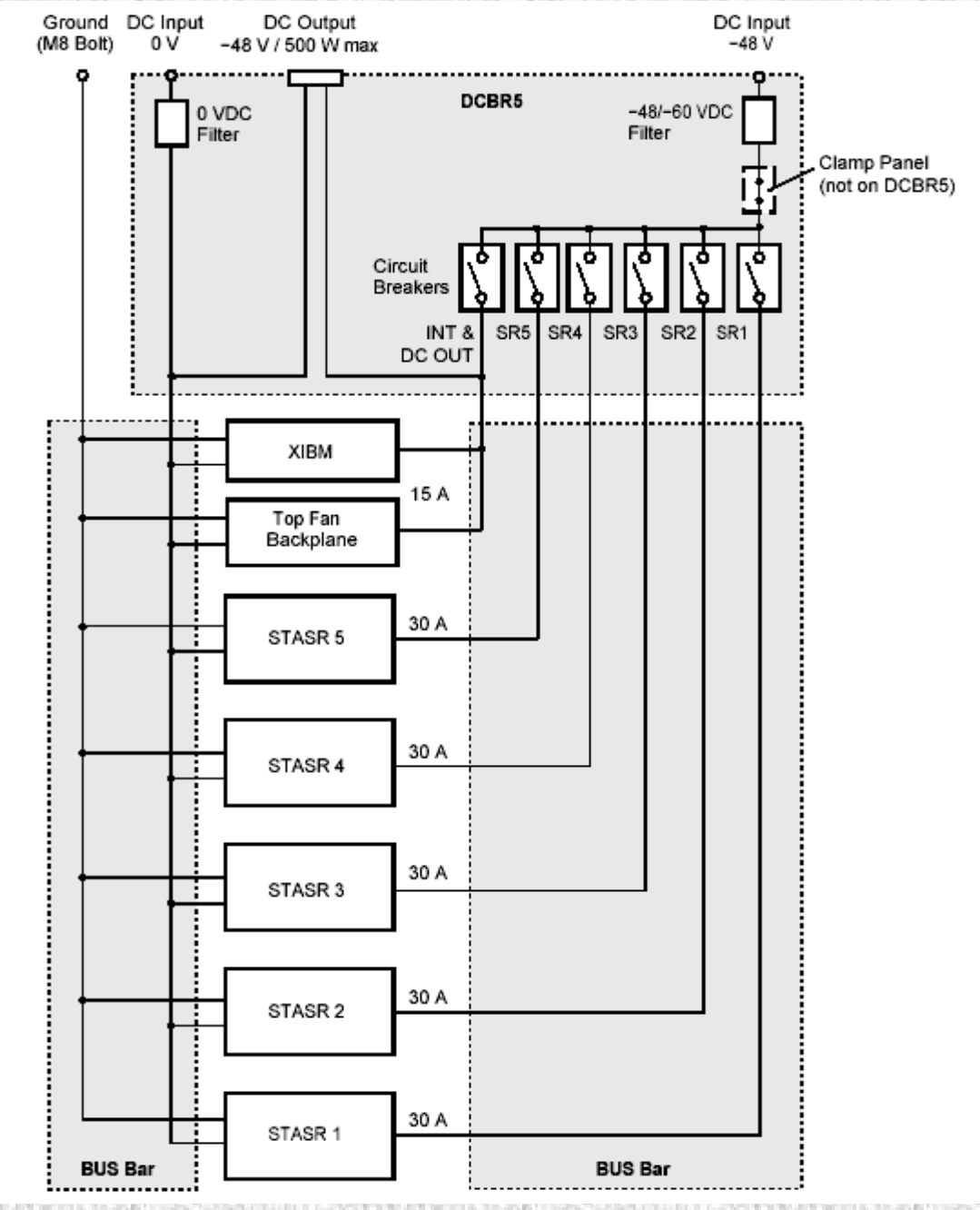


(*) Auxiliary 3 x 7/16 antenna blocks

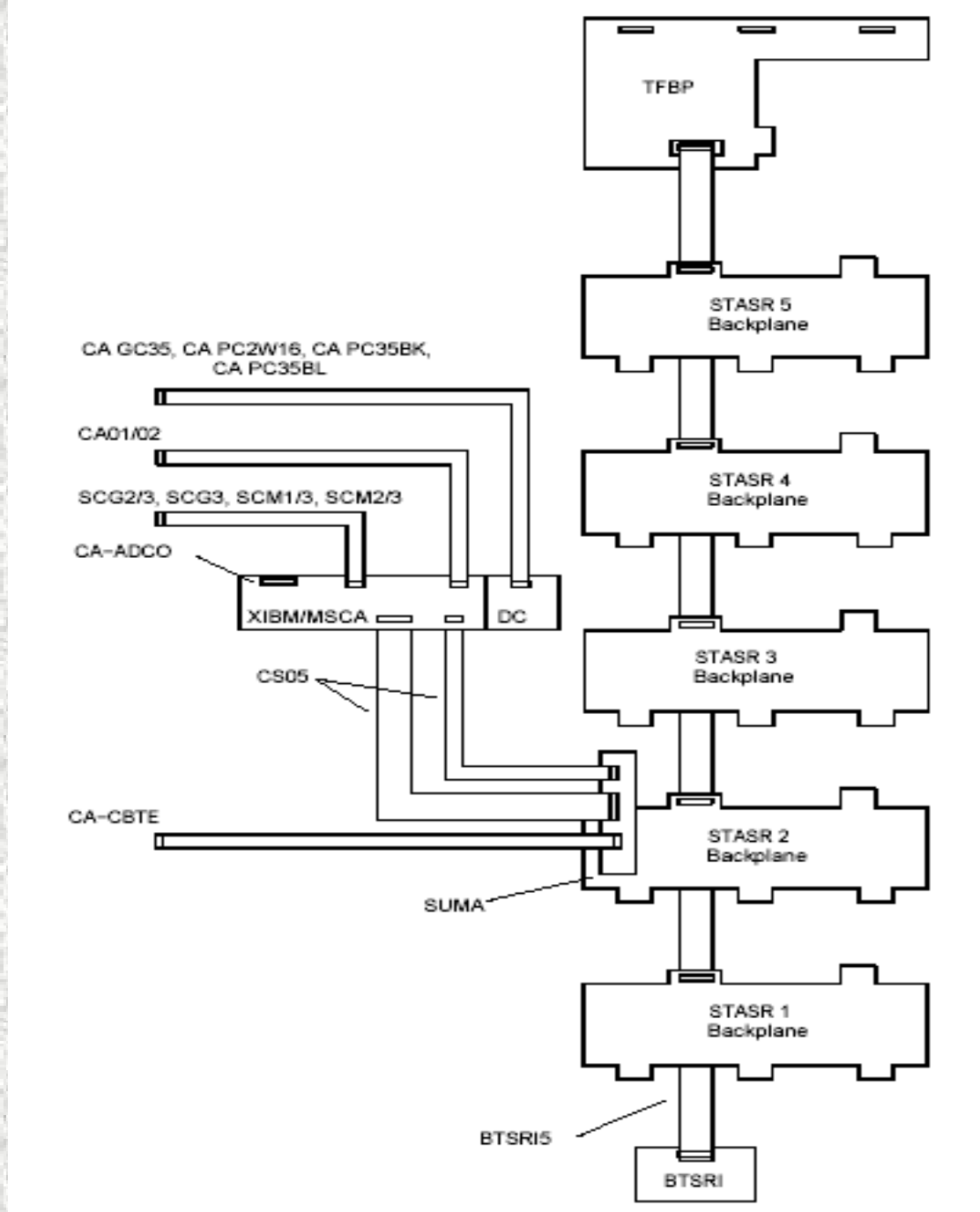
Note: Antenna connectors are not necessary completely equipped.

Figure 199: MBI3/MBI5 Top View

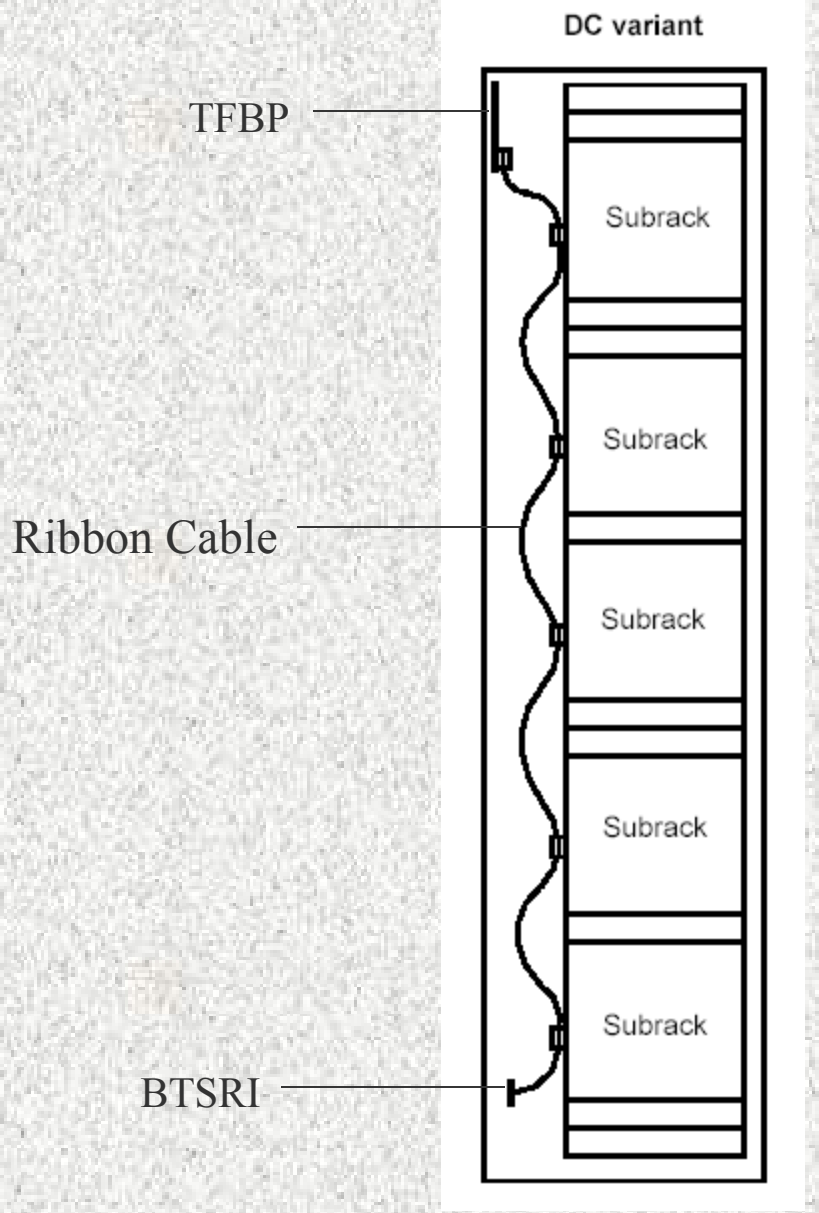
MBI5 DC Power Interconnections



MBI5 Data and Control Cabling



MBI5 Subracks Interconnection cabling



Naming Conventions for the BTS Configurations

1x1...4	means 1 sector with up to 4 TREs
3x1...2	means 3 sectors with up to 2 TRXs per sector
1x1...2/1x1...2	means Multiband configuration, with 1 sector and up to 2 TREs in Band 1, and 1 sector and up to 2 TREs in Band 2
1x(...2/...2)	means Multiband configuration, with 1 sector and up to 2 TREs in each band

Table 6: Naming Conventions Used for the BTS Configurations

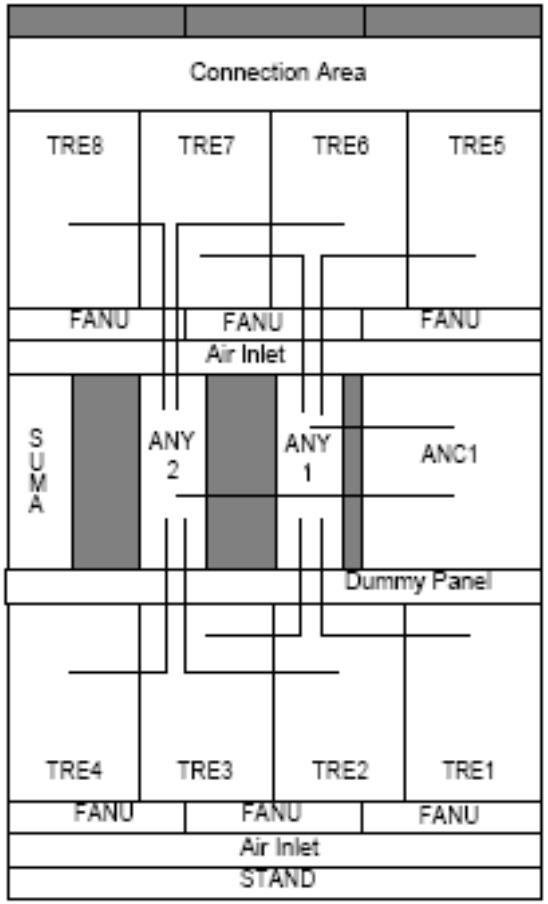
CONFIGURATION NOMENCLATURE

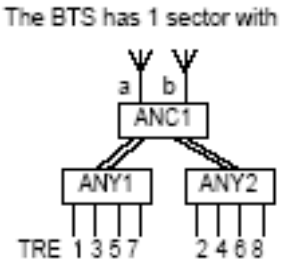
Different type of Configurations

BTS-9100-IND-MBI5-1N, 1P, 1Q TRX900 (MBI5 1,1,1G)
BTS-9100-IND-MBI5-2N, 2P, 2Q TRX900 (MBI5 2,2,2G)
BTS-9100-IND-MBI5-3N, 3P, 3Q TRX900 (MBI5 3,3,3G)
BTS-9100-IND-MBI5-4N, 4P, 4Q TRX900 (MBI5 4,4,4G)
BTS-9100-IND-MBI3-4N, 0P, 0Q TRX900 (MBI3 4,0,0G)

BTS-9100-OUT-MBO2-1N, 1P, 0Q TRX900-2HU-BU90 (MBO2-1, 1G)
BTS-9100-OUT-MBO2-2N, 2P, 0Q TRX900-2HU-BU90 (MBO2-2, 2G)
BTS-9100-OUT-MBO2-1N, 1P, 1Q TRX900-2HU-BU90 (MBO2-1, 1, 1G)
BTS-9100-OUT-MBO2-1N, 1P, 1Q TRX1800-2HU-BU90 (MBO2-1, 1, 1D)

BTS-9100-MBI3-8N,0P,0QG (MBI3 8,0,0G)





If more than 4 TREs, 2 ANYs are required. Pre-equipment possible

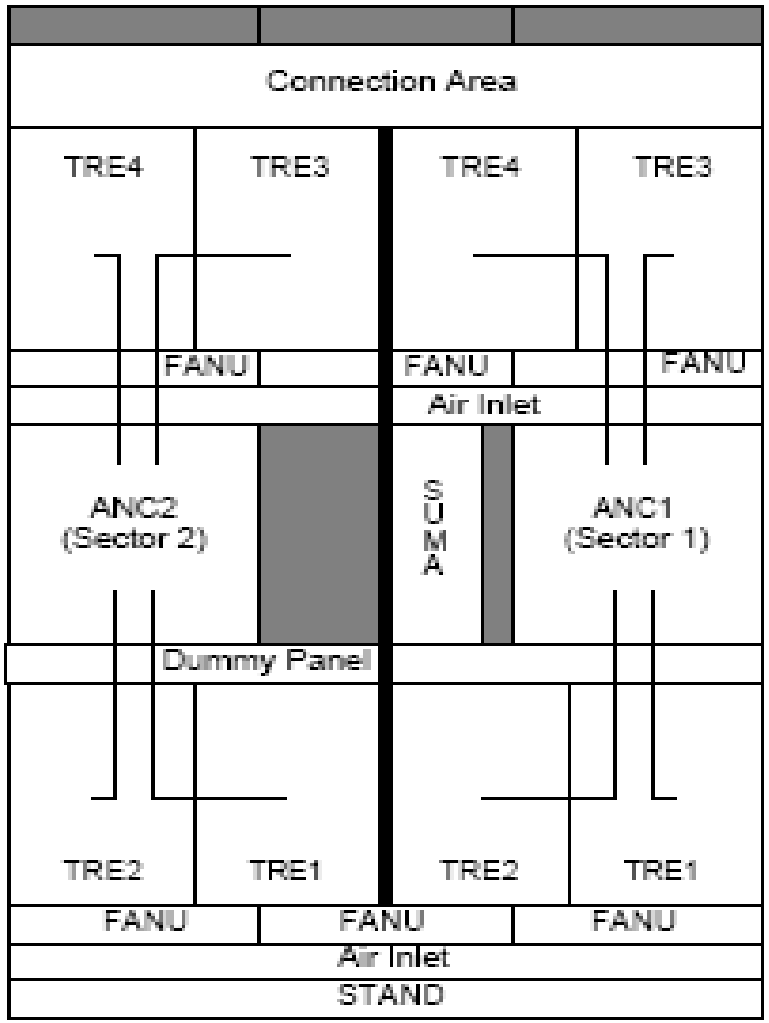
Up to 4 TREs, and if no ANY pre-equippec the TRE1 to TRE4 are directly connected to the ANC

The ANC can be replaced by the ANB in case of less than 3TREs

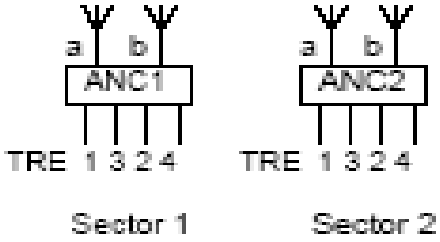
Empty space

Figure 47: MBI3- 1x1...8 - DC Configuration

BTS-9100-MBI3-4N,4P,0QG (MBI3 4,4,0G)



The BTS has 2 sectors:
- Sector 1 with n TREs,
- Sector 2 with p TREs

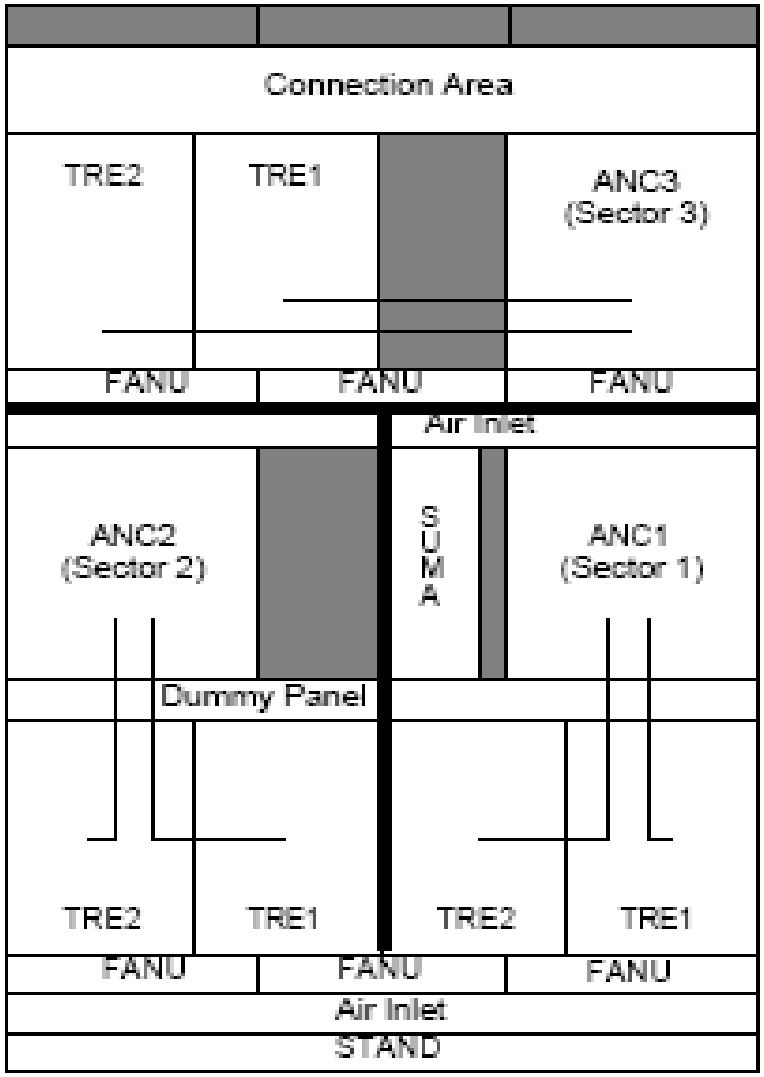


The ANC can be replaced by the ANB in case of less than 3TREs

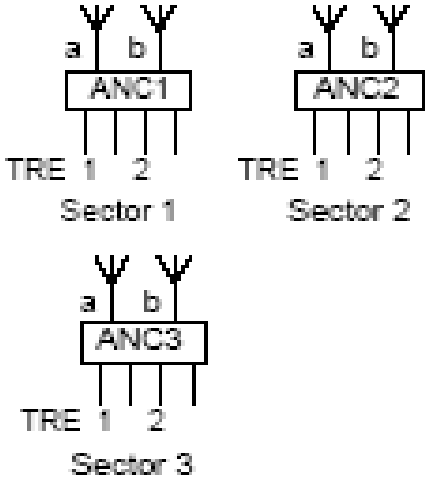
Empty space

Figure 49: MBI3 - 2x1...4 - DC Configuration

BTS-9100-MBI3-2N,2P,2QG (MBI3 2,2,2G)



The BTS has 3 sectors:
- Sector 1 with n TREs,
- Sector 2 with p TREs,
- Sector 3 with q TREs

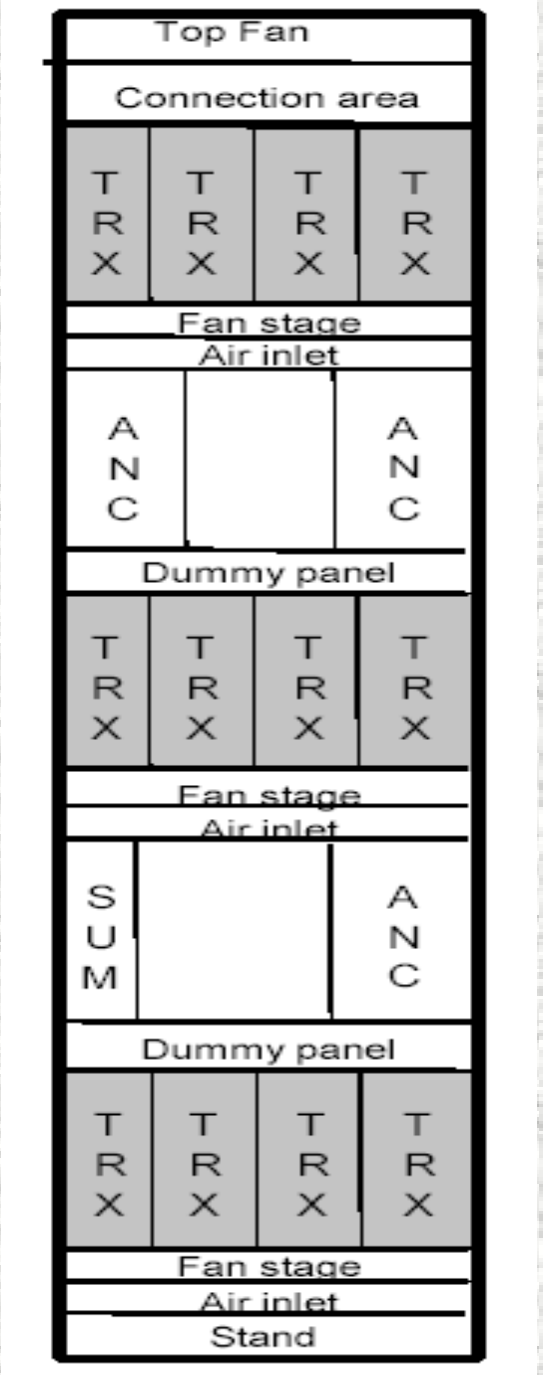


The ANC can be replaced by the ANB also

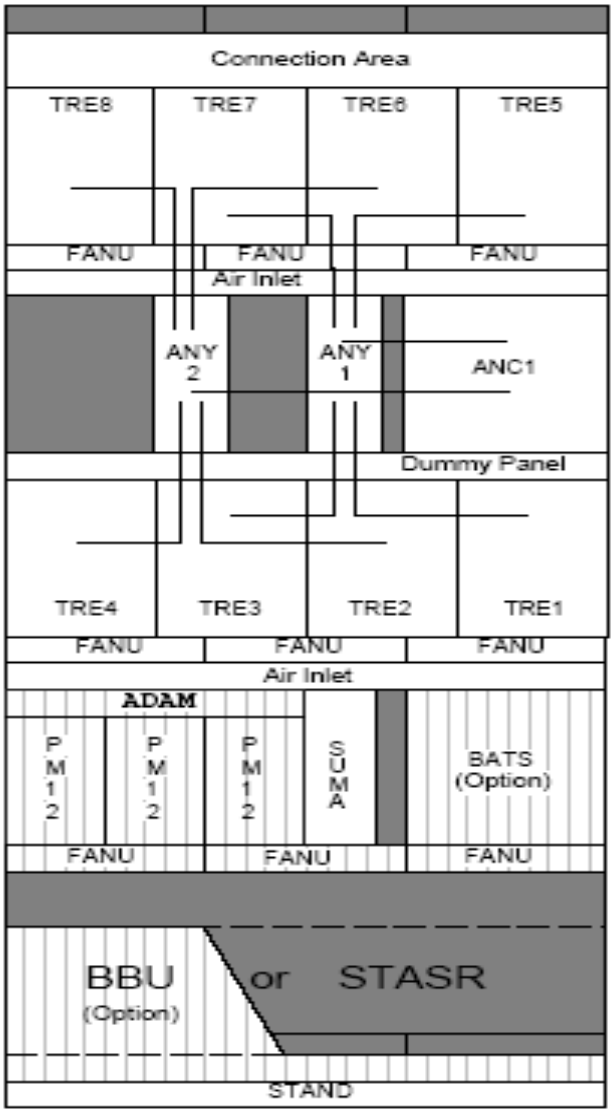
Empty space

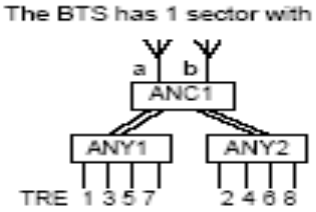
Figure 51: MBI3 - 3x1...2 - DC Configuration

MBI5 with 4,4,4 Configuration



BTS-9100-MBI5-8N,0P,0QG (MBI5 8,0,0G)





If more than 4 TREs, 2 ANYs are required. Pre-equipment possible

Up to 4 TREs, and if no ANY pre-equipped the TRE1 to TRE4 are directly connected to the ANC

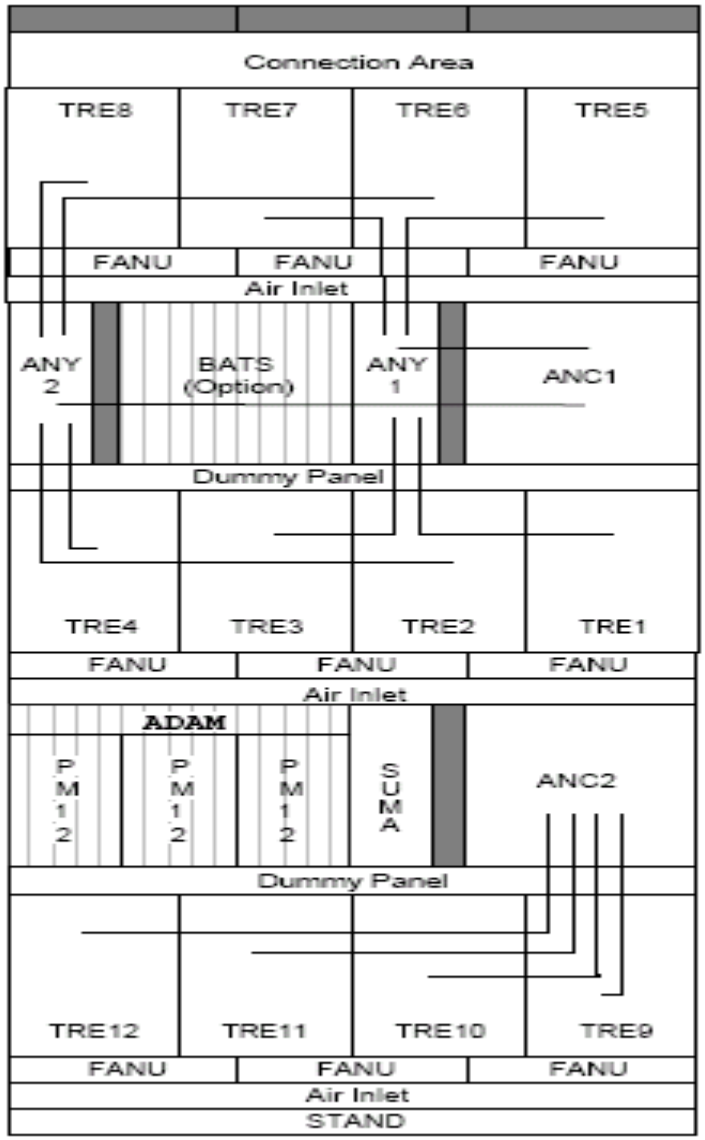
The ANC can be replaced by the ANB in case of less than 3TREs

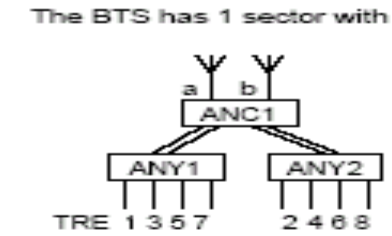
Modules present only in AC configuration

Empty space

Figure 53: MBI5 - 1x1...8 - AC or DC configuration

MBI5 - 1x9...12 (Low Loss) - AC or DC





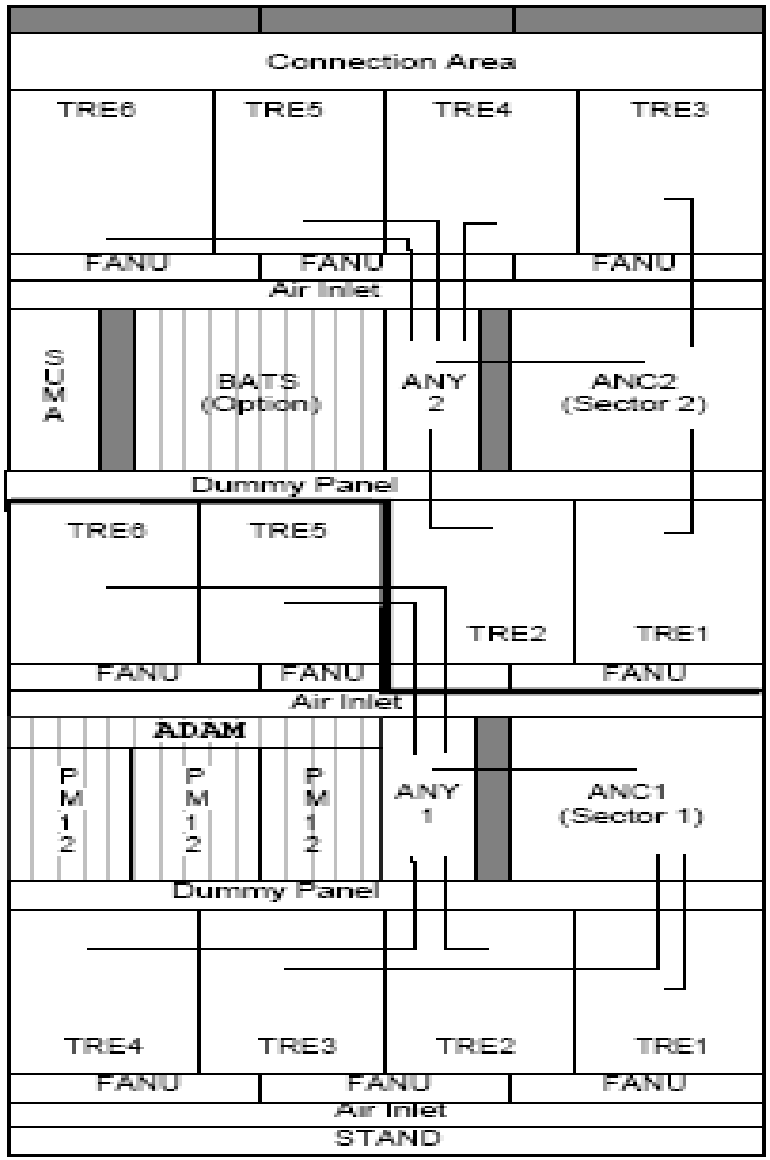
Both ANCs are set to the same sector number

Modules present only in AC configuration

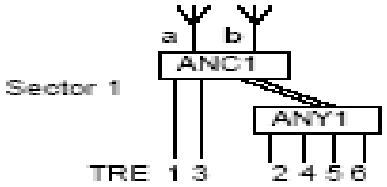
Empty space

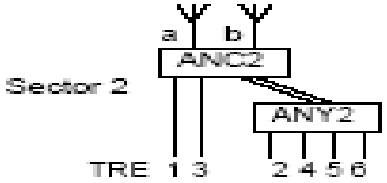
Figure 54: MBI5 - 1x9...12 (Low Loss) - AC or DC Configuration

BTS-9100-MBI5-6N,6P,0QG (MBI5 6,6,0G)



The BTS has 2 sectors:
- Sector 1 with n TREs,
- Sector 2 with p TREs





In each sector:
If no more than 4 TREs, no ANY is required. TRE1 to 4 are then cabled on ANC.

The ANC can be replaced by the ANB in case of less than 3TREs

Modules present only in AC configuration

Empty space

Figure 56: MBI5 - 2x1...6 - AC or DC Configuration

BTS-9100-MBI5-4N,8P,0QG (MBI5 4,8,0G)

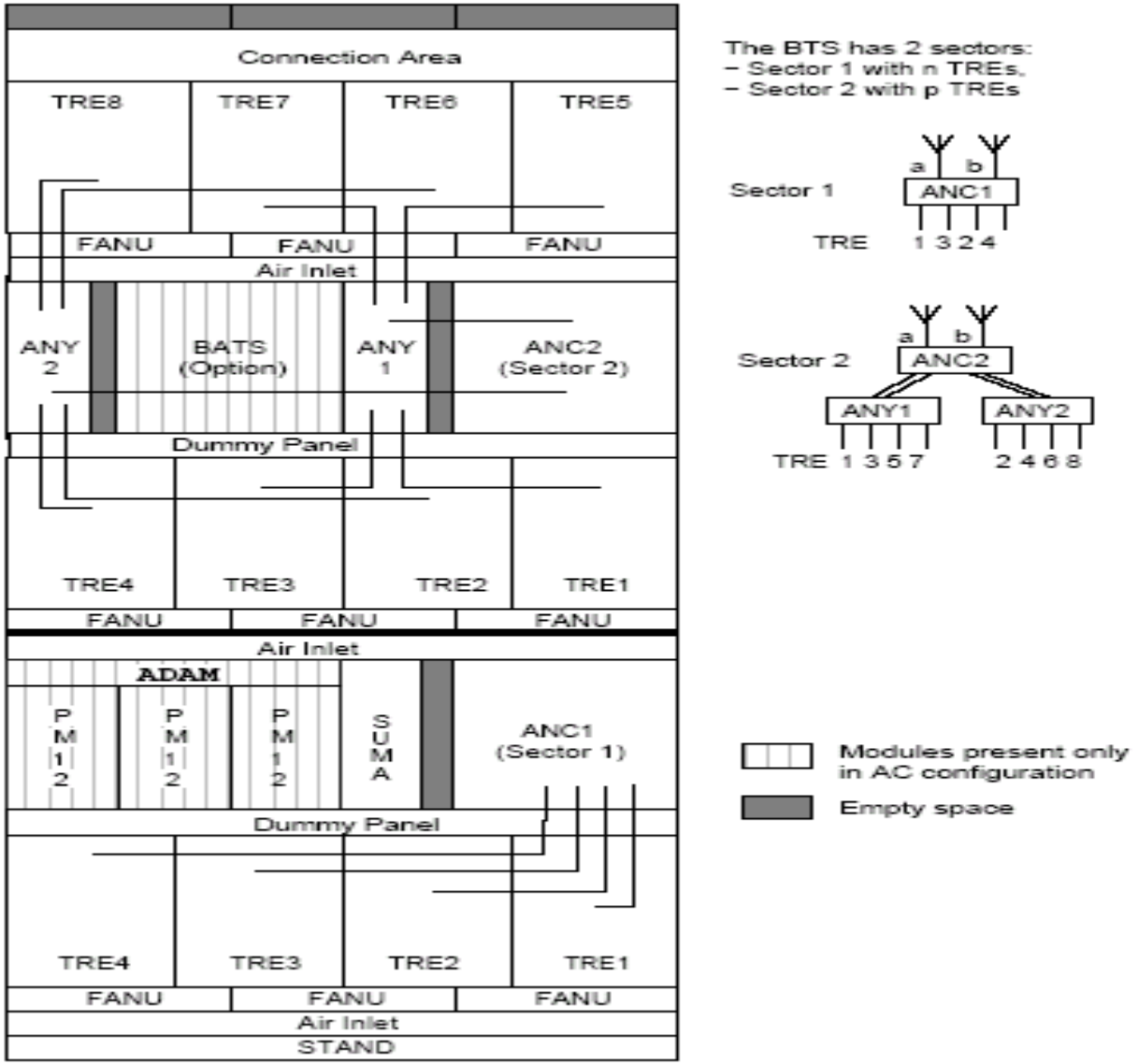


Figure 57: MBI5 - 1x1...8 + 1x1...4 - AC or DC Configuration

BTS-9100-MBI5-4N,4P,4QG (MBI5 4,4,4G)

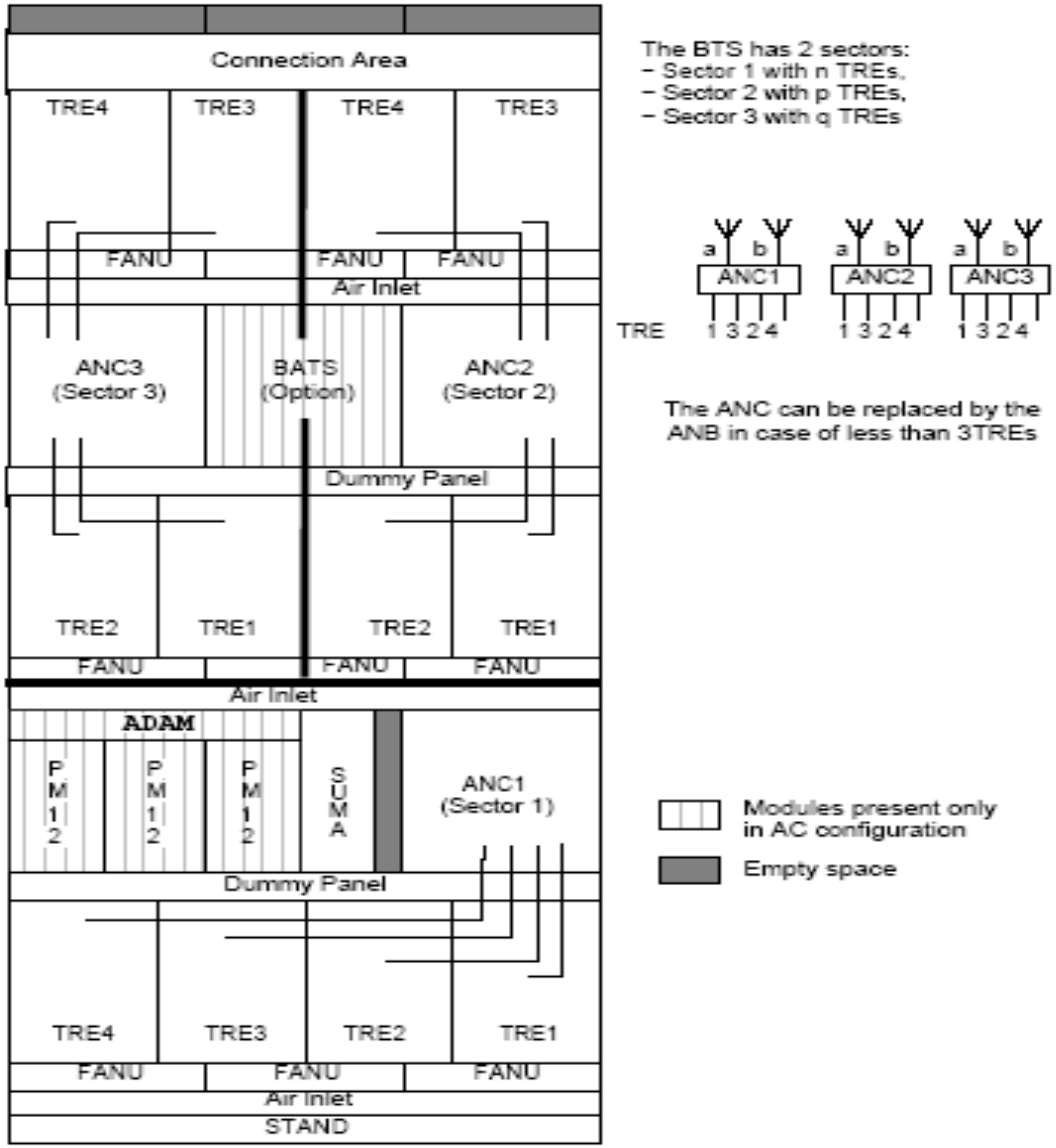
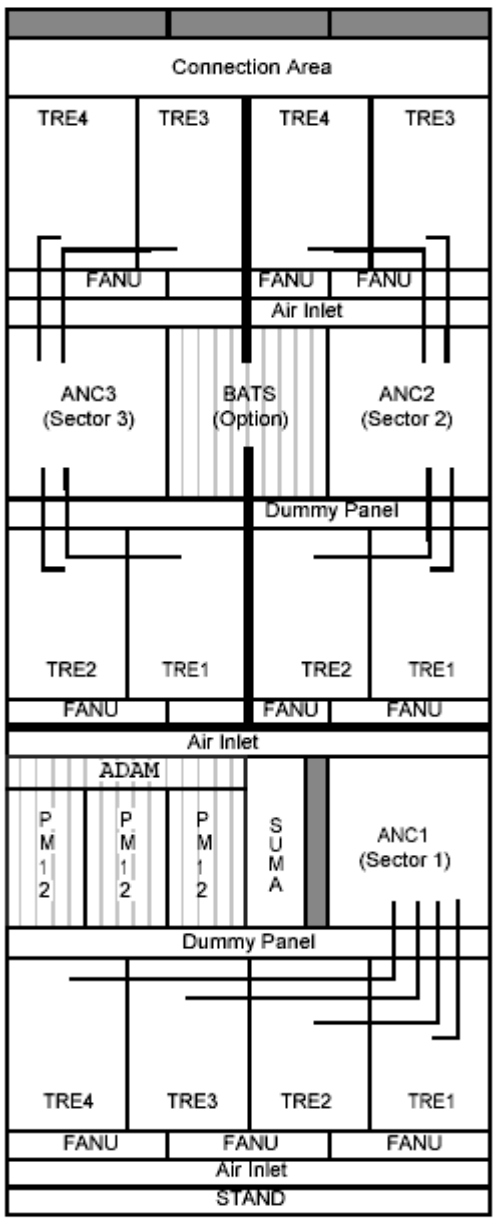


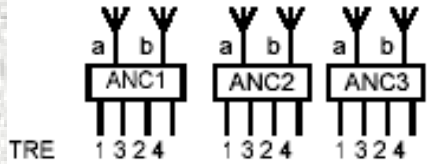
Figure 59: MBI5 - 3x1...4 - AC or DC Configuration

BTS-9100-MBI5-4N,4P,4QG (MBI5 4,4,4G)

Note:
Cards ADAM, PM12, and BATS(Opt) are used in AC version.



The BTS has 3 sectors:
- Sector 1 with n TREs,
- Sector 2 with p TREs,
- Sector 3 with q TREs

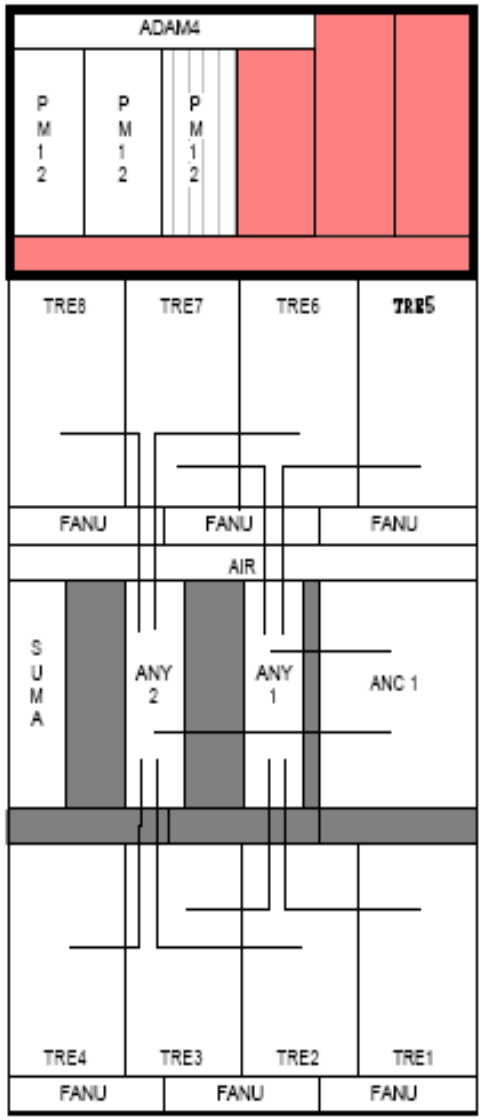


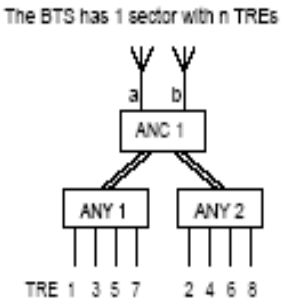
The ANC can be replaced by the ANB in case of less than 3TREs

Modules present only in AC configuration

Empty space

BTS-9100-MBO1-8N,0P,0QG-HU (MBO1 8,0,0G-HU)





The ANC can be replaced by the ANB in case of less than 3TRE 5

If more than 4 TREs, 2 ANY are required
Pre-equipment possible

Up to 4 TREs, and if no ANY pre-equipment, the TRE1 to TRE4 are directly connected to the ANC

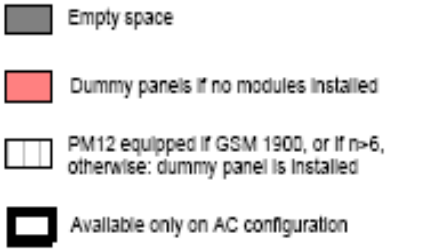
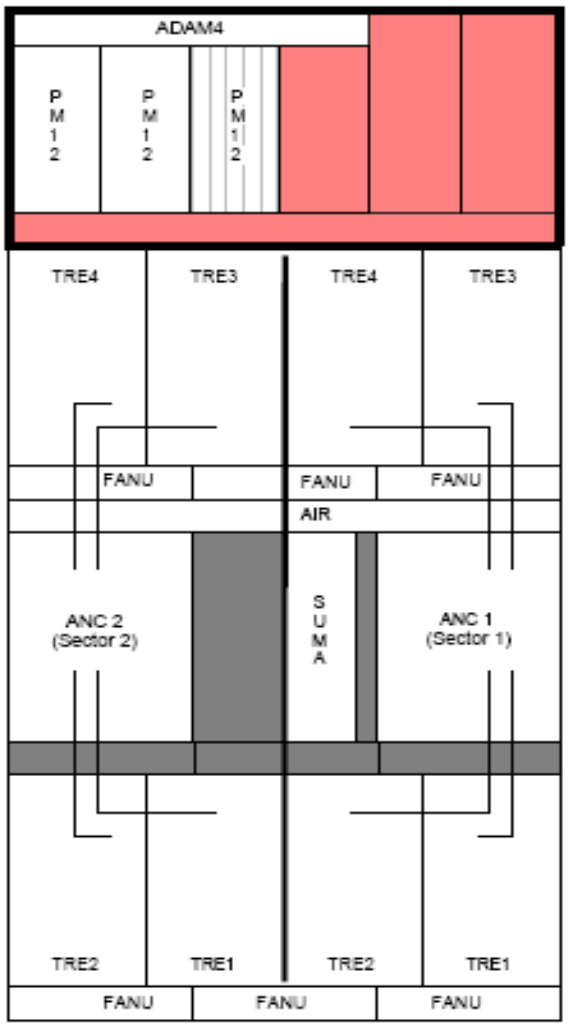
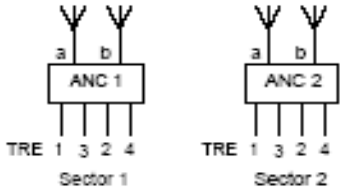


Figure 139: MBO1 - 1x1...8 Configuration

BTS-9100-MBO1-4N,4P,0QG-HU (MBO1 4,4,0G-HU)



The BTS has 2 sectors:
- Sector 1 with n TREs
- Sector 2 with p TREs



The ANC can be replaced by the ANB in case of less than 3TRE S

Empty space

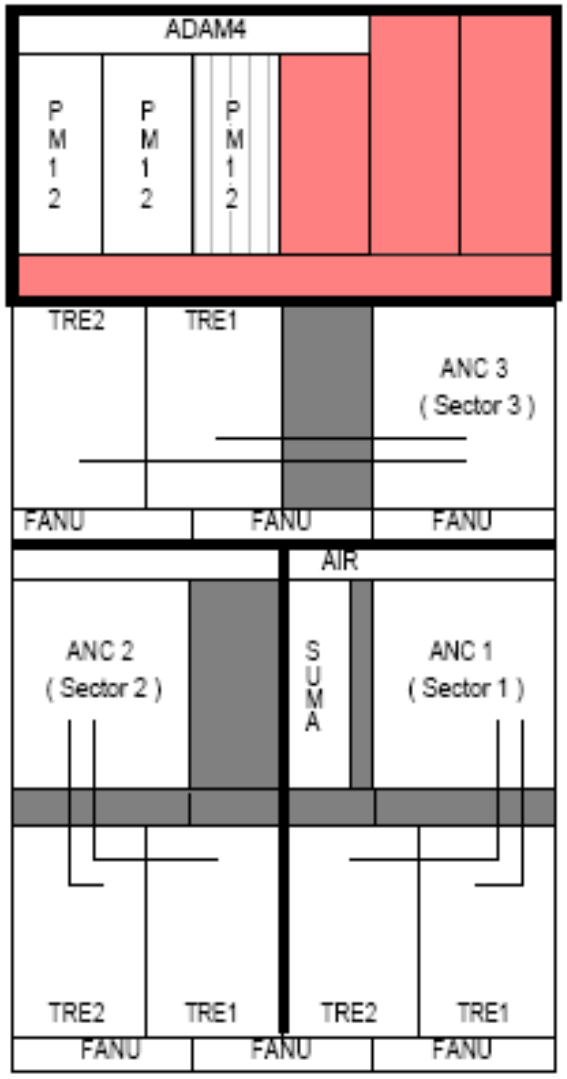
Dummy panels if no modules installed

PM12 equipped if GSM 1900, or if (n+p)>6, otherwise: dummy panel is installed

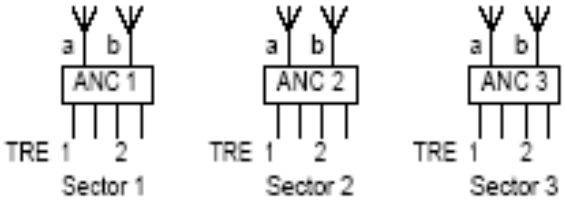
Available only on AC configuration

Figure 140: MBO1 - 2x1...4 Configuration

BTS-9100-MBO1-2N,2P,2QG-HU (MBO1 2,2,2G-HU)



The BTS has 3 sectors :
- Sector 1 with n TREs
- Sector 2 with p TREs
- Sector 3 with q TREs



On each ANC:
The bridges can be removed at installation time (on site), if maximum power is required

The ANC can be replaced by the ANB in case of less than 3TRE S

Empty space

Dummy panels if no modules installed

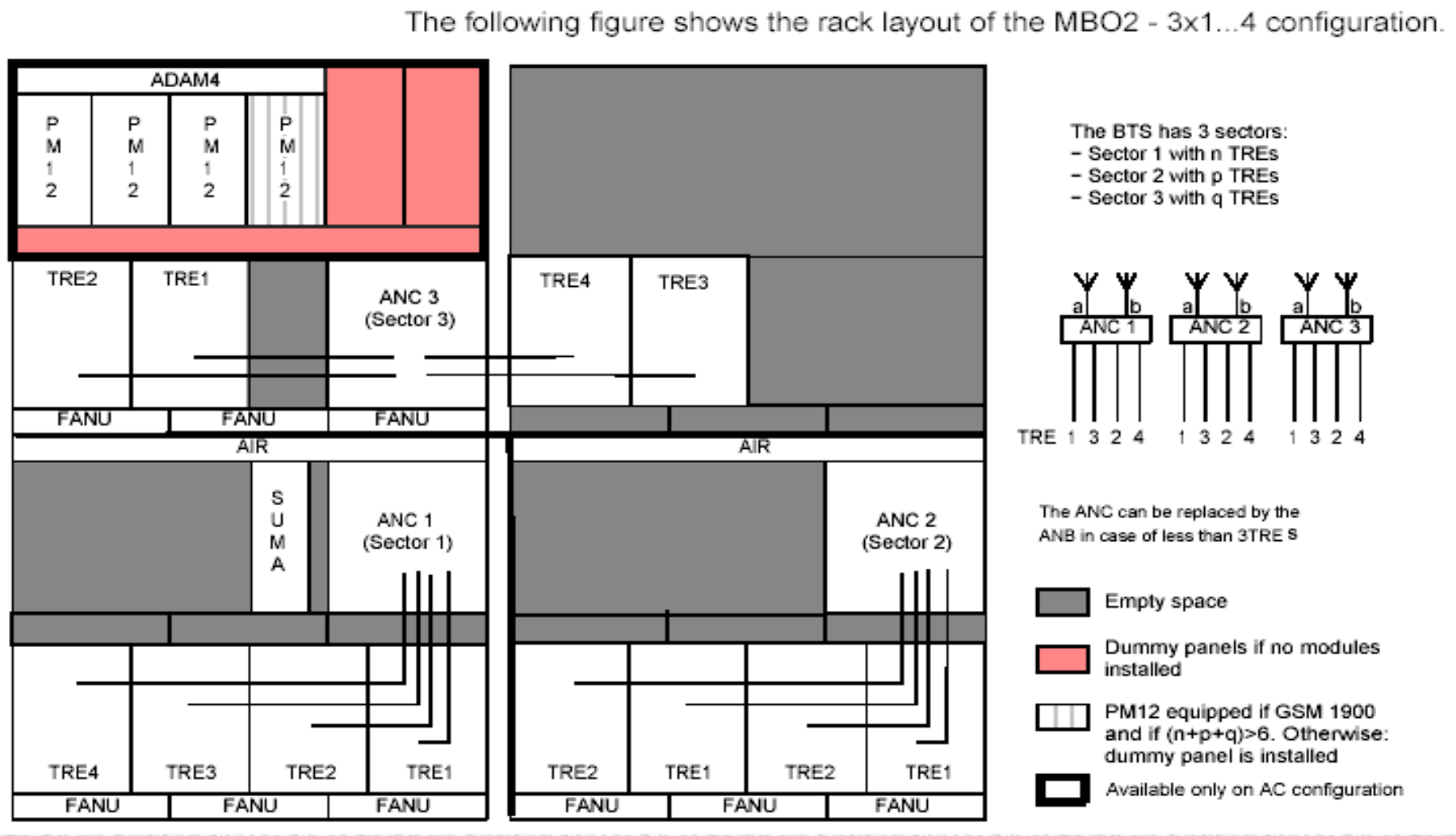
PM12 equipped if GSM 1900, otherwise: dummy panel is installed

Available only on AC configuration

Figure 141: MBO1 - 3x1...2 Configuration

OUTDOOR – BTS

BTS-9100-OUT-MBO2-4N, 4P, 4Q TRX900-2HU-BU90 (MBO2-4, 4,4G)



MBO2: Multistandard Base Station Outdoor

Present status of the Product with BSNL QA

-Indoor BTS MBI model with upto GPRS,EDGE compatibility only has been offered till date.

-The BTS offered is for GSM 900 only.

-TSEC is yet to be issued due to want of some GR non compliances

-At present only despatch clearance were issued and no Ics were issued for want of TSEC.

-Out door BTS has not been offered yet for TSEC.

END.