Prepared (also subject responsible if other)		No.		
ETL/G/S Peter Barwick		192 02-FGC 101 901		
Approved	Checked	Date	Rev	Reference
ETL/G/S Karl-Eric K Malberg		16/02/2006	B	

OMS 1200 Family R3.x

Compatibility and Composition Rules

Abstract:
INFORMATION FOR ERICSSON USER

Note from Product Management:
This document (not to be issued to customers) provides visibility of the OMS 1200 Family Composition Rules for R3.x. This document should be used in conjunction with the Provisioning and Control Document to generate a 'Bill of Quantities' for Customer Solutions. The BOQ will be a list of Marconi Saleable Entity Codes (SE).
Both Hardware and Software are purchased using Marconi SE Codes

Marconi is part of the Ericsson group. The Ericsson Optical Network is a transport network portfolio provided in conjunction with Marconi. It includes SDH and DWDM NE's and a common NMS system.
The portfolio is both broad and complete.

SMA ULTRA COMPACT AND EXPANDED ULTRA COMPACT PROVISIONING CONTROL DOCUMENT

This is a Marconi Communications Specification authorised for use by:

Nick Kings
SMA1/4/16 Engineering Manager
AC4521
Product Engineering
Beeston

The information contained herein is the responsibility of and is approved by the following, to whom all enquiries should be directed in the first instance:

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0.1 CONTENTS

0.2 HISTORY

Change No.	Issue	Details Of Change
N/A	1a	First Draft Issue Author: Name Andy Hargreaves Department AC4521 Site Beeston
N/A	1	First issue. Changes incorporated after review of issue 1a. Author: Name Andy Hargreaves Department AC4521 Site Beeston
ECN6031022	2	SE codes added for SFPs (+ description change) Bracket information changed 1.5M References removed EMC ME and SE codes added IPS table added Author: Name Andy Hargreaves Department AC4521 Site Beeston
ECN6031823	3	Following SE codes added:- SFP-E SU65AA 140M Trib & LTU SN64CF STM-1e Trib and LTU SP65TA Release 3 Backup S/W and LCT CD-ROM SP81C EOW SP52A Blank Optical Module KOP SP73A LCT (Windows 2000) NH40F LCT (Windows XP) NH40G Following SEs modified:- SMA1/4UC Core SP03A Horizontal mounting/Cooling assembly SP03B STM-1 Optical line Modules SU66**/SU67** Generic Trib EMC Cover SP73EA 140M Gen Trib Front access SN64CE 45M Trib and LTU SP63A DIN Options removed SN44AA/AC/AE/AG/AH Following SEs removed:- SMA LCT Software SA80A Various text updated. Weights, MTBF and dimensions added for UC units Section 14 (recommended cabling) text removed Author: Name Andy Hargreaves

		Department AC4521 Site Beeston
ECN6032549	4	Extensive Saleable entity structure/code changes. Separate CQA document created which will be used as the authority on Saleable Entities. Main text changes. Section 19 (SE structures removed) and references to CQA (Structures Document) added. Section 14 text added (previously just had a title) Section 10 Extensively updated (Software) and details from previous section 18 (now deleted) incorporated. Author: Name Andy Hargreaves Department AC4521 Site Beeston
ECN6033263	5	New issue to add EX configuration information. Section 2 updated slightly to introduce EX sub-rack and STM-4/16 Core. Section 4 – "EX Product Structure" added to give details of EX configuration rules. Section 5 – "SMA Ultra Compact and Extended Ultra Compact (UC & EX) Saleable Entities" updated to add new EX SEs.
	6	Updates for R3.3.1 Product Release:
	7	Core SEs updated to remove s/w on CF card - must now be ordered separately. New UC Cores SP03AC & SP13AC introduced with PWR/LCT LTU removed. New PWR/LCT LTU SEs SP03DA & SP03DB introduced for use with SP03AC & SP13AC from Q1 2006. Fan Tray removed from SMA16EC & EX SEs and equipping rules updated. EX Power Feed Protection LTU SE SP97AD replaced by SP20D. Comms/Aux/Ancillary in SP53B replaced by Enhanced Comms/Aux/Ancillary. 2M Trib SE SP60C now calls up 2M card Version 2. SMA UC AC Power & Battery Backup SEs introduced

0.3 ISSUE CONTROL

Date	21 Mar 2003	25 Apr 2003	09 June 2003	03 Nov 2003	13 Sep 2004	04 Nov 2004	29 Nov 2004	17 May 2005	04 Nov 2005
Section All	1a	1	2	3	4	5A	5	6	7

0.4 REFERENCES

0.5.1	1QDE10274AAU-YYA	Installation Guide for SDH Transmission Equipment.
0.5.2	1ADA61787AAF-BTA	Architecture Specification for SMA1/4 UC
0.5.3	1AFB60007AAJ-YBA	Netguide – Optical Budget Data
0.5.4	1QDA60005ACM-YYA	Marketing Export Controls Procedure Spec
0.5.5	1QAA20148AAW-YYA	Generic Hardware Procurement Specification
0.5.6	EN50082-1	European Standard (Class B - EN55022)

0.5.7	ETS 300 019-2	Equipment Engineering (EE):European Telecommunications Standard for Equipment Practice; Engineering Requirements for Subracks in misc Racks and Cabinets
0.5.8	EN 300 386-2	European Standard: Equipment Engineering Telecommunication Network Equipment Electromagnetic Requirements Part 2 Product Specific Compliance Criteria and Operating Conditions
0.5.9	ES 201 468	Enhanced Availability of Service Level
0.5.10	ETS 300 132-2	Equipment Engineering (EE):Power Supply Interface at the input to Telecommunications Equipment
0.5.11	BTR 2511	British Telecommunications Requirements for Telecommunication Power Requirements
0.5.12	EN 60950	European Standard: Safety of Information Technology Equipment including Electrical Business Equipment
0.5.13	EN 60825-1	European Standard: Safety of Laser Products
0.5.14	1ADR60693AAB-CTA	Series 4 SMA Provisioning Control Document
0.5.15	1ADR60773AAC-CQA	SMA UC Structures and Rules Document
0.5.16	1ADR60674AAX-CTA	Provisioning Control Document for ETSI Rack and Associated Parts
0.5.17	03ADR00001AAF-CTA	Packetspan II Product Provisioning Control Document

0.5 GLOSSARY OF TERMS

ADM	Add Drop Multiplexer
ATM	Asynchronous Transfer Mode
AUI	Adaption Unit Interface
CF	Compact Flash
DFW	Dual Fibre Working
ETA	Ethernet Traffic Adapter
LCT	Local craft terminal
LTU	Line termination unit
MM	Multimode
MTBF	Mean time between failures
PSU	Power supply unit
SDH	Synchronous digital hierarchy
SFW	Single Fibre Working
SMA1/4UC	SMA1/4 Ultra Compact
STM-1/4	Synchronous transport module
VC	Virtual container
VC-12	Virtual container level (12)
VCAM	Virtual container access module
VCTS	Virtual container transport system
ME	Manufacturable Entity
SE	Saleable Entity

End of section

1 INTRODUCTION

This document specifies the provisioning and control rules for the Marconi Communications SMA1/4 Ultra Compact Product.
The purpose of this document is to enable sales, commercial and planning to provision the product into SDH networks.

End of Section

2 OVERVIEW OF THE PRODUCT

2.1 SMA1/4UC

The SMA1/4UC is a full feature ADM, optimized for both SDH ring and terminal applications. The product is intended for applications requiring high volume 2Mbit/s transport at STM-1, for light traffic STM-4 applications that require the flexibility and protection options provided by a SIU sub-rack format. The equipment is also targeted for use in street/radio cabinets. It offers a flexible range of service deliveries including Ethernet. The product is also ideal for multi-tenanted buildings; it has the capacity to serve multiple businesses whilst minimizing space requirements.

It provides delivery of STM-1/4 SDH functionality to the customer together with SDH ring and protected terminal applications through two line interfaces.

The SMA1/4UC can be deployed in mobile radio networks for the collection and consolidation of traffic from radio base stations. The product has an extremely small footprint and flexible mounting options, vertical or horizontal, makes effective use of space.

The SMA1/4UC is designed and built on the highly successful SMA and MSH product range. This will complement these products which are already deployed extensively in SDH Access Networks (in street cabinets, local exchanges and directly on customer premises). The SMA1/4UC can be deployed in networks with the existing Marconi SDH products. They can be used in mixed rings with and subtended from the existing ADMs.

The **SMA1/4UC** is managed by Marconi's Network Management, MV38, the Element Management system, MV36, or by a local terminal.

2.1.1 Main Features

- Next generation SDH Add/Drop Multiplexer with full, non-blocking, VC-12 cross connection capability.
- Compatible with the Marconi Corporations range of synchronous multiplexers.
- Two Line interfaces supporting ring and protected terminal applications.
- Support of SNCP and 1+1 MSP traffic protection.
- STM-1 (155 Mbit/s) and STM-4 (622 Mbit/s) aggregate options.
- Full, non-blocking, VC-12 cross connect capability

Traffic ports:

- 2Mbit/s, 34Mbit/s, 45Mbit/s, STM-1 (optical and electrical), STM-4
- Ethernet 10 BaseT & 100 BaseT
- Support of I.421 for primary rate ISDN.
- TCM for termination of inter-operator paths.

- Comprehensive configuration, fault and performance management features.
- Compact design, suitable for customer premises, meeting Class B EMC requirements.
- 4 port STM-1/4 multi-rate card with SFP modules offering flexibility and a full range of optical and electrical interfaces.

2.1.2 Add/Drop-Based Applications

Conventional SDH Add/Drop Multiplexers, designed for rack mounting in a network-operator environment, are being deployed in increasing numbers to deliver services to business customers with high bandwidth and high Quality of Service (QoS) requirements. The **SMA1/4UC** allows the operator to target the next tier of small and medium business customers, with a cost-effective solution designed specifically around customer-premises requirements in terms of environment and capacity.

The **SMA1/4UC** can be deployed, as Network Termination Equipment (NTE), on customer premises. Applications include campus rings and multi-tenanted buildings. It will be deployed either as a terminal, in hubbing architectures, or as a ring based ADM. Traffic protection may be employed for both these applications, either 1+1 Multiplex Section Protection (MSP) or Sub Network Connection Protection (SNCP). The solution brings the major benefits associated with SDH delivery into the customer premises.

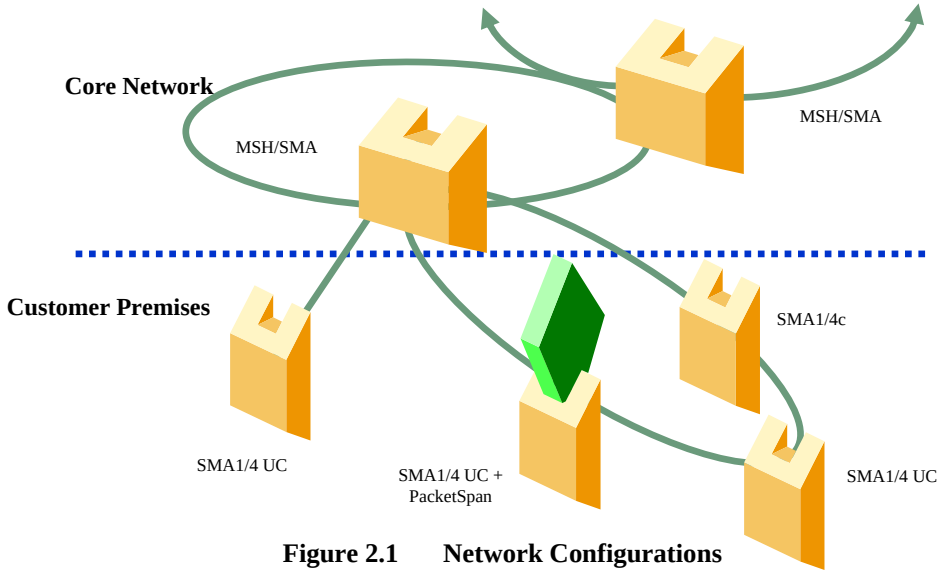


Figure 2.1 Network Configurations

The product will also be deployed in mobile radio networks for the collection and consolidation of traffic from radio base stations. Other applications will see the **SMA1/4UC** deployed within the access network, particularly in street side cabinets.

Example applications include telephony where the product will be deployed alongside Primary Multiplexers, delivering narrow-band services to residential customers.

The **SMA1/4UC** is designed to meet the ETSI and UK standards for Class B EMC, together with climatic, safety and regulatory standards appropriate to this environment.

2.1.3 Point to Point Applications

Although intended as a solution for integration within an SDH Network, the **SMA1/4UC** can also be used for point to point systems. This configuration can be used to support up to 63 x 2 Mbit/s for services such as 2 Mbit/s leased lines, direct connection to PBX's and data.

2.2 SMA1/4EX

The SMA1/4EX is a larger version of the SMA1/4UC offering equivalent functionality to the SMA1/4UC and the following extra features:

- Maximum capacity of 252 x 2Mbit/s balanced tributary access within the sub-rack.
- Maximum capacity of 126 x 2Mbit/s unbalanced tributary access within the sub-rack. (252 x 2Mbit/s unbalanced can be provided using balanced LTUs and external balanced-unbalanced conversion).
- 1:N 2 Mbit/s protection.
- Three generic tributary slots each having 2 x STM-1 bandwidth.
- Two generic tributary slots each having 4 x STM-1 bandwidth.
- Duplicated power LTU.

2.3 SMA1/4/16UC/EX

2.3.1 STM-4/16 Core Unit

The SMA1/4UC/EX uses the STM-1/4 Core/CCU unit.

A new type of Core/CCU provides unduplicated STM-4/16 interfaces. This unit will be useable in both UC and EX sub-racks and provide upgrade to STM-16 aggregate line rate.

The SMA4/16UC/EX will operate in the same way as the SMA1/4UC/EX with the following exceptions.

- Two-fibre MS-SPRING at STM-4 and STM-16 line rates can be provided.
- The STM-4/16 Core/CCU has only one bi-directional STM-4/16 interface per unit therefore MSP operation is not provided.
- Two further generic tributary slots, each having 4 x STM-1 bandwidth, are available.

2.3.2 SMA1/4/16 and UC/EX Options

There will be four basic configurations of the product.

- SMA1/4UC UC sub-rack with STM-1/4 Core/CCU card.
- SMA1/4EX EX sub-rack with STM-1/4 Core/CCU card.
- SMA4/16UC UC sub-rack with STM-4/16 Core/CCU card.
- SMA4/16EX EX sub-rack with STM-4/16 Core/CCU card.

Note that the EX version of sub-rack will only support the following STM-1/4 tributary cards.

- 4 Port STM-1/4 multi-rate card (with SFP modules).
- 2 port fixed STM-1 electrical interface (required for STM-1 operation with card protection).
- STM-4 VC-4 C/V contiguous to virtual concatenation conversion tributary.

2.4 NETWORK MANAGEMENT

The Network Management is via the Marconi Network Management System, MV38.

The network management information is carried over a DCC channel contained in the SDH Section Overhead (SOH). From R3.4 rev it is also possible to transport a DCC channel via a 2Mbit/s port using the Enhanced Comms/Aux/Ancillary card, please refer to section 10.1 for full details.

The SOH also provides an auxiliary channel for the transport of network management information for co-located equipment from Marconi Communications or third party equipment.

Management of the **SMA1/4/16UC/EX** is via the Marconi Element Management System, MV36, and/or the LCT.

The equipment management operations systems utilize Marconi standard workstation terminal, for providing management and control of the element.

Software download may be achieved from the LCT, or from the Element Manager MV36.

2.5 EXPORT LICENCE

It is the business' responsibility to ensure that an appropriate export licence covers any equipment manufactured or procured for export. In most cases, it is sufficient to use an Open general export licence (OGEL) for that equipment that do not employ any controlled items in their manufacture. Where controlled items are employed, an application for an individual licence **must** be applied for before exports can be permitted. Refer to the Marketing Export Controls Procedure specification, 1QDA 60005 ACM-YYA if guidance is required.

End of section

3 UC PRODUCT STRUCTURE

Figure 3.1 below shows the subrack layout of the SMA1/4 Ultra Compact.

The equipment can be seen as a set of component parts that are present in all configurations (the Core), plus other cards that are required in varying quantities depending on application.

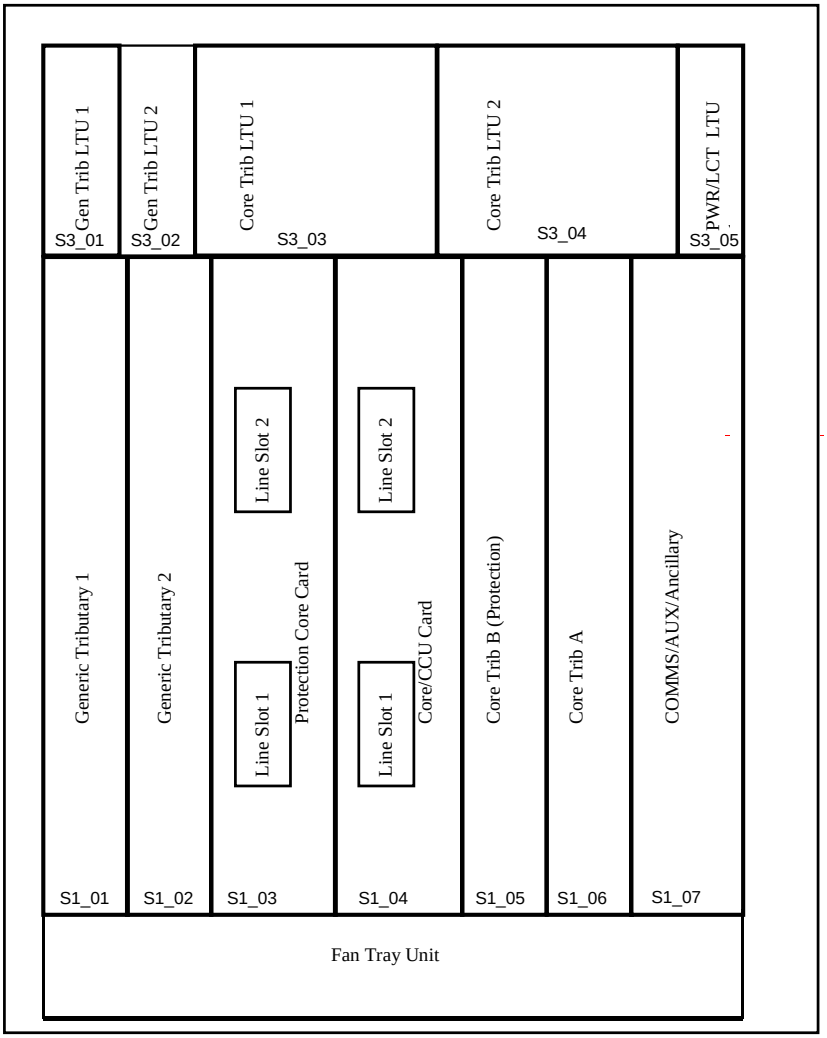


Figure 3.1 – UC Subrack Layout

3.1 EQUIPING/CONFIGURATION RULES

In order to realise a particular customer selected configuration the steps set out below should be followed.

	Shelf Configuration/Equipping Step	Notes
1	Select the Core (mandatory)	See section 5.1
2	Select the Power LTU (9 pin or 3 pin - mandatory) (from Q1 2006 with SP03AC & SP13AC UC Cores)	See sections 5.2.2.1 & 5.2.2.2
3	Select forced cooling if required.	See section 5.2.1.3
4	Select Core Protection if required (also needed if 2M Prot is to be selected)	See section 5.2.1
5	Select line modules required for use on Core and Protection units.	See section 5.3
6	Select 2M Core Trib Option if required.	See section 5.4.1
7	Select 2M Core LTU options	See section 5.4.1.2
8	Select 2M Core Trib protection if required. (also needed if Core Protection is to be selected)	See section 5.4.1.3
9	Select type of Generic trib required in slot 1	See section 5.5
10	Select required Generic Tributary slot 1 LTU Note: LTU required to power Trib Card – select SP70D if no LTU traffic access required.	See section 5.5
11	Select type of Generic trib required in slot 2	See section 5.5
12	Select required Generic Tributary slot 2 LTU Note: LTU required to power Trib Card – select SP70D if no LTU traffic access required.	See section 5.5
13	Select Comms/AUX/Ancillary Card if required	See section 5.6
14	Select required EMC covers	See section 5.7
15	Select required backup and LCT S/W if required.	See section 5.8
16	Select miscellaneous and kits of parts if required.	See section 5.9

3.1.1 Configurable card options for each card slot – SMA-1/4UC

Please refer to Figure 3.1 and see section 5 for details.
Notes:-

1) Options of do not fit are also possible. An EMC cover then covers the spare slot.
2) The assemblies fitted into the Core Trib LTU slots are actually a composite of two items. One item is an extender card and one is a front panel card. These two items are fitted together during installation before pushing the entire assembly into the appropriate slot.

Slot	Slot Name	Card Options	Card Code	Comments
S1_01	Generic Trib 1	Various	Various	See Section 5.5
S1_02	Generic Trib 2	Various	Various	See Section 5.5
S1_03	Protection Core Card	Protection Core Card or Core/CCU Card	1HAT61114AAT 1HAT61105AAF	- CCU function is disabled in this slot
S1_04	Core/CCU Card	Core/CCU Card	1HAT61105AAF	
S1_05	Core Trib B (Protection)	Core Trib Card (64x2M)	1HAT61107AAK	

S1_06	Core Trib A	Core Trib Card (64x2M)	1HAT61107AAK	
S1_07	Comms/Aux/Ancillary	Comms/Aux/Ancillary	1HAT61106BAE(1)	
S3_01	Gen Trib LTU 1	3x34/45M LTU or Generic Trib Pwr LTU V1 or Generic Trib Pwr LTU V2 or 140/155M LTU	1HAM61215AAH 1HAM61218AAM 1HAM61232AAE 1HAM61228AAC	
S3_02	Gen Trib LTU 2	3x34/45M LTU or Generic Trib Pwr LTU V1 or Generic Trib Pwr LTU V2 or 140/155M LTU	1HAM61215AAH 1HAM61218AAM 1HAM61232AAE 1HAM61228AAC	
S3_03	Core Trib LTU 1	Core Trib (32x2) LTU (UNBAL) or Core Trib (32x2) LTU (BAL)	1HBA60827AAV + 1HBA60828AAX 1HBA60831AAX + 1HBA60832AAA	See note above
S3_04	Core Trib LTU 2	Core Trib (32x2) LTU (UNBAL) or Core Trib (32x2) LTU (BAL)	1HBA60827AAV + 1HBA60828AAX 1HBA60831AAX + 1HBA60832AAA	See note above
S3_05	Power/LCT LTU	Power/LCT LTU	1HAM61217AAK or 1HAM61217ABC	9 pin D connector 3 pin Power D connector
S0_01	Fan Tray Unit	SMA1/4UC Fan Tray	1HAM61219AAP	Only if required - see Section 5.2.1.3
Line Slots	Line Slot	Line Modules	See section 4.4.1	

(1) 1HAT61106AAH superseded by Enhanced Comms/Aux/Ancillary Card. See section 10.1 for details

3.2 SALEABLE ENITITIES

The items within the Product Structure are sold as Saleable Entities (SEs)
Every SE has a set of dates associated with it, each of which marks a key event during its lifecycle: -

Release of Information Date
Acceptance of Orders Date
First Time Off Date
Volume Shipment Date
Last Time Buy Date
Withdrawn Date

These dates are the responsibility of Business Support to define, review and set within IPS. They are in addition to, and differ from, Effectivity Dates, which assign a SE to Product codes.

1ADR60773AAC-CQA (see reference 0.5.15) is the authoritative guide for Saleable Entity structures on this product.

End of section

4 EX PRODUCT STRUCTURE

Figure 4.1 below shows the subrack layout of the SMA Extended Ultra Compact.

The equipment can be seen as a set of component parts that are present in all configurations (the Core), plus other cards that are required in varying quantities depending on application.

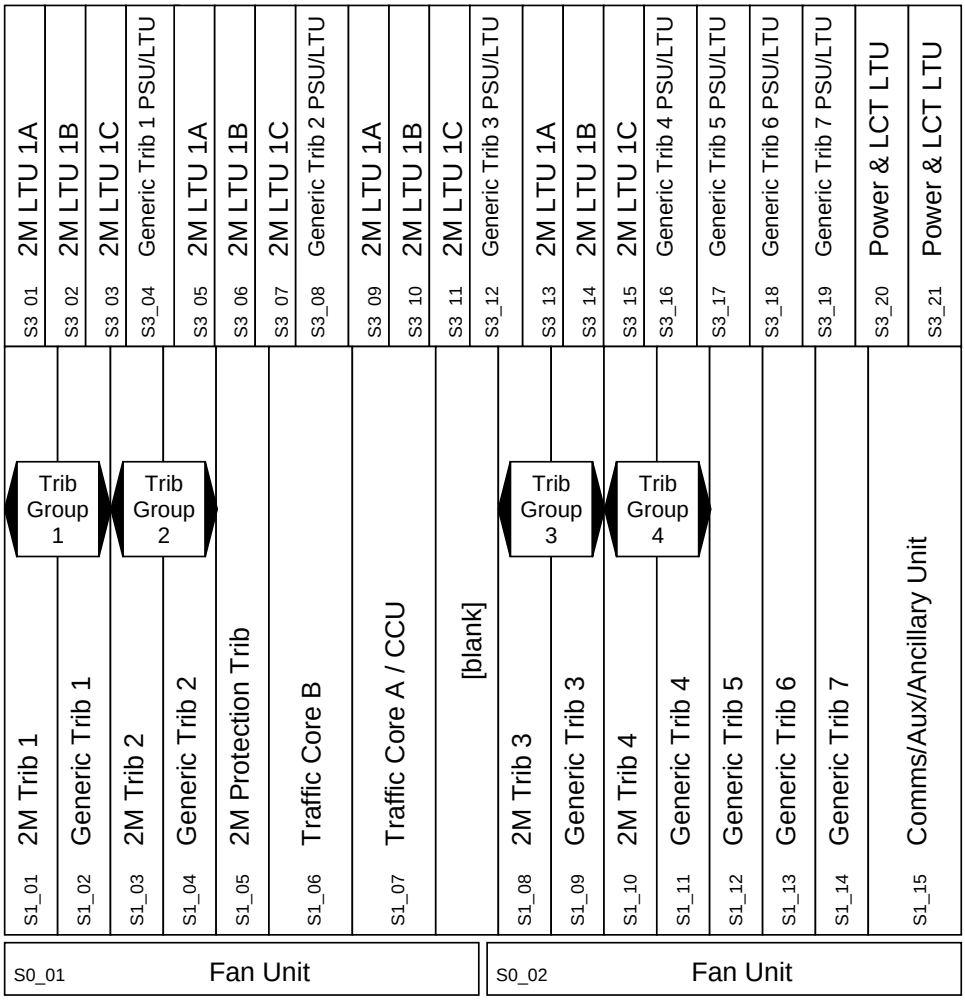


Figure 4.1 –EX Subrack Layout

4.1 EQUIPING/CONFIGURATION RULES

In order to realise a particular customer selected configuration the steps set out below should be followed.

	Shelf Configuration/Equipping Step	Slots	Notes
1	Select the Core (mandatory)	N/A	See section 5.1
2	Select narrow (19") mounting if required.	N/A	See section ???
3	Select Traffic Core B if required	S1_06	See section 5.2
4	Select forced cooling if required	S0_01, S0_02	See section 5.2.1.3
5	Select line modules required for use on Core A & B units.	N/A	See section 5.3
6	Select 2M Tribs if required	S1_01, 03, 08, 10	See section 5.4.2
7	Select 2M LTUs if required	S3_01, 02, 03, 05, 06, 07, 09, 10, 11, 13, 14, 15	See section 5.4.2
8	Select 2M Protection Trib if required	S1_05	See section 5.4.2
9	Select type of Generic Tribs required (Generic Trib cannot be fitted in same Trib Group as a 2M Trib)	S1_02, 04, 09, 11, 12, 13*, 14* (* STM-16 Core Only)	See section 5.5
10	Select required Generic Trib LTUs Note: LTU required to power Trib Card – select SP70D if no LTU traffic access required.	S3_04, 08, 12, 16, 17, 18, 19	See section 5.5
11	Select Comms/AUX/Ancillary Card if required	S1_15	See section 5.6
12	Select Protection Power & LCT LTU if required	S3_20	
13	Select required EMC covers	All	See section 5.7
14	Select appropriate build of backup and LCT S/W if required.	N/A	See section 5.8
15	Select miscellaneous items and kits of parts if required.	N/A	See section 5.9

4.1.1 Configurable card options for each card slot – SMA-EX

Please refer to Figure 4.1 and see section 5 for details.
Notes:-
1) Options of do not fit are also possible. In this case an EMC cover is than required to cover the spare slot.

Slot	Slot Name	Card Options	Card Code	Comments
S1_01	2M Trib 1	EX 63x2M Trib	03HAT00056AAQ	
S1_02	Generic Trib 1	Various	Various	See Section 5.5
S1_03	2M Trib 2	EX 63x2M Trib	03HAT00056AAQ	
S1_04	Generic Trib 2	Various	Various	See Section 5.5
S1_05	2M Protection Trib	EX 63x2M Trib	03HAT00056AAQ	
S1_06	Traffic Core B Card	1/4 Protection Core Card 16 Core B ADM Unit 1/4 Core/CCU Card 16 Core A ADM Unit	1HAT61114AAT 03HAT00041ABH 1HAT61105AAF 03HAT00041AAQ	- - CCU function is disabled in this slot CCU function is disabled in this slot
S1_07	Traffic Core A/CCU Card	1/4 Core/CCU Card 16 Core A ADM Unit	1HAT61105AAF 03HAT00041AAQ	
S1_08	2M Trib 3	EX 63x2M Trib	03HAT00056AAQ	
S1_09	Generic Trib 3	Various	Various	See Section 5.5

S1_10	2M Trib 4	EX 63x2M Trib	03HAT00056AAQ	
S1_11	Generic Trib 4	Various	Various	See Section 5.5
S1_12	Generic Trib 5	Various	Various	See Section 5.5
S1_13	Generic Trib 6	Various	Various	STM16 Core Only. See Section 5.5
S1_14	Generic Trib 7	Various	Various	STM16 Core Only. See Section 5.5
S1_15	Comms/Aux/Ancillary	Comms/Aux/Ancillary	1HAT61106BAE(1)	
S3_01	2M LTU 1A	EX 21x2M Bal LTU EX 63x2M Unbal LTU	02HAM00002AAJ 02HAM00003AAL	
S3_02	2M LTU 1B	EX 21x2M Bal LTU	02HAM00002AAJ	
S3_03	2M LTU 1C	EX 21x2M Bal LTU	02HAM00002AAJ	
S3_04	Gen Trib LTU 1	3x34/45M LTU Gen Trib Pwr LTU V2 140/155M LTU	1HAM61215AAH 1HAM61232AAE 1HAM61228AAC	
S3_05	2M LTU 2A	EX 21x2M Bal LTU EX 63x2M Unbal LTU	02HAM00002AAJ 02HAM00003AAL	- Only if 63x2M Unbal LTU is not fitted in S3_01
S3_06	2M LTU 2B	EX 21x2M Bal LTU	02HAM00002AAJ	
S3_07	2M LTU 2C	EX 21x2M Bal LTU	02HAM00002AAJ	
S3_08	Gen Trib LTU 2	3x34/45M LTU Gen Trib Pwr LTU V2 140/155M LTU	1HAM61215AAH 1HAM61232AAE 1HAM61228AAC	
S3_09	2M LTU 3A	EX 21x2M Bal LTU EX 63x2M Unbal LTU	02HAM00002AAJ 02HAM00003AAL	- Only if 63x2M Unbal LTU is not fitted in S3_05
S3_10	2M LTU 3B	EX 21x2M Bal LTU	02HAM00002AAJ	
S3_11	2M LTU 3C	EX 21x2M Bal LTU	02HAM00002AAJ	
S3_12	Gen Trib LTU 3	3x34/45M LTU Gen Trib Pwr LTU V2 140/155M LTU	1HAM61215AAH 1HAM61232AAE 1HAM61228AAC	
S3_13	2M LTU 4A	EX 21x2M Bal LTU EX 63x2M Unbal LTU	02HAM00002AAJ 02HAM00003AAL	- Only if 63x2M Unbal LTU is not fitted in S3_09
S3_14	2M LTU 4B	EX 21x2M Bal LTU	02HAM00002AAJ	
S3_15	2M LTU 4C	EX 21x2M Bal LTU	02HAM00002AAJ	
S3_16	Gen Trib LTU 4	3x34/45M LTU Gen Trib Pwr LTU V2 140/155M LTU	1HAM61215AAH 1HAM61232AAE 1HAM61228AAC	
S3_17	Gen Trib LTU 5	3x34/45M LTU Gen Trib Pwr LTU V2 140/155M LTU	1HAM61215AAH 1HAM61232AAE 1HAM61228AAC	
S3_18	Gen Trib LTU 6	3x34/45M LTU Gen Trib Pwr LTU V2 140/155M LTU	1HAM61215AAH 1HAM61232AAE 1HAM61228AAC	
S3_19	Gen Trib LTU 7	3x34/45M LTU Gen Trib Pwr LTU V2 140/155M LTU	1HAM61215AAH 1HAM61232AAE 1HAM61228AAC	
S3_20	Power/LCT LTU	EX Power/LCT LTU	03HAM00008AAX	
S3_21	Power/LCT LTU	EX Power/LCT LTU	03HAM00008AAX	
S0_01	Fan Tray Unit	SMA1/4UC Fan Tray	1HAM61219AAP	Only if required - see Section 5.2.1.3
S0_02	Fan Tray Unit	SMA1/4UC Fan Tray	1HAM61219AAP	Only if required - see Section 5.2.1.3
Line Slots	Line Slot	Line Modules	See section ???	

(1) 1HAT61106AAH superseded by Enhanced Comms/Aux/Ancillary Card. See section 10.1 for details

4.1.2 EX Trib Groups

Due to the number of backplane interfaces on the 63x2Mbit/s Trib card, it is not possible to fit it into a Generic trib slot. EX therefore uses dedicated 2M Trib slots that are each associated with a Generic Trib slot. This pair of Trib slots is known as a Trib group as shown in Figure 4.1

The two Trib slots in a Trib Group share the same bandwidth to the Switch and are therefore mutually exclusive. For example, if a Generic Trib is fitted in Generic Trib Slot 1 (S1_02) then a 2M Trib cannot be fitted in 2M Trib Slot 1 (S1_01). Likewise, if a 2M Trib is fitted in 2M Trib Slot 2 (S1_03) then a Generic Trib cannot be fitted in Generic Trib Slot 2 (S1_04) and so on. This only applies to the first 4 pairs of Trib slots, as Generic Tribs 5, 6 and 7 do not have 2M Tribs associated with them.

4.1.3 EX Bandwidth Distribution

There is a finite amount of bandwidth between the Switch and the Trib slots and therefore there are restrictions on how this bandwidth is distributed within the EX backplane. Figure 4.2 and Figure 4.3 show how the bandwidth is distributed:

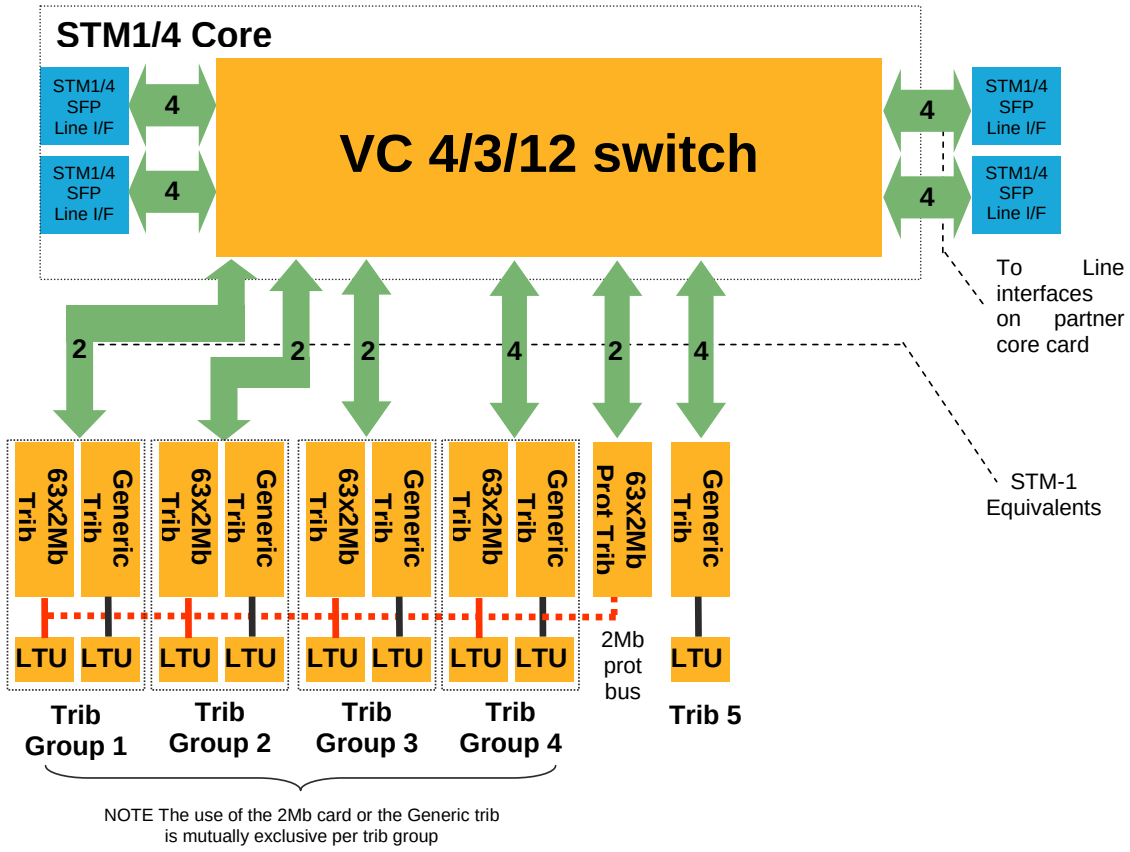


Figure 4.2 – SMA1/4EX Switch Bandwidth Distribution

As shown in Figure 4.2, Trib Groups 1 to 3 have an equivalent of 2xSTM-1 bandwidth and Tribs 4 to 5 have an equivalent of 4xSTM-1. Trib slots 6 & 7 have no connection to the switch when a SMA1/4 Core is fitted and therefore cannot be used.

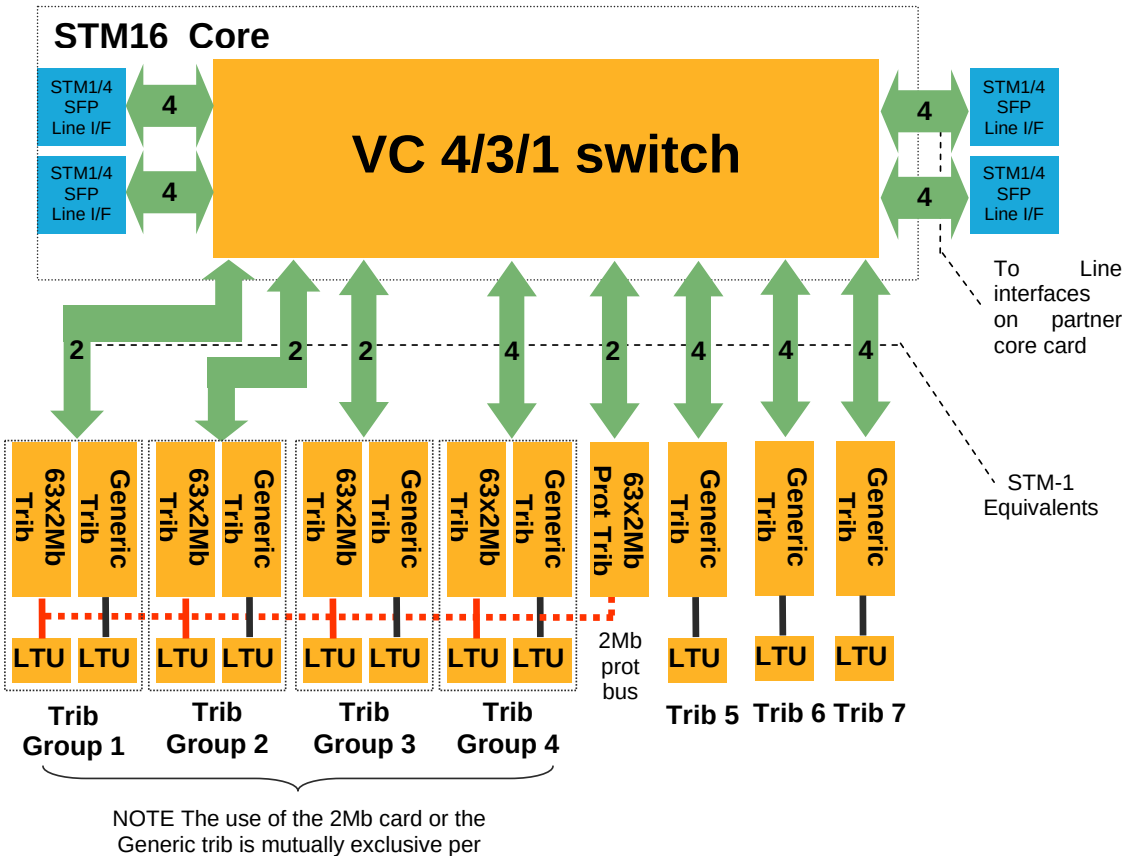


Figure 4.3 – SMA16EX Switch Bandwidth Distribution

Figure 4.3 shows, that when an SMA16 Core is fitted, Trib Groups 1 to 3 have an equivalent of 2xSTM-1 bandwidth and Tribs 4 to 7 has an equivalent of 4xSTM-1.

4.1.4 EX Overhead Distribution

When using an SMA1/4 Core card the OH access to Tributary slots is limited. The following table shows the number of DCCr and DCCm channels available to each Trib slot:

Trib Number	Slot Number	Bandwidth to Switch (STM1 Equiv.)	SMA1/4 Core		SMA16 Core	
			DCCr	DCCm	DCCr	DCCm

1	S1_02	2	-	-	2	2
2	S1_04	2	-	-	2	2
3	S1_09	2	-	-	2	2
4	S1_11	4	2	2	2	2
5	S1_12	4	2	2	2	2
6	S1_13	4	n/a	n/a	2	2
7	S1_14	4	n/a	n/a	2	2

Note: If a Trib card is fitted with less than or equal to 2 SDH interfaces a DCCr and a DCCm will be associated with each interface. If the Trib card has more than 2 SDH interfaces a DCCr will be associated with the first interface, a DCCr with the second, a DCCm with the third and finally a DCCm with the fourth.

4.1.5 Trib / LTU Slot Association

The following table shows which Trib Slots are connected to which LTU slots via the backplane:

Trib Description	Trib Slot Number	LTU Description	LTU Slot Number
2M Trib 1 (ports 1-21)	S1_01	2M LTU 1A	S3_01
2M Trib 1 (ports 22-42)	S1_01	2M LTU 1B	S3_02
2M Trib 1 (ports 43-63)	S1_01	2M LTU 1C	S3_03
Generic Trib 1	S1_02	Generic Trib 1 PSU/LTU	S3_04
2M Trib 2 (ports 1-21)	S1_03	2M LTU 2A	S3_05
2M Trib 2 (ports 22-42)	S1_03	2M LTU 2B	S3_06
2M Trib 2 (ports 43-63)	S1_03	2M LTU 2C	S3_07
Generic Trib 2	S1_04	Generic Trib 2 PSU/LTU	S3_08
2M Protection Trib	S1_05	---	---
Traffic Core B	S1_06	---	---
Traffic Core A / CCU	S1_07	---	---
2M Trib 3 (ports 1-21)	S1_08	2M LTU 3A	S3_09
2M Trib 3 (ports 22-42)	S1_08	2M LTU 3B	S3_10
2M Trib 3 (ports 43-63)	S1_08	2M LTU 3C	S3_11
Generic Trib 3	S1_09	Generic Trib 3 PSU/LTU	S3_12
2M Trib 4 (ports 1-21)	S1_10	2M LTU 4A	S3_13
2M Trib 4 (ports 22-42)	S1_10	2M LTU 4B	S3_14
2M Trib 4 (ports 43-63)	S1_10	2M LTU 4C	S3_15
Generic Trib 4	S1_11	Generic Trib 4 PSU/LTU	S3_16
Generic Trib 5	S1_12	Generic Trib 5 PSU/LTU	S3_17
Generic Trib 6	S1_13	Generic Trib 6 PSU/LTU	S3_18
Generic Trib 7	S1_14	Generic Trib 7 PSU/LTU	S3_19
Comms/Aux/Ancillary Unit	S1_15	---	---
---	---	Protection Power LTU	S3_20
---	---	Power & LCT LTU	S3_21

4.1.6 EX Power Distribution

The 2M Tribs, Traffic Cores and Comms/Aux/Ancillary Unit have on card 50v converters. The are fed directly from the Power Feed LTUs via the backplane.

Generic Tribs do not have on card 50v converters and therefore need a Generic Trib Power LTU (see section 5.5.1).

The EX products have duplicated Power Feed LTUs (slots S3_20 & S3_21). The Power & LCT LTU (S3_21) is part of the product's Core SE (i.e. SP20A & SP30A). The Protection Power LTU (S3_20) is available as an option and is required if a duplicated power feed is to be used.

4.2 SALEABLE ENITITIES

The items within the Product Structure are sold as Saleable Entities (SEs)
Every SE has a set of dates associated with it, each of which marks a key event during its lifecycle: -

Release of Information Date
Acceptance of Orders Date
First Time Off Date
Volume Shipment Date
Last Time Buy Date
Withdrawn Date

These dates are the responsibility of Business Support to define, review and set within IPS. They are in addition to, and differ from, Effectivity Dates, which assign a SE to Product codes.

1ADR60773AAC-CQA (see reference 0.5.15) is the authoritative guide for Saleable Entity structures on this product.

End of section

5 SMA ULTRA COMPACT AND EXTENDED ULTRA COMPACT (UC & EX) SALEABLE ENTITIES

Reference 0.5.15 is the authority on which SEs are currently supported on the UC. However, the following list is accurate at time of publication of this CTA.

Important note:- Where the SMA UC & EX product structure or Saleable Entity philosophy differs significantly to previous Marconi products and CTA documents then it is listed here for reference.

1) Tributary card Saleable Entities on previous products often came with connectors. On SMA1/4UC the SEs do not contain connectors and they must be ordered separately. An extensive range of connector kits of parts and pre-made cable assemblies are available to provide these requirements. See section 14.
2) Each separate release of software (e.g. R3.1, R3.2 R3.3.1 etc.) will have its own unique element software build (ie that stored on the CF System memory card) and also LCT. It is essential for reasons of compatibility that corresponding LCT and Element software builds must be used. For example R3.2 Element Software must be used with R3.2 LCT etc.

5.1 CORE SYSTEM

Any configuration of the product requires a minimum set of items. For convenience these are grouped together as a 'Core'.

The SMA UC & EX family consists of four separate products – SMA1/4UC, SMA1/4EX, SMA16UC & SMA16EX. There are currently 5 core options available for UC & EX, one for each product and an additional one for SMA1/4UC with an unprotected 2M trib interface. Each core provides the minimum configuration for the product as shown below:

Core SE Code	Subrack	Core/CCU Card	Notes
SP03AB	UC	STM1/4	SMA1/4UC – Min configuration. No traffic I/Fs & no software (See Note: 2, 3)
SP03AC (from Q1 2006)	UC	STM1/4	SMA1/4UC – Min configuration. No traffic I/Fs, no PWR/LCT LTU & no software (See Note: 2, 3)
SP03A-1	UC	STM1/4	Withdrawn (See Note: 1)
SP13AB	UC	STM4/16	SMA16UC – Min configuration. No traffic I/Fs, no Fans & no software (See Note: 2, 3, 4)
SP13AC (from Q1 2006)	UC	STM4/16	SMA16UC – Min configuration. No traffic I/Fs, no Fans, no PWR/LCT LTU & no software (See Note: 2, 3, 4)
SP20A	EX	STM1/4	SMA1/4EX – Min configuration. No traffic I/Fs & no software (See Note: 5)
SP30A	EX	STM4/16	SMA16EX – Min configuration. No traffic I/Fs, no Fans & no software (See Note: 4, 5)

Notes: 1. SP03A-1 has been withdrawn.
2. SP03AB & SP13AB supersede SP03 & SP13 respectively. These new SEs do not include system software on CF card and one must now be ordered separately for each Core UC system. Refer to section 5.8 for details.

3. From Q1 2006 SP03AC & SP13AC will supersede SP03AB & SP13AB respectively. These new core SEs will not include a Power/LCT LTU allowing introduction of the 3 pin version. A Product Bulletin will be issued confirming the availability dates. From this date a Power/LCT LTU must be ordered separately with each SP03AC or SP13AC Core UC system. Refer to section 5.2.2.1 and 5.2.2.2 for Power/LCT LTU details.
4. SP13AB & SP30A no longer include a Fan tray by default. If a Fan tray is required then one should be ordered separately. Refer to section 5.2.1.3 for details.
5. SP20A & SP30A also do not include system software on CF card and one must be ordered separately for each Core EX system. Refer to section 5.8 for details.

5.1.1 SMA1/4UC Core (No Software) SP03AB

SMA1/4UC Subrack	1HAG60627AAV	X1
CORE/CCU Card	1HAT61105AAF	X1
PWR/LCT LTU (9 pin)	1HAM61217AAK	X1
KOP- Subrack Mounting (ETSI&19")	1MBB61388AAH	X1

Notes: 1. This SE supersedes SP03A and does not include system software on CF card. A Compact Flash software SE must now be ordered separately. Please refer to Section 5.8 for details.
2. The vertical mounting kit of parts (KOP) also contains an EMC Cover 1MBA62266AAA for the fan tray slot. The EMC Cover should be fitted if no fan tray is configured. This KOP allows mounting either horizontally or vertically in standard 19" telecom and ETSI racks. DIN 19" mounting is also possible –see section 5.9.

5.1.2 SMA1/4UC Core (No Software, no Power/LCT LTU) SP03AC

SMA1/4UC Subrack	1HAG60627AAV	X1
CORE/CCU Card	1HAT61105AAF	X1
KOP- Subrack Mounting (ETSI&19")	1MBB61388AAH	X1

Notes: 1. From Q1 2006 SP03AC will supersede SP03AB. This new core SE will not include a Power/LCT LTU allowing introduction of the 3 pin version. A Product Bulletin will be issued confirming the availability dates. From this date a Power/LCT LTU must be ordered separately with each SP03AC Core UC system. Refer to sections 5.2.2.1 and 5.2.2.2 for Power/LCT LTU details.
2. This SE does not include system software on CF card. A Compact Flash software SE must be ordered separately. Please refer to Section 5.8 for details.
3. The vertical mounting kit of parts (KOP) also contains an EMC Cover 1MBA62266AAA for the fan tray slot. The EMC Cover should be fitted if no fan tray is configured. This KOP allows mounting either horizontally or vertically in standard 19" telecom and ETSI racks. DIN 19" mounting is also possible –see section 5.9.

5.1.3 SMA1/4UC 64x2Mbit/s Core Unprotected SP03A-1

SE Withdrawn.

5.1.4 SMA16UC Core (No Software) SP13AB

SMA1/4UC Subrack	1HAG60627AAV	X1
STM-4/16 Core A / CCU Card	03HAT00041AAQ	X1
PWR/LCT LTU (9 pin)	1HAM61217AAK	X1
KOP- Subrack Mounting (ETSI&19")	1MBB61388AAH	X1

Notes: 1. This SE supersedes SP13A and does not include system software on CF card. A Compact Flash software SE must now be ordered separately. Please refer to Section 5.8 for details.
2. The vertical mounting kit of parts (KOP) also contains an EMC Cover 1MBA62266AAA for the fan tray slot. The EMC Cover should be fitted if no fan tray is configured. This KOP allows mounting either horizontally or vertically in standard 19" telecom and ETSI racks. DIN 19" mounting is also possible –see section 5.9.

5.1.5 SMA16UC Core (No Software, no Power/LCT LTU) SP13AC

SMA1/4UC Subrack	1HAG60627AAV	X1
STM-4/16 Core A / CCU Card	03HAT00041AAQ	X1
KOP- Subrack Mounting (ETSI&19")	1MBB61388AAH	X1

Notes: 1. From Q1 2006 SP13AC will supersede SP13AB. This new core SE will not include a Power/LCT LTU allowing introduction of the 3 pin version. A Product Bulletin will be issued confirming the availability dates. From this date a Power/LCT LTU must be ordered separately with each SP13AC Core UC system. Refer to sections 5.2.2.1 and 5.2.2.2 for Power/LCT LTU details.
2. This SE does not include system software on CF card. A Compact Flash software SE must now be ordered separately. Please refer to Section 5.8 for details.
3. The vertical mounting kit of parts (KOP) also contains an EMC Cover 1MBA62266AAA for the fan tray slot. The EMC Cover should be fitted if no fan tray is configured. This KOP allows mounting either horizontally or vertically in standard 19" telecom and ETSI racks. DIN 19" mounting is also possible –see section 5.9.

5.1.6 SMA1/4EX Core SP20A

SMA EX Subrack	03HAG00001AAX	X1
STM-1/4 Core / CCU Card	1HAT61105AAF	X1
EX Power/LCT LTU	03HAM00008AAX	X1
Fan EMC Blanking Cover	03MBB00017AAT	X2

Notes: 1. This SE does not include system software on CF card. A Compact Flash software SE must now be ordered separately. Please refer to Section 5.8 for details.
2. The subrack comes complete with integral mounting brackets to suit 300mm and 600mm deep ETSI racks (a separate mounting bracket is available for 19" wide racks) – see section 5.9

5.1.7 SMA16EX Core SP30A

SMA EX Subrack	03HAG00001AAX	X1
STM-4/16 Core A / CCU Card	03HAT00041AAQ	X1
EX Power/LCT LTU	03HAM00008AAX	X1
Fan EMC Blanking Cover	03MBB00017AAT	X2

Notes: 1. This SE does not include system software on CF card. A Compact Flash software SE must now be ordered separately. Please refer to Section 5.8 for details.
2. The subrack comes complete with integral mounting brackets to suit 300mm and 600mm deep ETSI racks (a separate mounting bracket is available for 19" wide racks) – see section 5.9.

5.2 ITEMS ASSOCIATED WITH THE CORE

5.2.1 Generic SEs used in both UC and EX

5.2.1.1 SMA1/4UC & EX Protection ADM Unit SP71F

This unit provides protection of the STM1/4 Line/Switch core associated with SMA1/4UC and SMA1/4EX. It is fitted in the following slots depending on subrack type:

UC Subrack: Slot S1_03
EX Subrack: Slot S1_06

In SMA1/4**UC** this unit also contains the traffic processor for its related 2M Core Trib. Therefore:-

1) If 2M Core Protection (Section 5.4.1.3) is required then this Protection Core Card must also be fitted.
2) If this Protection Core card is fitted and a 2M Core trib (Section 5.4.1.1) is also provisioned then the 2M Core Protection Trib (Section 5.4.1.3) must also be fitted.

5.2.1.2 SMA16UC & EX Core B ADM Unit SP71G

This unit provides a second STM-16 Line interface and protection of the Switch core associated with SMA16UC and SMA16EX. It is fitted in the following slots depending on subrack type:

UC Subrack: Slot S1_03
EX Subrack: Slot S1_06

In SMA16**UC** this unit also contains the traffic processor for its related 2M Core Trib. Therefore:-

1) If 2M Core Protection (Section 5.4.1.3) is required then this Protection Core Card must also be fitted.
2) If this Protection Core card is fitted and a 2M Core trib (Section 5.4.1.1) is also provisioned then the 2M Core Protection Trib (Section 5.4.1.3) must also be fitted.

5.2.1.3 SMA1/4/16UC & EX – Forced Air Cooling SP03B

Forced Air cooling is available for the SMA1/4/16UC and EX products using a slide in fan tray. In order to give the operators benefits in power consumption and maintenance costs the fan tray should only be fitted if any of the following conditions apply.

1. An SMA1/4/16UC is mounted in a horizontal position **OR**
2. The air intake of an SMA1/4/16UC or EX shelf is above 45degC **OR**
3. A Layer 2 Card (ELS1000s, SP58A) is fitted, **and** the slot to it's right is also occupied.

Fan assembly	1HAM61219AAP	X1
Fan Filter	1MAA68476AAT	X1

The EX subrack can be fitted with two fan trays. Two should be fitted if case 2. above applies and in case 3. any Layer 2 card meeting the conditions described should have a fan tray below.

5.2.2 UC Specific Items

The following SEs are specific to the UC products (i.e. SMA1/4UC & SMA16UC). They do not apply to the EX products.

5.2.2.1 SMA1/4UC Power & LCT LTU (9 pin) SP03DB

Every SMA1/4UC Core must be fitted with a Power & LCT LTU. This was originally included in the SMA1/4UC Core SEs, however from Q1 2006 (cutover date to be advised via Product Bulletin) one must be ordered separately.

The two options offer power connectors using either 9 pin D-types (SP03DB) or 3 pin 'Italtel' D Types (SP03DA).

This SE contains one Power & LCT LTU with 9 pin D type connectors as originally offered. The LTU has two such connectors to support dual feeding. This LTU is fitted in slot S3_05.

Power & LCT LTU (9 pin)	1HAM61217AAK	X1

Power cable SP03AA (1HAU62501AAF) can be used to connect this LTU to the top of rack power distribution. This cable is 2.0m in length with an additional 0.4m breakout.

5.2.2.2 SMA1/4UC Power & LCT LTU (3 pin) SP03DA

This SE contains one Power & LCT LTU with 3 pin 'Italtel' D type connectors. The LTU has two such power connectors to support dual feeding. This LTU is fitted in slot S3_05.

Power & LCT LTU (3 pin)	1HAM61217ABC	X1

Power cable SP20AA (1HAU62025AAM) can be used to connect this LTU to the top of rack power distribution. This cable is 2.0m in length with an additional 0.4m breakout.

5.2.3 EX Specific Items

5.2.3.1 EX Power Feed Protection LTU SP20D

If a protected DC power feed is required for an EX product, a second Power LTU must be purchased.
The protection power feed LTU is fitted in slot S3_20.

Note: This power LTU is identical to the one supplied in the Core however the LCT port will only work on the LTU fitted in slot S3_21.

5.3 SFP TRIB & LINE INTERFACES

For the UC & EX products, most of the SDH interfaces are realised in the form of a slide Small Form-Factor Pluggable (SFP) module. The following table shows the SFP interface types that are available and which cards they are compatible with. The number represents the maximum number of SFPs that can be fitted.

SE Code	I/F Type	Connector Type	SMA1/4 Core[(1)]	SMA16 Core[(2)]	Quad Flex[(3)]
SU65AA	STM-1 Elec.	1.0/2.3 Coax	2	-	4
SU66AA	STM-1 S1.1	LC	2	-	4
SU66AB	STM-1 L1.1	LC	2	-	4
SU66AC	STM-1 L1.2	LC	2	-	4
SU67AA	STM-4 S/I4.1	LC	2	1	1
SU67AB	STM-4 L4.1	LC	2	1	1
SU67AC	STM-4 L4.2	LC	2	1	1
SU67AD	STM-4 L4.1+	LC	2	1	1
SU67AE	STM-4 L4.2+	LC	2	1	1
SU68AB	STM-16 S16.1	LC	-	1	-
SU68AC	STM-16 L16.1	LC	-	1	-
SU68AD	STM-16 L16.2	LC	-	1	-

(1) SMA1/4 Core: 1HAT61105AAF – STM1/4 Core/CCU
1HAT61114AAT – STM1/4 Protection Core

(2) SMA16 Core: 03HAT00041AAQ – STM16 Core A ADM Unit
03HAT00041ABH – STM16 Core B ADM Unit

(3) Quad Flex: 03HAT00043AAU – Quad Flexible STM1/STM4 SFP Trib

5.4 2MBIT/S TRIBUTARY INTERFACES

5.4.1 UC Specific 2Mbit/s Tributary

5.4.1.1 UC 64 Port 2MBit/s Core Traffic Unit SP60C

This unit provides traffic processing for up to 64 2Mbit/s channels. In order to gain physical access to the 2M interface an LTU must be fitted (see section 5.4.1.2).
Note :-

If Core Protection has been provisioned (Section 5.2.1.1 or 5.2.1.2) and this 2M Core Trib is then selected then 2M Core Protection (Section 5.4.1.3) must also be provided.

The unit should be pushed into slot S1_06

64x2M Core Trib Card (V2)	1HAT61107ABC	X1

5.4.1.2 UC 2Mbit/s LTU Options

The 2M Core tributary selected above offers the use of up to 64 2Mbit/s channels. Either 1 or 2 LTU assemblies should be selected, each giving physical access to 32 of the possible 64 channels.
The LTU assembly is made up of two modules. During installation the two modules are fitted together before pushing the entire assembly into the relevant slot. The slots used are S3_03 and S3_04.
The LTU is available in 2 different interface types. Balanced or Unbalanced may be selected.

5.4.1.2.1 Core Trib 32x2Mbit/s LTU Unbalanced SP60CA

32x2M Unbalanced LTU -Interface Module	1HBA60827AAV	X1
32x2M Unbalanced LTU – Front Panel	1HBA60828AAX	X1

5.4.1.2.2 Core Trib 32x2Mbit/s LTU Balanced SP60CB

32x2M Balanced LTU -Interface Module	1HBA60831AAX	X1
32x2M Balanced LTU – Front Panel	1HBA60832AAA	X1

5.4.1.3 UC 64 Port 2MBit/s Core Protection Traffic Unit SP60C

This unit is used to supply 1:1 2M traffic processing protection. It is identical to the standard 64 Port 2Mbit/s Core Traffic unit and hence the saleable entity number is identical.
This option can only be chosen after both a 2M Core Trib has been fitted in the other Core Trib slot (see section 5.4.1.1) and a Protection ADM Unit (see section 5.2.1.1 or 5.2.1.2) has been fitted.
The unit should be pushed into slot S1_05.

64x2M Core Trib Card (V2)	1HAT61107ABC	X1

5.4.2 EX Specific 2Mbit/s Tributary

5.4.2.1 EX 63 Port 2MBit/s Traffic Unit SP60E

This unit provides traffic processing for up to 63 2Mbit/s channels. In order to gain physical access to the 2M interface an LTU must be fitted (see section 5.4.2.2).
The 2M Trib unit can be fitted into any or all of the following slots: S1_01, S1_03, S1_08 and S1_10

EX 63x2M Trib Card	02HAT00056AAQ	X1

5.4.2.2 EX 2Mbit/s LTU Options

The EX 2M LTUs are available in two interface types. Balanced 120 ohm or Unbalanced 75 ohm may be selected. For Balanced interfaces the maximum possible number of 2M ports is 252. For Unbalanced interfaces this number is reduced to 126 due to the physical size of the LTU area.

5.4.2.2.1 EX 63x2Mbit/s LTU Unbalanced SP60EA

This LTU is a multi-card assembly with a large front-plate to give enough physical space for the 126 1.0/2.3 coax connectors. When this LTU is fitted it covers a total of 7 slots (6x2M LTU + 1xGeneric LTU). This makes the adjacent 2M Trib LTU area unusable. The following table shows which combination of slots this LTU can be fitted into:

2M LTU 1			**2M LTU 2**			**2M LTU 3**			**2M LTU 4**		
S3_01	S3_02	S3_03	S3_05	S3_06	S3_07	S3_09	S3_10	S3_11	S3_13	S3_14	S3_15
EX 63x2M LTU – 2M Trib 1											
						EX 63x2M LTU – 2M Trib 3					
			EX 63x2M LTU – 2M Trib 2								
EX 63x2M LTU – 2M Trib 1						EX 63x2M LTU – 2M Trib 3					

As can be seen from the table, fitting 2M Trib 2 with an Unbalanced LTU will not allow and future expansion of 2M Unbalanced interfaces.

EX 63x2M Unbalanced LTU	02HAM00003AAL	X1

5.4.2.2.2 EX Vertically Extended 63x2Mbit/s LTU Unbalanced SP60EZ

This is a variation on the standard 63x2Mbit/s LTU (SP60EA). It is used when more than 126 x 2Mbit/s ports are required from a single EX product. This LTU should also be used if any future expansion of the NE will increase the number of 2M ports beyond 126. The increase to a maximum of 252 x 2Mbit/s ports is achieved by vertically extending the LTU beyond the top of the subrack (see Figure 5.1). When planing installation it should be noted that this LTU will extend 180mm beyond the top of the subrack.

EX 63x2M Vert Extended Unbal LTU	03HAM00009AAA	X1
Cage Assembly – Vert Extended LTU	03MBA00083AAE	X1

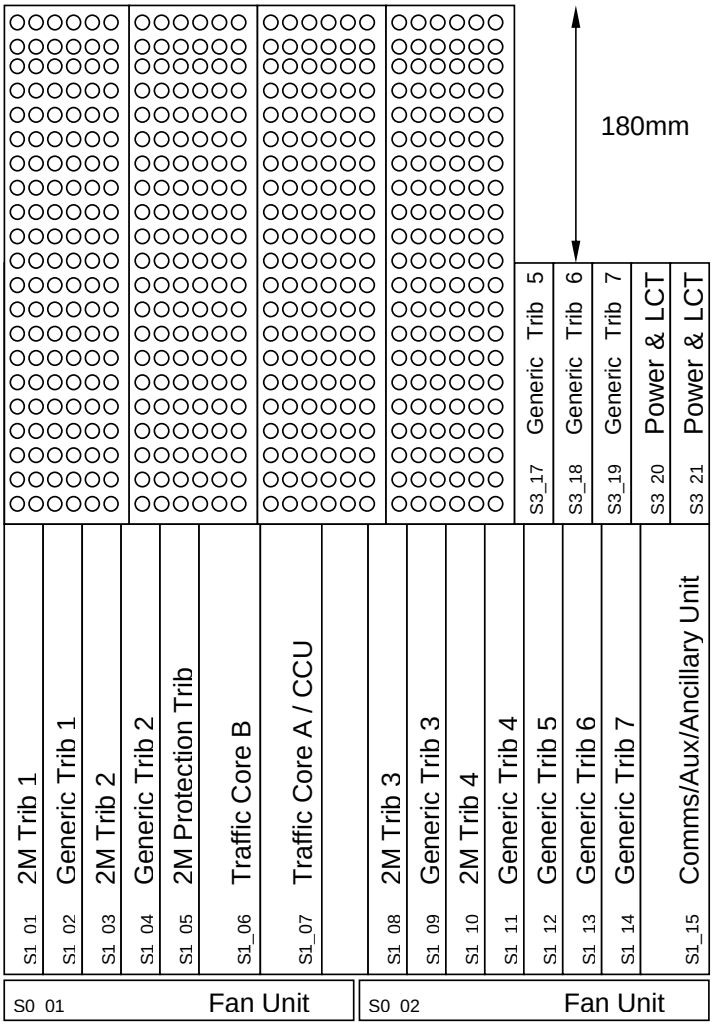


Figure 5.1 – Vertically Extended 2Mbit/s Unbal LTUs

5.4.2.2.3 EX 21x2Mbit/s LTU Balanced SP60EB

This is a single width LTU providing 21 ports of Balanced 2M on two 44-pin D-type connectors. Three of these LTUs are required to provide the full 63-ports of connectivity for each 2M Trib card.

This LTU can be fitted in the following slots:

Trib 1: S3_01, S3_02 and S3_03
Trib 2: S3_05, S3_06 and S3_07
Trib 3: S3_09, S3_10 and S3_11
Trib 4: S3_13, S3_14 and S3_15

EX 21x2M Balanced LTU	02HAM00002AAJ	X1

5.4.2.3 EX 63 Port 2MBit/s Core Protection Traffic Unit SP60E

This is the same unit/SE as the worker trib card. It has been highlighted to show an additional trib card is required for 1:N protection. If required this card is fitted in slot S1_05.

EX 63x2M Core Trib Card	02HAT00056AAQ	X1

5.5 GENERIC TRIBUTARY CARDS

Not all legacy Generic Trib Cards in the SMA range are compatible with UC & EX therefore new SE codes have been generated to identify which cards are available for use in UC & EX.

5.5.1 Generic Tributary Power LTU SP70C/SP70D

UC & EX products use a distributed power supply architecture, where the main 50V supply to the subrack is fed to each of the cards and then converted on card to the voltage levels required. All UC & EX specific cards have been designed with on board PSUs however Generic Trib Cards can be from legacy products without the on board converter. To overcome this problem a Generic Trib Power LTU has been designed, which has the 50V conversion on the LTU and feeds low voltage power to the Trib Card.

If a Generic Tributary with front panel access is to be used, this SE must be ordered to supply power to the associated tributary slot. If the tributary card has LTU access then the power for the tributary will be supplied by the LTU contained within the LTU plug-up tributary SE
This unit can be used in the following slots:

UC Subrack: S3_01 & S3_02
EX Subrack: S3_04, S3_08, S3_12, S3_16, S3_17, S3_18 & S3_19

SP70C

Generic Trib Power LTU	1HAM61218AAM	X1

Note:- A new higher power version of the Trib Power LTU is available. This is essential for use when the Tributary card is either an ETO-100 or Layer 2 card. It will have the Saleable Entity designation SP70D and will supersede SP70C.

SP70D

Generic Trib Power LTU	1HAM61232AAE	X1

SP70C is only compatible with SMA1/4UC. From UC & EX Release 3.3 onwards only SP70D should be ordered.

5.5.2 LTU Plug up Tributary Cards

If the tributary card to be used is LTU plug up then an UC & EX specific SE should be chosen which includes the tributary card and LTU specific to UC & EX.

SE Code	SE Description	ME details	ME Codes	Qty
SP61A	UC & EX 3 Port 34Mbit/s Trib + LTU & Power Module	SMA 34M Tributary Card (INTL) 3x34/45M LTU	1HAT60622BAN 1HAM61215AAF	X1 X1

SP63A	UC & EX 3 Port 45Mbit/s Trib + LTU & Power Module	SMA 45M Tributary Card 3x34/45M LTU	1HAT60623BAQ 1HAM61215AAF	X1 X1
SP62CD	UC & EX 34Mbit/s Transmux + LTU & Power Module	SMA 34M Transmux Card 3x34/45M LTU	1HAT60979AAC 1HAM61215AAF	X1 X1
SP64C	UC & EX 140 Trib Card + LTU & Power Module	SMA 140M Tributary Card (1.0/2.3) 140/155Mbit Electrical & Power LTU	1HAT60624CAP (1) 1HAM61228AAC	X1 X1
SP65TA	UC & EX STM-1 TCM Dual Elec. + LTU & Power Module	SMA STM-1 TCM Dual Electrical Tributary Card (1.0/2.3) 140/155Mbit Electrical & Power LTU.	1HAT61004ABP 1HAM61228AAC	X1 X1

Notes:-

1. 140M Tributary card 1HAT60624BFE has been superseded by 1HAT60624CAP due to obsolescence issues.

5.5.3 Front Plug up Tributary Cards

A number of front plug up tributary cards are available. However, if this option is chosen then a Generic Tributary Power LTU SE must be fitted as detailed in section 5.5.1.

5.5.3.1 UC & EX Multirate STM-1/STM-4 SFP Trib SP67EA

The Quad STM-1/STM-4 Trib SP67EA uses SFP type modules to provide the STM electrical or optical interfaces. See Section 5.3 for the types of SFPs available. The following table shows the number of SFPs that can be fitted depending on which Trib slot the Quad card is fitted in:

Subrack	Slot	STM-1 SFP	STM-4 SFP
UC	S1_01	4	1
UC	S1_02	4	1
EX	S1_02	2	0
EX	S1_04	2	0
EX	S1_09	2	0
EX	S1_11	4	1
EX	S1_12	4	1
EX*	S1_13	4	1
EX*	S1_14	4	1

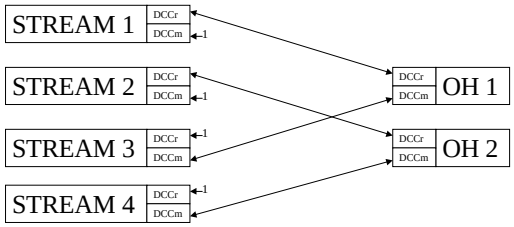
* Only available with STM-16 Core ADM Unit fitted

UC & EX Quad STM-1/STM-4 SFP Trib	03HAT00043AAU	X1

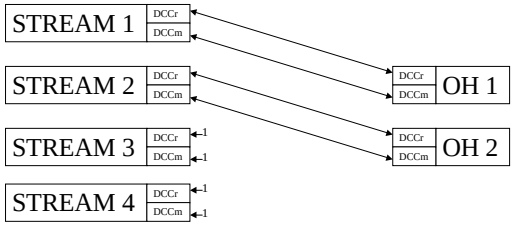
5.5.3.1.1 Multirate Trib Communication Channels Mapping

The following section details the communications channel mapping on the Multirate Trib. Limitations to the comms channels exist because the Multirate can be used as a 4 port card but the internal architecture of UC & EX only gives access to 2 overhead busses for each trib slot.

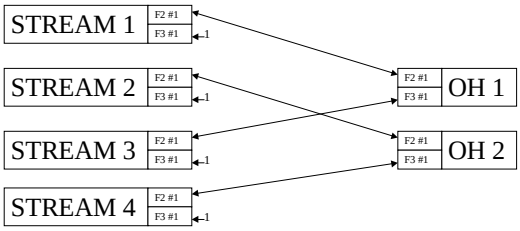
The configurable mapping of this card is described below in the following 4 diagrams:



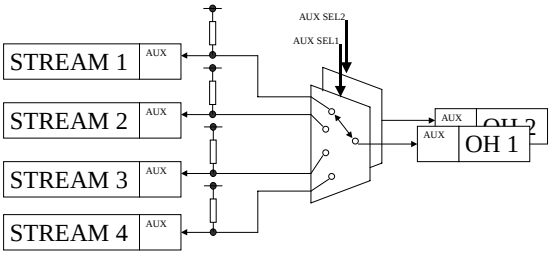
DCC mapping between optical ports and Backplane OH Bus for Quad STM-1



DCC mapping between optical ports and Backplane OH Bus for Dual STM-1 and STM-4



F2 mapping between optical ports and Backplane OH Bus for all modes *** SW only allows access to 2 channel ***



AUX mapping between optical ports and Backplane OH Bus for all modes (Quad STM-1, Dual STM-1 and STM-4

Figure 5.2 – Multirate Comms Channel mappings

5.5.3.2 Generic SMA Codes

UC & EX support the following Series 3 and Series 4 Generic Tributary Cards but they are not designated as part of the UC & EX family:

Packetspan

SE Code	SE Description
SP56A	Packetspan ETA-100 8 x 10/100M RJ45 Ethernet Trib Card
SP56B	Packetspan ETO-100 8 x 10/100M Optical/Electrical Ethernet SFP Trib Card

Refer to Packetspan CTA document 03ADR00001AAF-CTA for full Packetspan product details.

Layer 2

SE Code	SE Description
SP58A	ELS1000S Ethernet Line/LAN Switch

Refer to Layer 2 ELS1000S CTA document 05ABA00001AAL-CTA for full Layer 2 product details.

SDH Line cards

The Generic Tributary Cards shown in the following table are NOT compatible with the full UC & EX product range. They will however work in the SMA1/4UC.

These cards are being superseded by SP67EA and should not be ordered unless absolutely necessary.

SE Code	SE Description
SN65TA	STM-1 TCM Electrical Mux Front Access
SN65TG	STM-1 TCM Quad Electrical Mux Front Access
SN66TR,TS,TT	STM-1 TCM Quad Opt Mux - S1.1, L1.1, L1.2
SP66CA	Dual STM-1 Optical Base Card

	Modules for use with SP66CA
SP66EA	STM-1 OPT DFW SC 1300NM S1.1
SP66EC	STM-1 OPT DFW SC 1300NM L1.1
SP73A	Blanking Module Cover

5.5.3.3 Withdrawn Codes

The following unit, although in theory compatible with the UC & EX products, will not to be advertised. It is still available for sale, but is effectively withdrawn on this particular product range.

SE Code	SE Description
SP67TL	VC-4-4cv S4.1 SC Optical Unit

The following units are ONLY compatible with SMA1/4UC. They are still available for sale, but are effectively withdrawn on this particular product range.

SE Code	SE Description
SB33B	PACKETSPAN ERA-100 LINK ACCESS 100 FOR SMA
SN44AA	1310/1550NM RUGGEDISED COUPLER KIT
SN44AC	1536NM CONTRA RUGGEDISED COUPLER KIT
SN44AE	1554NM CONTRA RUGGEDISED COUPLER KIT
SN44AG	1536/1554NM CO-DIR TX RUGGEDISED COUPLER KIT
SN44AH	1536/1554NM CO-DIR RX RUGGEDISED COUPLER KIT
SN64CE	140M TRIB CARD FRNT ACES NB/HB TRIB
SN66TG	STM-1 TCM OPT MUX 1300NM L1.1 FCPC/SC (1.2E/S3)
SN66TJ	STM-1 TCM OPT MUX 1550NM L1.2 FCPC/SC (1.2E/S3)
SN66TQ	STM-1 TCM QUAD OPT MUX I1.1 FCPC/SC (SMA16)
SP65TE	STM-1 TCM DUAL ELEC MUX FRONT ACCESS SMA1/4C/4
SP66AE	STM-1 MOD - DFW FC OR SC 1550NM L1.2
SP67TA	STM-4 S3/S4 S4.1 SC/FC OPTICAL TRIBUTARY CARD
SP67TB	STM-4 S3/S4 L4.1 SC/FC OPTICAL UNIT
SP67TC	STM-4 S3/S4 L4.1+ SC/FC OPTICAL UNIT
SP67TD	STM-4 S3/S4 L4.2 SC/FC OPTICAL UNIT
SP67TE	STM-4 S3/S4 L4.2+ SC/FC OPTICAL UNIT

5.6 COMMS/AUX/ANCILLARY CARD SP53B

This unit is compatible with all UC & EX products. It provides access to a number of functions via its front panel connectors:-
Aux1, Aux2, 2 x Sync in (T3), 2 x Sync out (T4)
Ethernet/Q_X (10/100M Network Management Interface),
User inputs, user outputs,
Station alarm scheme
2M Test Bus

If access to these functions is required then the unit should be fitted.

This unit can be used in the following slots:
UC Subrack: S3_07
EX Subrack: S3_15

Comms/Aux/Ancillary Unit	1HAT61106BAE[(1)]	X1

(1) 1HAT61106AAH superseded by Enhanced Comms/Aux/Ancillary Card. See section 10.1 for details

5.7 EMC COVERS

A SMA subrack must have all slot positions filled to maintain the EMC performance of the equipment.
After following the configuration procedure set out in section 3.1 or 4.1, all slots that do not have a unit fitted must be equipped with an EMC cover. The covers available are listed in the table below. The table also indicated which EMC covers are applicable to each subrack type (i.e. UC and EX)

SE Code	SE Description	UC	EX	ME Code	Qty
SP73B	EMC Cover Core	Yes	Yes	1MBA62249AAB	X1
SP73C	EMC Cover Comms/Aux/Ancillary	Yes	Yes	1MBA62250AAW	X1
SP73EB	EMC Cover UC & EX 2M Trib	Yes	Yes	1MBA62253AAD	X1
SP73DB	EMC Cover UC 2M LTU	Yes	No	1MBA62252AAB	X1
SP73EA	EMC Cover Generic Trib	Yes	Yes	1MBA61103ABS	X1
SP73DA	EMC Cover Generic LTU	Yes	Yes	1MBA62251AAY	X1
SP73G	EMC Cover EX 2M LTU Single	No	Yes	03MBA00068AAK	X1
SP73H	EMC Cover EX 2M LTU Triple	No	Yes	03MBA00069AAM	X1

EX 2M LTU EMC covers are available in two sizes – single width and triple width. The single width covers one 2M LTU slot (e.g. S3_01) and the triple covers three (e.g. S3_01, S3_02 and S3_03). The singles have been designed to be used when a 2M Trib is partially equipped with 21x2M Balanced LTUs and the triples are for when no 2M Trib has been fitted.

5.8 BACKUP AND LCT S/W.

SP03SA	SMA1/4UC Rel 3.1 Compact Flash	1HGC61024AAA	X1
SP03SC	SMA1/4UC Rel 3.2 Compact Flash	1HGC61033AAN	X1
SP03SD	SMA UC & EX Rel 3.3.1 Compact Flash	03HGC00032AAA	X1
SP03SE	SMA UC & EX Rel 3.3.2 Compact Flash	03HGC00033AAC	X1
SP03SF	SMA UC & EX Rel 3.4 Compact Flash	03HGC00037AAL	X1
SP81C	SMA UC REL 3.1 Backup & LCT Software CD-ROM	1PHS60155AAA	X1
SP81CA	SMA UC REL 3.2 Backup & LCT Software CD-ROM	1PHS60205AAF	X1
SP81CB	SMA UC & EX REL3.3.1 Backup & LCT Software CD-ROM	03PHS00038AAE	X1
SP81CB(2)	SMA UC & EX REL3.3.2 Backup & LCT Software CD-ROM	03PHS00039AAG	X1
SP81CF	SMA UC & EX REL3.4 Rev2 Backup & LCT Software CD-ROM	03PHS00044AAL	X1

Note:-
(1) The Compact flash memory device is no longer supplied as part of any Core SE.
(2) R3.3.2 CD-ROM will also contain R3.3.1 software therefore SE stays the same.
(3) Rel 3.3.2 & Rel 3.4 also support SMA16UC and SMA16EX products.

5.9 MISCELLANEOUS

A number of additional items are available which are listed below.

SE Code	SE Description	ME Details	Qty
SP82SA	SMA UC & EX Product R3.1 Manuals on CD-ROM	1PHA60140AAH	X1
SP82SB	SMA UC & EX Product R3.2 Manuals on CD-ROM	03PHA00003AAG	X1
SP82SC	SMA UC & EX Product R3.3 Manuals on CD-ROM	03PHA00013AAW	X1
SP82SF	SMA UC & EX Product R3.4 Manuals on CD-ROM	03PHA00015AAB	X1
SP83C	UC & EX Software Licence	1SAA61558AAJ	X1
SM53A	EOW Handset	1HFA20002AAJ	X1
SV30J	RJ45 Local Craft Terminal Cable	1HAU61913ABX	X1
NH40H	External USB Card Reader for use with LCT	TBC	X1
NH40J	Next Generation LCT with Windows 2000 + Card Reader	1HGA60654AAQ	X1
NH40K	Next Generation LCT with Windows XP + Card Reader	1HGA60655AAS	X1
SP03C	UC Special DIN 19” rack mounting K.O.Ps (UC Subrack)	1MBB61388BAE	X1
SP20C	EX Special DIN 19” rack mounting K.O.Ps (EX Subrack)	03MBB00014AAM	X1

MP93AA	34/45/140/STM1 1.0/2.3 ST214 1 Port Straight Connectors	1MBB60851AAJ	X1
MP93AB	34/45/140/STM1 1.0/2.3 HFE2290 1 Port Straight Connectors	1MBB60891AAU	X1
MP93AC	34/45/140/STM1 1.0/2.3 BT2003 1 Port Straight Connectors	1MBB60912AAG	X1
MP93AD	34/45/140/STM1 1.0/2.3 BT2003 1 Port Straight Connectors T54	1MBB60912BAD	X1
MP93BA	2MBIT/S UNBAL ST212 1.0/2.3 16 Ports Straight Connectors	1MBB60850AAG	X2
MP93BB	2MBIT/S UNBAL HFE2290 1.0/2.3 16 Ports Straight Connectors	1MBB60891ABM	X2
MP93BC	2MBIT/S UNBAL BT3002 1.0/2.3 16 Ports Straight Connectors	1MBB60913ABB	X2
MP93BD	2MBIT/S UNBAL BT3002 T54 1.0/2.3 16 Ports Straight Connectors	1MBB60913BBX	X2
MP93CC	UC 2MBIT/S BAL D-TYPE KOP 32 Ports Connectors	1MBB61426AAT	X1
MP93CC03	UC 2MBIT/S BAL 2x 3M CABLE ASS 78W - OPEN END 32PT	1HAU62508AAV	X1
MP93CC20	UC 2MBIT/S BAL 2x 20M CABLE ASS 78W - OPEN END 32PT	1HAU62508ABN	X1
New SE	EX 2MBIT/S BAL D-TYPE KOP 21 Ports Connectors	TBC	X2
SP52A	Rack Mounted EOW Unit	1HAL60518AAY	X1
SP03AA	SMA UC 9PIN PWR CABLE (2 REQ FOR PROT'N)	1HAU62501AAF	X1
SP20AA	SMA UC/EX 3PIN PWR CABLE (2 REQ FOR PROT'N)	1HAU62025AAM	X1
SP52AA	EOW 1U SHELF POWER CABLE	1HAU62522AAN	X1
SP52B	EOW/PSTN RACK UNIT 19 /ETSI RINGMASTER/SLAVE	1HAL60518ABR	X1
SP53BA	KOP 8 x RJ45 PLUS EXTRACTOR TOOL	1MBB61427AAV	X1
SP53BB	KOP 3 x D-TYPES for Comms/Aux/Ancillary Unit	1MBB61428AAX	X1
SU65ZA(1)	Electrical SFP Connector KOP 2x45deg for 7000 Cable	1MBB61422AAK	X1
SU65ZB(1)	Electrical SFP Connector KOP 2x45deg for 3002 Cable	1MBB61462AAV	X1

Notes:

(1) To be ordered in conjunction with STM-1 Electrical SFP, SU65AA

5.10 SPARES SP97**

On certain occasions there is a need to order individual units for spares etc. In addition a number of items are only available as part of a Saleable Entity (SE) or Manufacturable Entity (ME). These entities may themselves contain several other items, thus making it economically unattractive to order the full entity. To get around this problem a number of SEs have been created to enable individual items to be ordered.

SP97AA	Spare UC Subrack (with mounting KOP)	1HAG60627AAV 1MBB61388AAH
SP97AB	Spare UC Power/LCT LTU (9 pin)	1HAM61217AAK
SP97AC	Spare EX Subrack	03HAG00001AAX
SP97AE	Spare SMA16UC & EX Core A ADM Unit	03HAT00041AAQ
SP97AF	Spare SMA1/4UC & EX Core/CCU Card	1HAT61105AAF

5.11 SMA UC AC POWER & BATTERY BACKUP

5.11.1 AC POWER/BATTERY BACKUP UNIT SP03P

The AC Power & Battery Backup Unit allows the UC to be powered either from the mains supply or from batteries in the event of a mains failure. The unit also allows for the charging of these batteries when the mains supply is restored. The unit indicates it's status to the UC via the user alarm interface.

The AC Power & Battery Backup Unit is housed in a metal enclosure similar in size to that of the UC. This allows the unit to be mounted next to the UC in a standard ETSI rack, either horizontally or vertically. The unit can be fitted with one or two sets of batteries, dependant on the load and the required backup time.

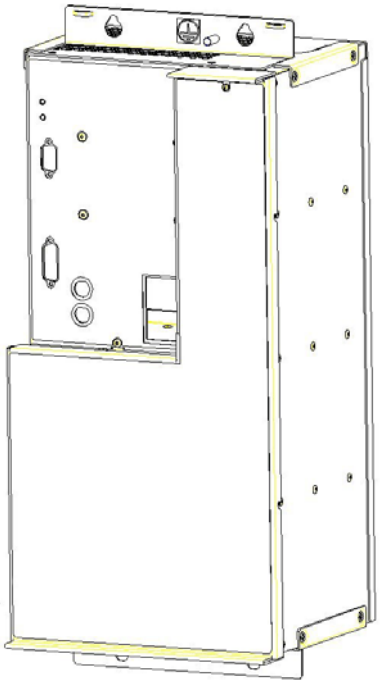


Figure 5.3 - SMA UC AC Power & Battery Backup Unit

The mains input requires an input voltage range of 85V to 265V AC. The output is approximately 58V DC at a maximum current of 3.1A (180W), when running on mains.

The capacity of one fully charged set of batteries is 7Ah at 48v, and for two sets of batteries 14Ah at 48v. The battery back-up time is dependent on the load, but as an example the following table shows the approximate times for different configurations (based on two sets of batteries being fitted):

Core/CCU, 2M trib x 2 & AUX	55W	12 Hours
Core/CCU, Protection, 2M trib x 2 Generic trib* x 2 & AUX	100W	7 Hours
Core/CCU, Protection, 2M trib x 2, Layer 2, AUX & fan	150W	4.5 Hours
16 Core/CCU, 16 Protection, 2M trib x 2, L2 x 2, AUX & fan**	165W	4 Hours

The SE includes the AC Power & Battery Backup Unit, a 3 pin to 3 pin DC Power Interconnection cable and an Alarm Cable. No batteries are included - please refer to Section 5.11.2 for details.

SMA UC AC Power & Battery Backup Unit	03HAN00007AAH	X1
DC Power Interconnecting Cable	03HAU00009AAJ	X1
Alarm Cable Assembly	03HAU00003AAV	X1

The DC Power interconnecting cable is used to connect the DC output from the AC Power & Battery Backup Unit to the DC input of the SMA UC 3pin Power/LCT LTU SP03DA. The cable is approximately 30cm in length.

The Alarm Cable connects between the Status Output connector on the AC Power & Battery Backup Unit and the Alarm Input connector on the SMA UC. This cable is also approximately 30cm in length.

5.11.2 BACKUP BATTERY PACK SV30U

The AC Power & Battery Backup Unit SE does not contain any batteries so these must be ordered separately.

It is recommended that if possible these are procured locally due to their weight and the potential airfreight transport difficulties associated with batteries.

Each battery pack consists of four YUASA NP7-12FR sealed lead acid batteries. No other battery type should be used. These each have a capacity of 7Ah at 12v, so the set of four batteries have an overall capacity of 7Ah at 48v. Each battery has a weight of 2.4kg.

For extended battery backup time a second set can be fitted to the AC Power & Battery Backup Unit as previously described, giving a capacity of 14Ah at 48v.

The following SE contains a single set of four batteries.

SDH Ext II Battery Pack	1MBB61085AAG	X1

End of section

6 TRAFFIC INTERFACES

There are two traffic interface types:-
Optical Interfaces and Electrical Interfaces.

Each of the above interfaces have optical connector options and electrical data rate options.

The choices of Interface slots available are Line slots and Tributary Slots.

There are a total of 4 line slots. These are associated with the Core/CCU and Protection cards (2 per) and the modules that plug into these slots are of the SFP size.

There are essentially 4 tributary slots. 2 ‘generic’ slot are multi-purpose (apart from 2M traffic) whereas the other 2 are dedicated to provision of 2Mbit/s traffic. Tributary traffic interfaces are provided either on the front of card or via traffic LTUs associated with the card.

See Sections 6 for Non-Traffic Interfaces and Section 7 for Monitor points.

6.1 LINE SLOTS

6.1.1 OPTICAL SFP MODULES

Connector:	LC connector
Location:	SFP type module plugged into 1 of two slots provided on the Core/CCU (1HAT61105AAF) and Core Protection (1HAT61114AAT) units.
Use:	For Short and Long Haul Optical Line Transmission Optical ITU-T G.957 S1.1,L-1.1,L1.2,S4.1,L4.1,L4.2,L4.1+,L4.2+
Protocol:	ITU-T G.707, G.957-8

6.1.2 ELECTRICAL SFP MODULES

Connector:	DIN 1.0/2.3 co-axial
Location:	SFP type module plugged into 1 of two slots provided on the Core/CCU (1HAT61105AAF) and Core Protection (1HAT61114AAT) units.
Use:	For in-station electrical line transmission
Electrical spec:	75ohms unbalanced to ITU-T G.703
Protocol:	ITU-T G.707

6.2 OPTICAL TRIBUTARY CARDS

The following cards are plugged into the generic trib slots S1_01 and S1_02.

6.2.1 STM-1 Optical Daughter Card Modules

Connector: 2 x BT COF 8A FC/PC or SC, monitor ports see Section 7

Location: Fitted to Dual STM-1 Optical Card, 1HAT60878AAT

Use: For Short and Long Haul Optical Line Transmission
Optical/Electrical spec: ITU-T G.957 S1.1 & L-1.1/1.2

Protocol: ITU-T G.707, G.957-8

6.2.2 Conventional STM-1 Optical

Connector: 2 x BT COF 8A FC/PC or SC, monitor ports see Section 7.

Location: Front mounted on STM-1 optical card 1HAT60791* variants

Use: For Short and Long Haul Optical Line Transmission
Optical/Electrical spec: ITU-T G.957 S1.1/1.2 & L-1.1/1.2

Protocol: ITU-T G.707, G.957-8

6.2.3 Quad STM-1 Optical

Connector: 8 x BT COF 8A FC/PC or SC

Location: Front mounted on Quad STM-1 optical TCM card SN66TQ,TR,TS,TT

Use: For Long-Haul Optical Line Transmission
Optical/Electrical spec: ITU-T G.957 I1, S1.1, L-1.1/1.2

Protocol: ITU-T G.707, G.957-8

6.2.4 STM-4 Optical

Connector: 2x BT COF 8A FC/PC or SC, monitor ports see Section 7

Location: Front mounted on STM-4 optical card 1HAT61008* variants

Use: For Short and Long Haul Optical Line Transmission
Optical/Electrical spec: ITU-T G.957 S1.1,L1.1, L1.1+,L1.2,L1.2+

Protocol: ITU-T G.707, G.957-8

6.3 ELECTRICAL TRIBUTARY CARDS (FRONT PANEL ACCESS)

6.3.1 Conventional STM-1 Electrical

Connector: 3 x Siemens 1.0/2.3 co-axial including monitor port (See Section 7).

Location: Front mounted on STM-1 Electrical card 1HAT60803ABT

Use: For in-station electrical line transmission

Electrical spec: 75ohms Unbalanced to ITU-T G.703

Protocol: ITU-T .G707

6.3.2 Dual STM-1 Electrical

Connector: 6 x Simmons 1.0/2.3 co-axial including monitor port (See Section 7).

Location: Front mounted on Dual STM-1 Electrical card 1HAT61004ABP
Use: For in-station electrical line transmission

Electrical spec: 75ohms Unbalanced to ITU-T G.703

Protocol: ITU-T G.707

6.3.3 Quad STM-1 Electrical

Connector: 8 x Siemens 1.0/2.3 co-axial.

Location: Front mounted on Quad STM-1 Electrical card 1HAT61059AAJ

Use: For in-station electrical line transmission

Electrical spec: 75ohms Unbalanced to ITU-T G.703

Protocol: ITU-T G.707

6.3.4 140Mbit/s

Connector: 3 x Siemens 1.0/2.3 co-axial including monitor port (See Section 7).

Location: Front mounted on 140 Mbit/s Tributary cards – 1HAT60624BFE/CAP

Use: In-station electrical line transmission

Electrical spec: 75ohms Unbalanced to ITU-T G.703

Protocol: CMI

6.4 ELECTRICAL TRIBUTARY CARDS (LTU ACCESS)

6.4.1 2Mbit/s BALANCED LTU

Associated with: 64x2M Core Tributary Card 1HAT61107AAK/ABC

Connector: 2 x 78 Way D Type Connector

Location: Front mounted on 2 Mbit/s Balanced LTU –Front Panel (1HBA60832AAA)

Use: In-station electrical tributary interfaces

Electrical spec: 120ohms balanced to ITU-T G.703, ETS 300 166

Protocol: HDB3

6.4.2 2Mbit/s UNBALANCED LTU

Associated with: 64x2M Core Tributary Card 1HAT61107AAK/ABC

Connector: 64 x Siemens 1.0/2.3 co-axial

Location: Front mounted on 2 Mbit/s Unbalanced LTU –Front Panel 1HBA60828AAX

Use: In-station electrical tributary interfaces

Electrical spec: 75ohms Unbalanced to ITU-T G.703

Protocol: HDB3

6.4.3 34/45Mbit/s LTU

Associated with: 34Mbit/s Tributary card 1HAT60622BAN, Transmux card 1HAT60979AAC or 45Mbit/s Tributary card 1HAT60623BAQ,

Connector: 9 x Siemens 1.0/2.3 co-axial including monitor port (See Section 13).

Location: Front mounted on 34/45 Mbit/s LTU 1HAM61215AAH

Use: In-station electrical tributary interfaces

Electrical spec: 75ohms Unbalanced to ITU-T G.703

Protocol: HDB3/B3ZS

6.4.4 140/155 Mbit/s UNBALANCED LTU

Associated with:	140Mbit/s Tributary card (1HAT60624BFE/CAP) or Dual STM-1 TCM Electrical Tributary (1HAT61004ABP)
Connector:	6 x Siemens 1.0/2.3 co-axial inc. monitor ports (2 off) (See Section 7).
Location:	Front mounted on 140/STM-1 LTU 1HAM61228AAC
Use:	In-station electrical tributary interfaces
Electrical spec:	75ohms Unbalanced to ITU-T G.703
Protocol:	CMI

End of section

7 NON-TRAFFIC EXTERNAL INTERFACES

See Sections 5 for Traffic interfaces and Section 7 for Monitor points.

Non-traffic external interfaces are provided by front mounted connectors on the following :-

1HAM61217AAK	Power/LCT LTU (UC 9 pin)
1HAM61217ABC	Power/LCT LTU (UC 3 pin)
03HAM00008AAX	Power/LCT LTU (EX 3 pin)
1HAT61106BAE(1)	Comms/Aux/Ancillary Card
03HAN00007AAH	AC Power & Battery Backup Unit

Note that a Power/LCT LTU is always fitted. The Comms/Aux/Ancillary card is optional.
(1) 1HAT61106AAH superseded by Enhanced Comms/Aux/Ancillary Card. See section 10.1 for details

7.1 POWER/LCT LTU INTERFACES

7.1.1 POWER (UC 9 pin)

Connector: 2 x 9 way (male) ‘D’ type

Indicators: 2 x Green LEDs, one for each input

Use: Rack DC supply inputs

Electrical spec: prETS 300 132 and BTR 2511

Ext connection: Via cable assembly 1HAU62501AAF

7.1.2 POWER (UC 3 pin)

Connector: 2 x 3 way (‘Italtel’ 3W3A) ‘Power D’ type

Indicators: 2 x Green LEDs, one for each input

Use: Rack DC supply inputs

Electrical spec: prETS 300 132 and BTR 2511

Ext connection: Via cable assembly 1HAU62025AAM

7.1.3 POWER (EX 3 pin)

Connector: 1 x 3 way (‘Italtel’ 3W3A) ‘Power D’ type

Indicators: 1 x Green LEDs

Use: Rack DC supply inputs

Electrical spec: prETS 300 132 and BTR 2511

Ext connection: Via cable assembly 1HAU62025AAM

7.1.4 LOCAL CRAFT TERMINAL INTERFACE

Connector: 8 pin RJ45 Socket

Use: Local Terminal interface

Electrical spec: V.24 (RS232)

Protocol: Full-Duplex Asynchronous serial comms (Marconi Comms Proprietary)

Ext connection: Via cable 1HAU61913AAF provided in SV30J

7.2 COMMS/AUX/ANCILLARY CARD INTERFACES

7.2.1 ELEMENT MANAGER CLNS1 (Q/B3) Interface

Connector: 1 x 8 pin RJ45

Use: Ethernet LAN MV36 interface

Electrical spec: IEEE 802.3 standard

Protocol: OSI 7-layers conforming to ITU-TSS G.773 (Q.811 /Q.812)'B3' stack

7.2.2 AUXILIARY INTERFACES

Connector: 2 x 8 pin RJ45 Socket

Use: External Interface to the 2 x 64Kbit Auxiliary Interfaces

Electrical spec: V.11

7.2.3 2Mbit/s TEST BUS

Connector: 1 x 8 pin RJ45 Socket

Use: To monitor 1 of the 64 core 2M Trib channels

Electrical spec: G.703.

7.2.4 EXTERNAL TIMING INPUTS

Connector: 2 x 8 pin RJ45 Connector

Use: To Synchronise the Ultra Compact to an External timing source.

Electrical spec: 120 ohms balanced or 75 ohms unbalanced to ITU-TSS G.703, prETS 300 166 (Both provided on connector).

Protocol: G.703 section 10 2048kHz NRZ or G.703 Section 6 HDB3

7.2.5 EXTERNAL TIMING OUTPUTS

Connector: 2 x 8 pin RJ45 Connector

Use: To Synchronise external equipment to the Ultra Compact.

Electrical spec: 120 ohms balanced or 75 ohms unbalanced to ITU-TSS G.703, prETS 300 166 (Both provided on connector).

Protocol: G.703 section 10 2048kHz NRZ or G.703 Section 6 HDB3

7.2.6 BW7R Alarm Scheme

Connector: 1 x 15-way “D” type Female

Use: Rack interface to Light Signalling Equipment and remote Supervision Console.

Specification: As Marconi Communications System Interface Spec 1ADA60638AAR-BSA.

7.2.7 User Output Interface

Connector: 1 x 9-way “D” type Male

Use: 4 off general purpose alarm outputs, which can be enabled or disabled via LCT).

Specification: As Marconi Communications System Interface Spec 1ADA60638AAR-BSA.

7.2.8 User Input Interface

Connector: 1 x 15-way “D” type Male

Use: 6 off general purpose alarm inputs. (Raises alarm on LCT).

Specification: As Marconi Communications System Interface Spec 1ADA60638AAR-BSA.

7.3 AC POWER & BATTERY BACKUP UNIT

7.3.1 Mains Input

Connector: IEC 320

Use: Mains Power Inlet.

Electrical spec: 85v to 265v AC, 47-65Hz.. Max power consumption 240W

7.3.2 DC Output

Connector: ‘Reversed’ 3W3A Italtel Power D Type

Use: 48v DC (nom) output to power UC.

Electrical spec: 48v DC (nom).

7.3.3 Alarm/Status Output

Connector: 15 way Male D Type

Use: Alarm/Status output from AC Power/Battery Backup Unit

Protocol: For connection to SMA UC Alarm Input

End of section

8 MONITOR POINTS & TEST BUS

See Sections 5 for Traffic interfaces.

8.1 34/45MBIT/S

Connector: 1 x Siemens 1.0/2.3 co-axial. per Port (3 per LTU)

Location: Front mounted on the 34/45M LTU 1HAM61215AAF

Use: Output signal monitor point.

Electrical spec: Attenuated representation of the signal at the Tributary traffic port

Protocol: HDB3 34Mbit/s
B3ZS 45Mbit/s

8.2 140/155MBIT/S

Connector: 1 x Siemens 1.0/2.3 co-axial per port (2 per LTU)

Location: Front mounted on the 140/155M LTU 1HAM61228AAC

Use: Output signal monitor point.

Electrical spec: Attenuated representation of the signal at the Tributary traffic port

Protocol: CMI

8.3 CONVENTIONAL STM-1 OPTICAL

Connector: 2 x Siemens 1.0/2.3 co-axial.

Location: Front mounted on the STM-1 Optical & DWDM cards (see Section 5 for codes)

Use: Output signal and clock monitor points.

Electrical spec: Electrical representation of the signal at the traffic port

Protocol: ECL Logic Levels, ITU-T G.707, G.957-8-9(draft) .

8.4 DUAL STM-1 OPTICAL AND QUAD STM-1 OPTICAL/ELECTRICAL

No monitor points are available on the front plate of these cards (see Section 5 for codes)

No monitor points are available on the front plate of the Quad Electrical card (see section 5 for code).

8.5 CONVENTIONAL STM-1 ELECTRICAL

Connector: 1 x Siemens 1.0/2.3 co-axial.

Location: Front mounted on the STM-1 Electrical card (see Section 5 for code).

Use: Output signal monitor point.

Electrical spec: Attenuated representation of the signal at the traffic port

Protocol: CMI, ITU-T G.707

8.6 DUAL STM-1 ELECTRICAL

Connector: 2 x Siemens 1.0/2.3 co-axial.

Location: Front mounted on the Dual STM-1 Electrical card (see Section 5)

Use: Output signal monitor points.

Electrical spec: Attenuated representation of the signal at the traffic port

Protocol: CMI, ITU-T G.707

8.7 2MBIT/S TESTBUS

Connector: 1 x 8 pin RJ45 Socket

Use: To monitor 1 of the 64 core 2M Trib channels

Electrical spec: G.703.

Location: Front mounted on Comms/Aux/Ancillary Card 1HAT61106BAE(1)

Protocol: HDB3

(1) 1HAT61106AAH superseded by Enhanced Comms/Aux/Ancillary Card. See section 10.1 for details

End of section

9 COMMUNICATIONS

The Comms/Aux/Ancillary Card 1HAT61106BAE(1) provides customer access to the communications functions on the SMA-1/4UC. Network management message handling and message routing to network elements is performed by the Core/CCU unit.

The communications protocol between the Network Elements and the Gateway Multiplexer/Element Manager is based on the ISO Open Systems Interconnect 7-layer model.

The Comms/Aux/Ancillary Card (SP53B) provides an Ethernet interface (10/100baseT) via a RJ45 type connector for connection to MV36.

Messages for/from other network elements are routed over the overhead access busses and are embedded into the line signal using the STM1 SOH DCC channels (CCITT G784 Qecc interfaces). Overhead busses interface to the Core/CCU Card, each being able to carry a DCC channel (DCCr[192kbit/s] and DCCm[576kbit/s]). The choice of DCC data rate should be determined during Element Manager system design.

From R3.4 rev it is also possible to transport a DCC channel via a 2Mbit/s port using the Enhanced Comms/Aux/Ancillary card, please refer to section 10.1 for full details.

(1) 1HAT61106AAH superseded by Enhanced Comms/Aux/Ancillary Card. See section 10.1 for details

9.1 IS-IS TABLE SPACE

Product	Available IS-IS Table Space
SMA-1/4UC	

End of section

10 AUXILLARY AND ANCILLARY FUNCTIONALITY

One slot is provided for the Comms/Aux/Ancillary card (SP53B)

This allows omnibus handling of client telemetry data, via RTU's (Remote Terminal Units used for controlling equipment such as C-MUX primary multiplexers) or MCU's(Management Communications Units), both around an SDH ring and on STM-n tributaries. This is achieved by inserting and extracting Auxiliary data between discrete 64kbit/s I/O ports (from the client's equipment) and Section Overhead bytes (SOH) of the SDH line interfaces.

An enhanced version of the Comms/Aux/Ancillary card is available from Q1 2006. This enhanced card is fully backwards compatible with the original card, but also offers E1 OLO communications and configurable Bw7R alarm outputs. The E1 OLO comms feature allows a DCC communication channel to be mapped into a G.704 2Mbit/s frame for transport via 2Mbit/s tributary port.

10.1 COMMS/AUXILIARY/ANCILLARY CARD (SP53B)

The Comms/Aux/Ancillary Card 1HAT61106BAE provides customer access to two asynchronous bi-directional 64kbit/s data channels. One card can be fitted per Subrack in the dedicated Comms/Aux/Ancillary slot.

These two 64kbit/s channels are routed to two line interfaces and there is no access to overhead bytes of tributary slots. Choice of line interface is either under operator command (LCT/NM) or Core/CCU control (when MSP is activated).

The card is not connected to the SMA Control Bus, therefore it cannot be configured or monitored via the EMOS/LCT. The Card has an Inventory PROM and a Card Presence signal, which will be de-activated, if the card is removed.

To maintain auxiliary data continuity in, say, an SDH ring, if the Line East and Line West auxiliary data is not to be accessed locally at a particular element, it has to be bypassed. The data can be patched through by externally wiring the appropriate connectors together. Alternatively it is possible to bypass Row 9 Column 8 data only via LCT/NM configuration. If this bypass option is chosen then the Comms/Aux/Ancillary card is not required.

The E1 OLO comms feature offered by the enhanced Comms/Aux/Ancillary Card allows either DCCr (compatible with Huawei partner equipment) or DCCm communications to be carried over the 2Mbit/s channel. This is selectable by hardware link. The E1 OLO channel is connected via the backplane to port 32 of each 2M Tributary card, and the LCT/NM is used to configure the single 2M trib selected to carry the E1 OLO comms (from R3.4 rev 2).

The enhanced Comms/Aux/Ancillary Card also allows configuration of some of the Bw7R output pins, as requested by a number of customers. Again this is achieved by configuration of hardware links on the card.

Note: Comms/Auxiliary/Ancillary Card 1HAT61106BAE supersedes the original card 1HAT61106AAH. The original card remains fully supported and offers all of the above listed features except for E1 OLO Comms, which requires the enhanced 1HAT61106BAE card.

10.2 EXTERNAL EOW UNIT (SP52A)

EOW functionality is provided by an external stand-alone unit (SP52A) which plugs into the Comms/Aux/Ancillary card.
A cable assembly (SP52AA) is available for connecting to the top of rack power supply.

10.2.1 General Features

The EOW unit provides an audio channel through the SMA by utilises the E1/E2 bytes within the STM-n SOH. The handset interface for the EOW is a standard 2 wires analogue interface with DC current feed, hook status detection and DTMF signaling. A 4-wire analogue/digital interface is available to extend the EOW by means of another 4-wire analogue/digital interface with similar characteristics. This interface is available in order to EOW-connect two equipments, which do not communicate by traffic links

The External EOW unit provides:-

- Analogue EOW access via a 2-Wire interface
- EOW reset and Control via buttons
- Analogue EOW access via a 4-Wire interface
- EOW telephone number control
- EOW ring Master/Slave Control
- EOW Call arrival buzzer and relay output signals for extending locally
- Status readout via LEDs and external Alarm outputs
- Dual 64kbit/s clock and data interfaces (Port 1 and Port 2)

10.2.2 External EOW Unit Installation

An outline drawing of the external EOW unit is shown below (Figure 10.1). The Unit occupies a full rack width and is suitable for rack mounting in an ETSI (600mm) and 19” racks.
The unit is supplied with two mounting brackets and fixings.
The EOW Unit occupies 1U vertical x rack width x 75mm (Max) depth into rack.

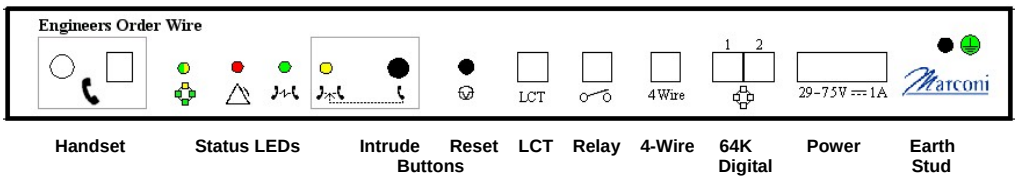


Figure 10.1 - External EOW Unit Layout

Note, all connections are made to the front of the unit.

10.2.3 Battery Supply

A single 3-pin DIN connector is used for the Battery supply for the primary power source (-48V DC nominal, -29V to –75V DC).
A cable assembly (SP52AA) is available for connecting to the top of rack power supply.

10.2.4 Digital Interfaces

Two 64kbit/s interfaces are provided by two 8-pin RJ45 connectors. These are cabled up to the two AUX ports (AUX1 and AUX2) on the SMA equipment.

10.2.5 Handset (2-Wire) Connectors

The handset is connected into the either of the Dual 2-Wire interfaces. A 6-pin RJ11 connector and an ADC Bantam PC834J Stereo Phonejack connector are provided.

10.2.6 Analogue (4-Wire) Connector

A Single 4-Wire interface is provided on an 8-pin RJ45 connector. The port is configured using a “dumb” terminal (see 10.2.8).

10.2.7 External Relay Contact

Relay contacts, NC, NO and the relay 'Pole' are provided and can be connected via the RJ45 connector.

10.2.8 Local Terminal

A single RJ45 connector is provided for the connection of a local 'dumb' terminal.
Using a dumb terminal it is possible to configure the EOW unit as a Ring Master or Slave, to set up the Unit Telephone number and to enable the 4-Wire port.

End of section

11 LOCAL TERMINAL AND ELEMENT SOFTWARE

There are two main software components to the system.

One is the Network Element software containing individual software modules for each of the card types and the other is the Local Terminal management software.

During operation the Element Software is stored on a Compact Flash type System Memory device pushed into a connector on the Core/CCU card.

The purpose of the Local Terminal is to provide all the functions necessary to locally configure, control and monitor each SMA subrack. The Local Terminal comprises application software running on an IBM compatible PC interfacing to the equipment subrack via a cable. The user performs operations on the apparatus via the keyboard or mouse.

Individual Compact Flash Saleable Entities are available for each release of product software. The LCT software is provided on a CD-ROM. Also contained on the CD-ROM is Network Element software to allow on-site upgrade of existing earlier releases of Compact Flash.

Each separate release of software (e.g. R3.1, R3.2 R3.3.1 etc.) will have its own unique element software build (i.e. that stored on the Compact Flash System memory device) and also LCT**. It is essential for reasons of compatibility that corresponding LCT and Element software builds must be used. That is R3.2 Element Software must be used with R3.2 LCT etc.**

11.1 LCT HARDWARE

Computer

NH40J	Next Generation LCT with Windows 2000 + Card Reader
NH40K	Next Generation LCT with Windows XP + Card Reader
NH40F	Local Craft terminal Hardware with Windows 2000 (WITHDRAWN Do Not use)
NH40G	Local Craft terminal Hardware with Windows XP (WITHDRAWN Do Not use)

Notes:-

1) NH40F and NH40G have been superseded by NH40J and NH40K respectively. They should not be ordered and are only shown here for reference.
2) The network element System Memory is stored on a compact Flash device in the UC & EX product range. Maintenance upgrades of element software continue to be supported by software download. However, major updates such as a change of revision of element software can now be accomplished much faster by the direct reprogramming of the compact flash. To this end the new LCT hardware entities NH40J/NH40K come ready equipped with a ‘card reader’ to enable this reprogramming to be carried out.
3) In cases where customer already have the older NH40F/NH40G a separate stand-alone card reader is provisioned by NH40H below.

Compact Flash Programmer

NH40H	External USB Card Reader for use with LCT NH40F/G

This is a stand-alone Compact Flash programmer that plugs into the USB port of the PC.

Cables

SV30J	SMA1/4CP, SMA1/4c and SMA1/4UC Local Craft Terminal Cable

The cable provided for the above is Belden 9502 (1WAD20028AAL) which contains 2 off twisted pairs of 24AWG PVC insulated wires with overall screen and drain wire or equivalent. It is used to connect between the PC and the RJ45 type LCT connector on the front of the SMA1/4UC.

11.2 LCT & BACKUP SOFTWARE

The Local Terminal Software is executed from the hard drive on the PC to provide the Local Terminal functions for the SMA products.
The LCT software is supplied on a CD-ROM, which must first be installed onto the hard drive of the PC. The CDROM also includes backup software, of the release in question, for the actual element (i.e. the software stored in the Compact Flash device).

SP81C	SMA UC REL 3.1 Backup & LCT Software CD-ROM
SP81CA	SMA UC REL 3.2 Backup & LCT Software CD-ROM
SP81CB	SMA UC & EX REL 3.3.1 Backup & LCT Software CD-ROM
SP81CB(1)	SMA UC & EX REL 3.3.2 Backup & LCT Software CD-ROM
SP81CF	SMA UC & EX REL 3.4 Backup & LCT Software CD-ROM

1) R3.3.2 CD-ROM will also contain R3.3.1 software therefore SE stays the same.
2) Rel 3.3.2 & Rel 3.4 also support SMA16UC and SMA16EX products.

11.3 LCT OPERATING SYSTEM

The Operating System required for use with the Local Terminal software is Windows 2000 or Windows XP.

11.4 NETWORK ELEMENT SOFTWARE

This is stored on a Compact Flash memory device, which should be housed in the connector on the Core/CCU card. Different releases of software have different Compact Flash saleable entities. The Compact flash memory device is no longer supplied as part of any Core SE and must be ordered separately.

SP03SA	SMA1/4UC Rel 3.1 Compact Flash
SP03SC	SMA1/4UC Rel 3.2 Compact Flash
SP03SD	SMA UC & EX Rel 3.3.1 Compact Flash
SP03SE	SMA UC & EX Rel 3.3.2 Compact Flash
SP03SF	SMA UC & EX Rel 3.4 Compact Flash

11.5 CELLSPAN CARDS

Currently not supported on SMA UC & EX product range.

11.6 PACKETSPAN CARDS

The Packetspan software is provided on card and unit where applicable, and is programmed in the factory or by software download. Firmware is held on the card and not on the Compact Flash System Memory device.
Refer to Packetspan Provisioning Control Document 03ADR00001AAF-CTA for full details.

11.7 LAYER 2 CARDS

The Layer 2 Card software is provided on card and unit where applicable, and is programmed in the factory or by software download. Firmware is held on the card and not on the Compact Flash System Memory device.
Refer to Layer 2 Provisioning Control Document 05ABA00001AAL-CTA for full details.

End of section

12 CARD FACIA

On those units unique to this product, facias are always fitted during manufacture. There are no options in terms of facia type or fit/not fit.
Existing SMA units may or may not have options. The relevant SE structure should be consulted.

End of section

13 EMC COVERS

A SMA subrack must have all card slot positions and all LTU positions fitted to maintain the EMC performance of the equipment.

13.1 UNEQUIPPED SLOT COVERS

Following the equipping of the subrack with required cards and LTUs, extra EMC covers may be needed:

SP73B	EMC Cover Core	1MBA62249AAB
SP73C	EMC Cover Comms/Aux/Ancillary	1MBA62250AAW
SP73EB	EMC Cover 2M Trib	1MBA62253AAD
SP73DB	EMC Cover 2M LTU	1MBA62252AAB
SP73EA	EMC Cover Generic Trib	1MBA61103ABS
SP73DA	EMC Cover Generic LTU	1MBA62251AAY
SP73G	EMC Cover EX 2M LTU Single	03MBA00068AAK
SP73H	EMC Cover EX 2M LTU Triple	03MBA00069AAM

When any cards and/or LTUs are ordered for inclusion in the subrack and there is a core EMC cover already fitted the appropriate cover should be discarded or re-cycled.
Note:- There is an EMC cover associated with the Fan slot. However, this cover (1MBA62266AAA) is provided within the SMA1/4/16UC Cores SP03AB & SP13AB.

End of section

14 MECHANICAL DETAILS

The subrack is a card cage mechanical design meeting the ETSI standard ETS 300 119 Part-4 and screened for EMC according to ETSI requirements ETS 300 119 Part 2/4.

14.1 SUBRACK MOUNTING

The SMA1/4/16 UC subrack can be mounted in a number of racks:-

1. ETSI –Right hand side or Left hand side
2. 19" –Right hand side or Left hand side
3. Horizontally mounted in a ETSI rack
4. Horizontally mounted in a 19" rack
5. DIN 19 " - Right hand side or Left hand side
6. Horizontally mounted in a DIN 19" rack

If mounted vertically, 2 subracks may be fixed side by side.

The 19" rack is for a standard telecomms type 19" rack which has a 600mm cabinet/535mm throat, whereas the DIN 19" meet the requirement for the German market.
Options 1-4 are accommodated by the mounting brackets kit of parts 1MBB61388AAH supplied as part of the core UC system. See sections 5.1.1 & 5.1.3.
Options 5-6 are accommodated by the mounting brackets kit of parts 1MBB61388BAE supplied as a separate saleable entity (SP03C) See section 5.9

If mounted horizontally then a fan unit must be fitted. Refer to Section 5.2.1.3 for full details.
Note:- The brackets meet the requirements for office vibration only. They have not been tested against extended requirements for earthquake zones.

14.2 UNIT DIMENSIONS

The attached table shows the approximate dimensions of the SMA1/4UC specific units.

SMA1/4UC Unit Type	Height (mm)	Depth (mm)	Width (mm)
1HAG60627AAV SMA1/4UC SUB RACK	445	280	218
1HAT61105AAF Core/CCU Card	254	229	33
1HAT61106AAH/BAE Comms/AUX/Ancillary Card	254	229	39.5
1HAT61107AAK/ABC 64x2M Core Trib Card	254	229	22
1HBA60827AAV 32x2M Unbalanced LTU –Interface module	147 (Combined)	117 (Combined)	71 (Combined)
1HBA60828AAX 32x2M Unbalanced LTU –Front panel			
1HBA60831AAX 32x2M Balanced LTU –Interface module	147 (Combined)	117 (Combined)	71 (Combined)
1HBA60832AAA 32x2M Balanced LTU –Front panel			
1HAM61215AAF 3x34M LTU	147	117	21
1HAM61217AAK Power/LCT LTU (9 pin)	147	117	21
1HAM61218ABC Power/LCT LTU (3 pin)	147	117	21
1HAM61218AAM Generic Trib Power LTU	147	117	21
1HAT61114AAT Protection Core Card	254	229	33
1HAM61219AAP Fan Assembly (SMA1/4UC)	22	222	214
03HAN00007AAH AC Power & Battery Backup Unit	445	177	218
1400729-***** & 1400744-**** SFP Optical Line Module	11	13	63
1HAL60517AAW STM-1 Electrical Module DIN 1.0/2.3	11	13	63

1HAM61228AAC 2 x STM-1/140M LTU	147	117	21
03HAG00001AAX EX Subrack	445	278	449
03HAM00008AAX EX Power/LCT LTU	147	117	22
03HAT00056AAQ EX 63x2M Trib Card	254	228	25
03HAM00003AAL EX 63x2M Unbal LTU	147	124	141
03HAM00002AAJ EX 21x2M Bal LTU	151	121	19
03HAT00043AAU Multirate Trib Card	254	228	25
03HAT00041AAQ STM-4/16 Core A/CCU ADM Unit	254	232	38
03HAT00041ABH STM-4/16 Core B ADM Unit	254	232	38
03HAM00009AAA EX Vertically Extended 63x2M Unbal LTU	315	124	82

14.3 WEIGHTS

Unit/Card Weights:

Cards	Card Weight (kg)
UC Specific	
1HAG60627AAV SMA1/4UC SUB RACK	2.9
1HAT61107AAK/ABC 64x2M Core Trib Card	0.39
1HBA60827AAV 32x2M Unbalanced LTU –Interface module	0.07
1HBA60828AAX 32x2M Unbalanced LTU –Front panel	0.18
1HBA60831AAX 32x2M Balanced LTU –Interface module	0.11
1HBA60832AAA 32x2M Balanced LTU –Front panel	0.11
1HAM61217AAK Power/LCT LTU (9 pin)	0.12
1HAM61217ABC Power/LCT LTU (3 pin)	0.12
03HAN00007AAH AC Power & Battery Backup Unit (no batteries fitted)	5.2
EX Specific	
03HAG00001AAX EX Subrack	7.46
03HAM00008AAX EX Power/LCT LTU	0.25
03HAT00056AAQ EX 63x2M Trib Card	0.43
03HAM00003AAL EX 63x2M Unbal LTU	0.63
03HAM00002AAJ EX 21x2M Bal LTU	0.17
03HAM00009AAA EX Vertically Extended 63x2M Unbal LTU	TBC
UC & EX Generic	
1HAT61105AAF Core/CCU Card	0.5
1HAT61106AAH/BAE Comms/AUX/Ancillary Card	0.7
1HAM61215AAF 3x34M LTU	0.18
1HAM61218AAM Generic Trib Power LTU	0.15
1HAT61114AAT Protection Core Card	0.5
1HAM61219AAP Fan Assembly (SMA1/4UC)	0.5
1400729-***** & 1400744-**** SFP Optical Line Module	0.012
1HAL60517AAW STM-1 Electrical Module DIN 1.0/2.3	TBC
1HAM61228AAC 2 x STM-1/140M LTU	TBC
03HAT00043AAU Multirate Trib Card	0.40
03HAT00041AAQ STM-4/16 Core A/CCU ADM Unit	0.80
03HAT00041ABH STM-4/16 Core B ADM Unit	0.80
SMA Generic	
1HAT60622BAN 34Mbit/s Tributary Card	0.4
1HAT60623BAQ 45Mbit/s Tributary Card	0.4
1HAT60624BFE/CAP 140Mbit/s Tributary Card	0.4
1HAT60979AAC 34Mbit/s Transmux	0.42
1HAT60917AAG VCTS VCAM Card (EXTENDER I&II)	0.44
1HAT60791* STM-1 Optical Card TCM	0.46
1HAT60878AAT Dual STM-1 Optical card, without optics fitted	0.38
SN66TQ,TR,TS,TT Quad STM-1 Optical Card for SMA-1/4c	0.55
1HAT60803ABT STM-1 Electrical Card	0.4
1HAT61004ABP Dual STM-1 Electrical Card	0.38

1HAT61059AAJ Quad STM-1 Electrical Card	0.45
1HAT61008*** STM-4 Optical Card	TBC

14.4 RECOMMENDED RACKS FOR HOUSING SMA SUBRACKS/UNITS

Recommended ETSI racks and Racking installation kits of parts can be found in ref0.5.16 Provisioning Control Document for ETSI Rack and Associated Parts 1ADR60674AAX-CTA.

NOTE: Other racks not listed may be used to house SMA Subracks but consideration should be given to the provision of suitable mounting brackets and the availability of adequate access for fibre or co-axial cables from the rack cable route to the subrack connection points. e.g. on some rack types the cable route may be blocked by the relative positions of the rack and subrack metalwork, especially important when subracks are mounted back to back..

CAUTION: The rack chosen should allow the SMA subrack to have the rack front covers fitted in normal operation, this is to provide ESD protection and assist air flow through the rack for natural convection cooling. See also Section 17 details.

A fan tray should always be fitted in the SMA1/4 Ultra Compact when it is mounted horizontally. Please refer to Section 5.2.1.3 for full fan tray equipping rules.

14.5 OPTICAL FIBRE AND CABLE DRESSING

CAUTION: For racks requiring full functionality, careful consideration must be given to the management of cabling by the use of suitable cable ducting.

14.6 SUBRACK INSTALLATION

Refer to the ‘Installation Guide for SDH Transmission Equipment’ 1QDE10274AAU-YYA for further information.

End of section

15 RECOMMENDED CABLES, CONNECTORS, CABLE ASSEMBLIES AND KITS OF PARTS

A number of external connection points are provided on the equipment. These give access to traffic interfaces, synchronisation ports, management ports etc. as detailed in sections 5, 6 and 7. It is important to ensure that the correct cables and connectors are used to connect to these interfaces.

15.1 RECOMMENDED CABLES

Given below is a list of recommended cables that may be used. The list is not exclusive but FAILURE to use cables of this type with comparable electrical properties may result in the installation not being fully compliant with EMC regulations.

Connectors can be purchased in pre-packaged kits of parts or in the case of balanced 2M a pre-formed cable assembly is also available. (See later this section)

15.1.1 Traffic Interfaces

Card Type	Cable					
	HFE2290	BT3002 (Note1)	BT2003(Note 2)	ST212 (Note 1)	ST214 (Note 2)	RA7000
	1WAE20028AAX	1WAE20002AAE	1WAE00005AAW	1WAE20031AAX	1WAE20030AAV	1300903-0035
2M Unbalanced LTU	Y	Y	N	Y	N	T.B.A.
34/45M LTU	Y	N	Y	N	Y	T.B.A.
140/155M LTU	Y	N	Y	N	Y	T.B.A.
140/155M Front plug up	Y	N	Y	N	Y	T.B.A.
STM-1 Elec. SFP	N	N	N	N	N	Y

Notes:-

1) BT3002/ST212 not recommended for 34/45/140/155 due to increased attenuation

2) BT2003/ST214 not recommended for 2M due to its large diameter

15.1.2 Non-Traffic Interfaces

Interface Type	Quantity	Cable Connector Type	Cable Type	Cable Code
Comms/Aux/Ancillary				
Unbalanced Sync (note 1)	2	RJ45	75 Ohm Coax	1WAE20004AAJ
Aux	2	RJ45	Screened pair cable (4pair)	1WAD20062AAJ
Balanced Sync (note1)	2	RJ45	Screened pair cable (4pair)	1WAD20062AAJ
2M Test Bus	1	RJ45		
Network Management	1	RJ45	Screened pair cable (4pair)	1WAD20062AAJ
User Output	1	9 way D-type Male	User defined	User defined
User Input	1	15 way D-type Male	User defined	User defined
Alarms	1	15 way D-type Female	User defined	User defined
UC PWR/LCT				
LCT cable	1	RJ45	N/A	Use 1HAU62913AAF
Subrack Power (9 pin LTU)	2	9 way D-type Female	N/A	Use 1HAU62501AAF
Subrack Power (3 pin LTU)	2	3-way Power D-type, 2 Female Contacts	N/A	Use 1HAU62025AAM
EX PWR/LCT				
LCT cable	1	RJ45	N/A	Use 1HAU62913AAF
Subrack Power	2	3-way Power D-type, 2 Female Contacts	N/A	Use 1HAU62025AAM

Comment [JB1]: This is not acceptable. Cables need to be screened & have appropriate shielded back-shells to maintain EMC compliance!

Comment [JB2]: As above.

Comment [JB3]: As above.

Notes:-

1) Each of the 2 sync connectors provides access to both balanced and unbalanced sync. Wiring and choice of cable determines which interface is implemented.

15.1.3 Cable Details

CABLE:	**HFE 2290 Cable 1 or Siemens Cable V45466-D13-C15 or V23614-A102-A76**
CODE:	1WAE 20028 AAX
TYPE:	75 Ohm Double Screened co-axial
USE :	Unbalanced connections to all Tributary ports, however the attenuation characteristics must be checked before use.
NOTE:	Max dist. 2M – 330m, 34M – 170m, 45M – 150m, 140M – 85m, STM-1 – 80m Note: Typical cable may support 5-10% extra length but is not guaranteed

CABLE:	**BT 3002 Cable**
CODE:	1WAE 20002 AAE
TYPE:	75 Ohm Double Screened co-ax to CW1383A
USE :	Unbalanced connections to 2M Tributary ports
NOTE:	Signals up to 2Mbit/s, short lengths may be acceptable above 2Mbit/s however the attenuation characteristics must be checked before use and no EMC compliance above 2Mbits is offered by Marconi Communications (for BT)

CABLE:	**BT 2003 Cable**
CODE:	1WAE 00005 AAW
TYPE:	75 Ohm Double Screened co-ax (low loss)
USE :	Unbalanced connections to Line and Tributary ports
NOTE:	Signals above 2Mbit/s (for BT). Not recommended for 2M ports due to the relatively large cable diameter which makes cable routing within the rack difficult when a large number of ports are utilised.

CABLE:	**ST212 Cable**
CODE:	1WAE 20031 AAX
TYPE:	75 Ohm Double Screened co-ax
USE :	Unbalanced connections to Tributary and Sync ports
NOTE:	Signals up to 2Mbit/s (for Italtel). Short lengths may be acceptable above 2Mbit/s however the attenuation characteristics must be checked before use and no EMC compliance above 2Mbits is offered by Marconi Communications.

CABLE:	**ST214 Cable**
CODE:	1WAE 20030 AAV
TYPE:	75 Ohm Double Screened co-ax (low loss)
USE :	Unbalanced connections to Tributary/Line ports
NOTE:	Signals above 2Mbit/s (for Italtel). Not recommended for 2M ports due to the relatively large cable diameter which makes cable routing within the rack difficult when a large number of ports are utilised.

CABLE:	**Belden 9806 cable**
CODE:	1WAD 20062 AAJ
TYPE:	Screened Pair Cable (4 pair)
USE :	Connections to balanced Sync, Auxiliary, Alarm and Network Management ports
NOTE:	100-120 Ohm balanced signals up to 2Mbit/s

CABLE:	**Coaxial 7/0.1mm**
CODE:	1WAE20004AAJ
TYPE:	75ohm coaxial
USE :	Connections to unbalanced RJ45 Sync ports.
NOTE:	75 Ohm unbalanced sync signals

CABLE:	**Raydex RA7000 cable**
CODE:	1300903-0035
TYPE:	75ohm coaxial
USE :	Connections to STM-1 SFP electrical modules.

15.2 PRE MADE CABLE ASSEMBLIES

The following standard pre-made cable assemblies have been created to ease installation.

POWER Cable Assembly – SMA1/4UC (9 pin) (SP03AA)	
CODE:	1HAU62501AAF
TYPE:	Multicore (x9) 20AWG (0.56mm^2 1WAD20141AAH) terminated with 9 way D Type

USE: Power cable between PWR/LCT unit (9 Way D-Type) and SMA1/4UC top of rack power supply (breakout).
NOTE: 2 off required for protected battery supplies.

POWER Cable Assembly – SMA1/4UC/EX (3 pin) (SP20AA)

CODE: 1HAU62025AAM
TYPE: Two-Core 8 AWG (4mm^2 - 1WAD20128AAS) terminated with 3 pin 3W3A Power D Type
USE: Power cable between PWR/LCT unit (3Way Power D-Type) & SMA1/4UC/EX top of rack power supply (breakout).
NOTE: 2 off required for protected battery supplies.

2M Balanced LTU cable assembly 3m (MP93CC03)

CODE: 1HAU62508AAV (3 m length)
TYPE: Screened Pair Cable (32 pair) terminated with 78way sub-miniature D type
USE: Connections to balanced 2M Tributary ports,
NOTE: Assembly pack consists of two separate cables, each of which is terminated with a D-type at one end. This gives a total 2M balanced port connectivity of 32 channels. (i.e. 32 inputs and 32 outputs).

2M Balanced LTU cable assembly 20m (MP93CC20)

CODE: 1HAU62508ABN (20m length)
TYPE: Screened Pair Cable (32 pair) terminated with 78way sub-miniature D type
USE: Connections to balanced 2M Tributary ports,
NOTE: Assembly pack consists of two separate cables, each of which is terminated with a D-type at one end. This gives a total 2M balanced port connectivity of 32 channels. (i.e. 32 inputs and 32 outputs).

CABLE: LCT Cable Assembly (SV30J)

CODE: 1HAU61913AAF
TYPE: Belden 9502 or equivalent, 8 way.
USE: Local terminal interface for SMA1/4UC, SMA1/4CP and SMA1/4c

CABLE: EOW 1U Shelf Power Cable (SP52AA)

CODE: 1HAU62522AAN
TYPE: 3 Core (1.5mm Sq.) CU PVC 3 x 30/0.25 SCN 16A (1WAD20122AAE)
USE: Power Cabling between EOW unit and SMA1/4UC top of rack power supply

15.3 CONNECTOR KITS OF PARTS

A number of kits of parts containing multiple connectors are available and these are listed below

Notes:-
1. Right angled connectors are not recommended for LTU connections as the PCB connectors on the actual LTUs tend to be too close together.
2. All the traffic coax connectors listed below are of type 1.0/2.3 male. 2 are required per interface (i.e one input and one output).

Saleable Entity	Description	ME Code	ME Qty	SE Contents
SP53BA	KOP 8 x RJ45 Plus Extractor tool (For use with e.g. Comms/Aux/Ancillary Unit.)	1MBB61427AAV	1	8 x RJ 45 Extractor tool (for extracting RJ45 connectors from the Comms/Aux/Ancillary unit)
SP53BB	KOP 3 x D-Types (For use with e.g. Comms/Aux/Ancillary Unit.)	1MBB61428AAX	1	1 x 9 way D Type Male 1 x 15 way D Type Male 1 x 15 way D Type Female D-Type hoods
SU65ZA	Electrical SFP Connector KOPs	1MBB61422AAK	1	2 x 45deg Male 1.0/2.3 for 7000 cable
SU65ZB	Electrical SFP Connector KOPs	1MBB61462AAV	1	2 x 45deg Male 1.0/2.3 for 3002 cable
MP93AA	Straight ST214 1 port	1MBB60851AAJ	1	2 x straight ST214
MP93BB	Straight HFE2290 1 port	1MBB60891AAU	1	2 x straight HFE2290
MP93BC	Straight BT2003 UK std 1 port	1MBB60912AAG	1	2 x straight BT2003 Standard
MP93BD	Straight BT2003 Type 43 1 port	1MBB60912BAD	1	2 x straight BT2003 Type 43
MP93BA	Straight ST212 16 ports	1MBB60850AAG	2	32 x straight ST212
MP93BB	Straight HFE2290 16 ports	1MBB60891ABM	2	32 x straight HFE2290
MP93BC	Straight BT3002 Standard 16 ports	1MBB60913ABB	2	32 x straight BT3002 Standard
MP93BD	Straight BT3002 Type 43 16 ports	1MBB60913BBX	2	32 x straight BT3002 Type 43
MP93CC	78 Way D Type Belden 9806 32 port	1MBB61426AAT	1	2 x D-type

End of section

16 POWER CONSUMPTION AND EQUIPMENT PROTECTION

16.1 POWER CONSUMPTION FIGURES

Figures for SMA1/4UC & EX specific cards are absolute maximums and are early estimates. See Product Champion for latest figures.

Cards/Units	Power Consumption
SMA1/4UC Specific	
1HAG60627AAV SMA1/4UC SUB RACK	0W
1HAT61107AAK/ABC 64x2M Core Trib Card	12.5W
1HBA60827AAV 32x2M Unbalanced LTU –Interface module	0W
1HBA60828AAX 32x2M Unbalanced LTU –Front panel	0W
1HBA60831AAX 32x2M Balanced LTU –Interface module	0W
1HBA60832AAA 32x2M Balanced LTU –Front panel	0W
1HAM61217AAK Power/LCT LTU (9 pin)	0.5W
1HAM61217ABC Power/LCT LTU (3 pin)	0.5W
03HAN00007AAH AC Power & Battery Backup Unit (Maximum)	TBC
EX Specific	
03HAG00001AAX EX Subrack	0W
03HAM00008AAX EX Power/LCT LTU	0.5W
03HAT00056AAQ EX 63x2M Trib Card	23W (inc LTU)
03HAM00003AAL EX 63x2M Unbal LTU	N/A (see above)
03HAM00002AAJ EX 21x2M Bal LTU	N/A (see above)
03HAM00009AAA EX Vertically Extended 63x2M Unbal LTU	N/A (see above)
UC & EX Generic	
1HAT61105AAF Core/CCU Card (including system memory module)	19W
1HAT61106AAH/BAE Comms/AUX/Ancillary Card	12W
1HAM61215AAF 3x34M LTU	5W
1HAM61218AAM Generic Trib Power LTU	2W
1HAT61114AAT Protection Core Card	12W
1HAM61219AAP Fan Assembly (SMA1/4UC)	14W
1400729-***** & 1400744-**** SFP Optical Line Module	0.8W
4800943-0017 STM-1 Electrical Module DIN 1.0/2.3	1.0W
1HAM61228AAC 2 x STM-1/140M LTU	5.0W
03HAT00043AAU Multirate Trib Card	11W
03HAT00041AAQ STM-4/16 Core A/CCU ADM Unit	26W
03HAT00041ABH STM-4/16 Core B ADM Unit	23W
SMA Generic	
1HAT60622BAN 34Mbit/s Tributary Card without LTUs	12W
1HAT60623BAQ 45Mbit/s Tributary Card without LTUs	12W
1HAT60624BFE/CAP 140Mbit/s Tributary Card without LTUs	8W
1HAT60979AAC 34Mbit/s Transmux without LTU	11W
1HAT60791* STM-1 Optical Card TCM	7.7 W
1HAT60878AAT Dual STM-1 Optical Card TCM without optical modules	4 W
SN66TQ,TR,TS,TT Quad STM-1 Optical Card for SMA-1/4c	12.0 W
1HAT60803ABT STM-1 Electrical Card TCM with LTU	11 W
1HAT60803ABT STM-1 Electrical Card TCM no LTU (i.e.: front access)	8.8 W
1HAT61004ABP Dual STM-1 Electrical Card with LTUs	15.4 W
1HAT61004ABP Dual STM-1 Electrical Card no LTUs (i.e.: front access)	11 W
1HAT61059AAJ Quad STM-1 Electrical Card TCM (front access only)	7.58 W
1HAT61008*** STM-4 Optical Card	8W
1HAT60876AAP Comms/Controller Card including SMC	10 W
1HAT60877AAR STM1/4 ADM Card without optics, including LTU	20 W
1HAT61052AAT STM1/4 ADM Card without optics, including LTU	20W
1HAT60988AAQ STM1/4 ADM Card without optics, including LTU	20W

16.2 TYPICAL POWER CALCULATION

1 x Subrack Core*	=	19.5W	*Core:- Core/CCU Card, Memory module and Pwr/LCT LTU
2 x STM1 Optical modules	=	1.6W	
Protection Core Card	=	12W	Switch protection
64x2M Trib Card	=	12.5W	
2 x 32x2M LTU	=	0W	
Dual STM1 Electrical Front access	=	11W	
Generic Trib Power LTU	=	2W	
Comms/Aux/Ancillary	=	10W	
		68.6W	

16.3 EXTERNAL PROTECTIVE DEVICE (EPD)

The EPD (fuse or circuit breaker) for each of the –48V supply feeds to the equipment should be selected as follows.

16.3.1 Type & Location

If the EPD is to be located at the top of a rack containing heat-dissipating equipment then it should be a temperature-compensated device such as a (Hydraulic) Magnetic Circuit-Breaker, or a temperature-compensated thermal or thermal-magnetic circuit-breaker.
Fuses & non-compensated thermal & thermal-magnetic circuit-breakers should only be used in "end-of-suite" locations remote from racks containing heat-dissipating equipment.

16.3.2 Device Parameter Selection

The ***Breaking Capacity*** of the EPD must meet or exceed the Prospective Fault Current (I_F) at its load-side terminals.

The ***Rated Current*** of the EPD should initially be selected to be the lowest available value that exceeds the rated current of the subrack internal fuse. Internal fuse data are:

- For UC: Belfuse Type SSQ-5, rated at 5A
- For EX: Belfuse Type SSQ-12, rated at 12A
- Data available at www.belfuse.com

The ***Rated Current*** of the EPD may be increased as a result of the following selection process, but should not exceed the current-carrying capacity of unprotected internal conductors in the subrack. These are:

- For UC: 16A (Power connector, 4A per contact)
- For EX: 20A (PCB Copper - via holes supplying fuse)

The ***time-current characteristic*** should now be selected to meet the following criteria:

- The minimum energy let-through (I^2t) of the EPD must be greater than the I^2t value represented by the equivalent time or current point of the inrush current limit curve given in ETSI EN 300 132-2 Clause 4.7.1 & Figure 2 (see www.etsi.org), for all values of I and t.

  For the purpose of this comparison the maximum input current I_m as defined in EN 300 132-2 is given by:

$$I_m = I_{R(\max)} \cdot \frac{V_{R(\min)}}{48} \quad \ldots . [1]$$

  Where $I_{R(max)}$ & $V_{R(min)}$ are the maximum RATED CURRENT and minimum RATED VOTAGE of the subrack, as given on the rating label & below:

  $V_{R(min)} = 38.4V$

  For UC: $I_{R(max)} = 4A, \Rightarrow I_m = 3.2A$

  For EX: $I_{R(max)} = 9.5A, \Rightarrow I_m = 7.6A$

- The minimum energy let-through (I^2t) of the EPD must be greater than the maximum energy let-through of the subrack internal fuse for any given value of I where I is less-than or equal-to the Prospective Fault Current (I_{AN}) at the Power-LTU power connector, given that where the power cord has N conductors per supply pole (i.e. in the UC power cord), all such conductors are sound & the fault current is shared between them.

- If the EPD is a Fuse then it must be further co-ordinated with the subrack internal fuse so that the EPD is not weakened if the internal fuse operates.

- The guaranteed maximum disconnect-times of the EPD at I_F, I_A & at I_{AN} must be capable of protecting the Power Cord, where I_A & I_{AN} are the Prospective Fault Currents at the Power-LTU power connector when one or N conductors respectively per supply pole carry the fault current. NOTE: for power cords where $N \neq 1$, I_A assumes that a single conductor carries the fault current in one pole, but all N conductors carry the fault current in the other pole.

  This is not expected to be a problem when using the cables recommended in section 15.2 provided that the fastest time-current characteristic that meets all of the above criteria has been selected.

  Power Cord protection can be assessed using Equation 2 for faults anywhere within the Power Cord (desirable) & Equation 3 for equipment faults (***mandatory***). Meeting Equation 3 with $N = 1$ ($I_{AN} = I_A$) protects the power cord against faults within its own connector.

$$5 \geq T_F \leq \frac{k^2.S^2}{I_F^{\,2}} \quad \ldots . [2] \qquad\qquad 5 \geq T_{AN} \leq \frac{k^2.S^2.N^2}{I_{AN}^{\,2}} \quad \ldots . [3]$$

  T_F / T_{AN} = disconnect-time of EPD in seconds at I_F / I_{AN} respectively. T_x must be less than 5 seconds for formula to be valid: typical values are 1 - 30 ms.

k = Cable Factor. This is normally obtained from local Building Wiring Regulations in the territory of installation, or from the cable manufacturer. For example, in the UK BS 7671 gives a value of k = 100 for 90°C PVC cables with conductors operating at maximum temperature (i.e. carrying the cable's rated current taking into account ambient temperature de-rating factors).

S = Cross-sectional area of an individual power cord conductor in mm^2

N = Number of conductors per supply pole - (4 for UC, 1 for EX)

I_F / I_{AN} = Prospective Fault Current at EPD / Power-LTU power connector

16.4 MULTIPLE SUBRACK MOUNTING

16.4.1 Mechanical considerations

The subrack may be mounted in either the vertical or horizontal axis.
In the vertical mounting option multiple subracks can be mounted in the vertical direction and up to 2 side by side horizontally. However, when doing so thermal aspects must be considered as described in the following section.
The standard Core UC subracks (SP03AB & SP13AB) comes supplied with brackets to allow all these mounting options.
For horizontal mounting a fan must always be fitted. Please refer to Section 5.2.1.3 for full fan tray equipping rules.

Note:- The brackets meet the requirements for office vibration only. They have not been tested against extended requirements for earthquake zones.

16.4.2 Thermal Considerations

If required, it is permissible to mount more than one SMA subrack or other equipment in one Rack framework, however consideration must be given to:
a) The maximum permissible power dissipation allowed in the customer's rack framework.
b) The maximum rise in temperature under which the upper SMA subrack will operate.
c) The ETS Climatic Limits. The equipment has been tested as conformant to ETS 300 019-2 Class 3.1e, which includes a working range of time operating at different temperatures and relative humidities.
d) The reduced MTBF resulting from continuous operation at elevated temperature.
e) Forced air-cooling.

Guide to compliance:
It is considered that with a maximum overall sub-rack power dissipation within a 19inch or ETSI rack framework of up to 780W, the expected temperature rise over outside rack framework ambient would be no greater than 20DegC. This would be seen as the limit for rack equipping.

Refer to important notes below:-

NOTE: Continuous operation at maximum ambient temperature is not recommended, it would be expected that continuous operation would be at ambient temperatures less than 30DegC but operation up to the maximum is allowable for short periods (Hours) as part of a weather or air conditioning plant failure – see c) above.
NOTE: Operating a subrack in increased ambient temperature as normal deployment will reduce the Equipment MBTF.

THE COMBINED POWER DISSIPATION OF ALL EQUIPMENT IN A RACK SHOULD BE CHECKED AGAINST MARCONI COMMUNICATIONS AND CUSTOMER INSTALLATION RULES.

The use of multiple subracks with total power dissipation exceeding 780W should not normally be used without forced air cooling or further environmental verification.

Note: If the subrack is mounted horizontally then a fan tray should always be fitted. Please refer to Section 5.2.1.3 for full fan tray equipping rules.

End of section

17 RELIABILITY

17.1 SMA CARD MTBF PREDICTIONS

The following card figures are to be assumed for MTBF calculations. Engineering should be consulted before any figures other than the MTBF (Spec.) are committed to a customer.

Note :- MTBF (Spec.) = MTBF(HRD*) x 3 and may be offered to customers as the Marconi Communications specification for MTBF. This multiplication factor is based on passed experience of previous units calculated versus actual MTBF.
Cards have MTBF calculated to HRD5 however some cards from early equipment were calculated to HRD4.
It should be emphasised that the figures below are from theoretical calculations only and are not based on actual field returns. Also the figures for the SMA1/4UC & EX specific MEs should be treated with caution.

Note 1) These particular figures are rough estimates based on similar units and are not from detailed calculations.
Note 2) Figure given is for the combined Interface and front panel unit, which together form the LTU function.

Cards/Units	MTBF years HRD(*)	MTBF years (Spec.)
SMA1/4UC Specific (Estimates based on current designs)		
1HAG60627AAV SMA1/4UC SUB RACK module (Note 1)	100	300
1HAT61107AAK/ABC 64x2M Core Trib Card	20	60
1HBA60827AAV 32x2M Unbalanced LTU –Interface module (Note 2)	131.3	393.9
1HBA60828AAX 32x2M Unbalanced LTU –Front panel	-	-
1HBA60831AAX 32x2M Balanced LTU –Interface module (Note 2)	138.88	416.64
1HBA60832AAA 32x2M Balanced LTU –Front panel	-	-
1HAM61217AAK Power/LCT LTU (9 pin) (Note 1)	100	300
1HAM61217ABC Power/LCT LTU (3 pin) (Note 1)	100	300
03HAN00007AAH AC Power & Battery Backup Unit	TBC	TBC
EX Specific		
03HAG00001AAX EX Subrack	81	243
03HAM00008AAX EX Power/LCT LTU	640	640
03HAT00056AAQ EX 63x2M Trib Card	14.1	42.3
03HAM00003AAL EX 63x2M Unbal LTU	9.5	28.5
03HAM00002AAJ EX 21x2M Bal LTU	42.2	126.2
03HAM00009AAA EX Vertically Extended 63x2M Unbal LTU	9.5	28.5
UC & EX Generic		
1HAT61105AAF Core/CCU Card	15.43	46.29
1HAT61106AAH/BAE COMMS/AUX/Ancillary Card (Note 1)	20	60
1HAM61215AAF 3x34M LTU (Note 1)	50	150
1HAM61218AAM Generic Trib Power LTU	50.0	150.0
1HAT61114AAT Protection Core Card	21.06	63.18
1HAM61219AAP Fan Assembly (SMA1/4UC)	TBC	TBC
1400729-***** & 1400744-**** SFP Optical Line Module	50	150
1HAL60517AAW STM-1 Electrical Module DIN 1.0/2.3	860.47	2581.41
1HAM61228AAC 2 x STM-1/140M LTU	29.4	88.2
03HAT00043AAU Multirate Trib Card	45	135
03HAT00041AAQ STM-4/16 Core A/CCU ADM Unit	13.5	40.5
03HAT00041ABH STM-4/16 Core B ADM Unit	22.5	67.5

Cards/Units	MTBF years HRD(*)	MTBF years (Spec.)
SMA Generic (Calculated figures)		
1HAT60791* STM-1 Optical Card TCM	20	60
1HAT60878AAT Dual STM-1 Optical Card without optical modules	21.69	65.07
SN66TQ,TR,TS,TT Quad STM-1Optical Card for SMA-1/4c	25.16	75.48
1HAT60803ABT STM-1 Electrical Card TCM	21.1	63.3
1HAT61004ABP Dual STM-1Electrical Card	18.25	54.75
1HAT61059AAJ Quad STM-1Electrical Card TCM	40.15	120.45
1HAT61008*** STM-4 Optical Card		
1HAT60874* STM1 Dual Fibre Working Optical Module	28.1	84.3
1HAT61098* STM1 Dual Fibre Working Optical Module	28.1	84.3
1HAT60908* STM4 Dual Fibre Working Optical Module	28.1	84.3
1HAT60875* STM1 Single Fibre Working Optical Module	28.1	84.3
1HAT60909* STM4 Single Fibre Working Optical Module	28.1	84.3
1HAT60624BFE/CAP 140Mbit/s Tributary Card	35	105
1HAM60798ABN/ACF/839AAN 140Mbit/s/STM-1 LTU & Link LTU	111	333
1HAT60622BAN/623BAQ 34/45Mbit/s Tributary Card	34	102
1HAT60979AAC 34M Transmux Card	TBD	TBD

End of section

18 STANDARDS AND APPROVALS

Note: This section needs approval from SDA and Engineering. Discuss with Product Champion before making any commitments to customers etc.

The SMA-1/4UC & EX equipment meets the following specifications when all EMC and protective equipment rack covers are in position. Consideration should be given to the expected working conditions of the equipment when installed in an equipment rack, see Section 14 & 16 for guidance.

Electrical, Environmental and Safety Approval Testing has been performed considering:

The SMA-1/4UC equipment is primarily rack-mounted equipment for use in telecomms centres.

Approved racks are described in Section 14.4.

The equipment is not approved for use in environments beyond the environmental specification. If alternative housing is required then the necessary advice and approval shall be sought from the design authority and where necessary testing will be required.

18.1 ENVIRONMENTAL SPECIFICATION

Atmospheric

Equipment meets ETS 300 019-2
In operation - Class 3.1E
In Storage - Class 1.1
In transport - Class 2.3

Electromagnetic

Product Family Standard EN 300 386-2

and European Standards
ES 201 468 Enhanced Availability of Service Level 2 including, but not limited to:

Radiated Immunity - EN 61000-4-3 (10V/m)
Radiated Emission - EN 55022 (Class B)

DC Power Interface - ETS 300 132-2

and British Telecommunications
Requirements for telecommunication power requirements – BTR 2511 Iss03

18.2 SAFETY

In order to comply with the safety requirements of EN60950, the equipment should be professionally installed in a restricted access location.

Note: A protective earth connection must be made:
Before any external cables are connected, the equipment must be connected to Protective Earth:

The SMA1/4UC & EX shelf-frame shall be connected to protective earth via the shelf support metalwork. The frame must remain connected to Protective Earth until all external cables are removed. Cards must not be removed or inserted with cables attached.

The equipment has been designed to meet the general requirements of:-

Health and Safety at Work Act 1974
EN 60950
BT Specification RC5000P
Marconi Communications Product Safety Design Guide 1QDA 20090 AAY-YYA.

18.2.1 Electrical Safety

The equipment meets

EN60950: 2000
AS/NZS60950: 2000
ACA TS 001: 1997

18.2.2 Optical Safety

The optical source devices which are used in this equipment may have been classified by their manufacturers, under laser radiation safety standards EN 60825-1, as class 3M laser products, and so potentially can emit invisible optical radiation in excess of the inherently safe class 1 limits defined by this standard.
The use of these optical devices within the equipment, however, involves drive, power monitoring and control circuitry to limit the power available from these devices, the design and setting up of the equipment ensures that the product meets the class 1 limits.
No attempt should be made to adjust or tamper with the laser or its control circuitry as this may result in class 1 emission limits being exceeded.
A safety interlock/shutdown mechanism is provided, which limits the emission duration of the transmitted output power to a maximum of 4.6 seconds in the event of a fibre breakage.
Two discrete control loops are provided to ensure that the output power cannot exceed its specified operating limits. In the event of a fault occurring, these loops remove power from the laser drive circuitry.
Refer to the SMA Handbook warnings and operating instructions for guidance on laser and other hazards.

18.3 REPORTS

Reports have been produced to support the compliance and approval of the SMA equipment (e.g. Thermal Analysis /Environmental/EMC/Safety Reports).

End of section

END OF DOCUMENT