R57901-020-A000-01

DeTeWe public communication networks

Advanced Line Interconnection Access Network

ALIAN

GENERAL DESCRIPTION

ISSUE 1.0
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Preface

The ALIAN is a flexible access network multiplexer developed by DeTeWe PCN together with Fujitsu for the German market.

A sophisticated network management system is integrated in the ALIAN to provide operation, maintenance, and management functions.

This manual gives a general description of the ALIAN including its characteristics, configuration, functions, and technical specifications.

Section 1 : Describes the ALIAN systems.

Section 2 : Describes the service applications.

Section 3 : Describes the system functions.

Section 4 : Describes the equipment configuration.

Section 5 : Describes the maintenance function.

Section 6 : Describes the technical specification.

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GENERAL DESCRIPTION

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1. SYSTEM DESCRIPTION

This section describes the system features of the Advanced Line Interconnection Access Network (ALIAN) and suitable network configuration.

1.1 System Features

The ALIAN is designed to meet a wide range of customer access and fiber transport applications. It has a powerful and flexible architecture.:

Key features of the ALIAN are:

- Standard feature set for many size ranges
- Support for POTS and ISDN BRA lines with concentration
- High capacity channel units - 15 POTS lines per unit, 12 ISDN lines per unit
- Wide range of VF, data and high speed channel units
- Comprehensive subscriber line test features
- Integral grooming function
- Support for integrated digital loop carrier (IDLC) based V5.2 operation
- Migratable to SDH transport (STM-1 using new CMS shelf)
- Integral X.25 network management interface
- Event driven network management protocol
- Compact design
- Front access for all units and cabling

1.2 Network Configuration

The ALIAN is configurable with an SDH transport equipment as an IDLC node. The ALIAN is suitable for both point-to-point and ring types of access network.

Figure 1.1 shows a typical example of the IDLC mode access network configuration. The tributaries from an exchange are interfaced to an SDH transport system, and served to subscribers via the ALIAN RT.

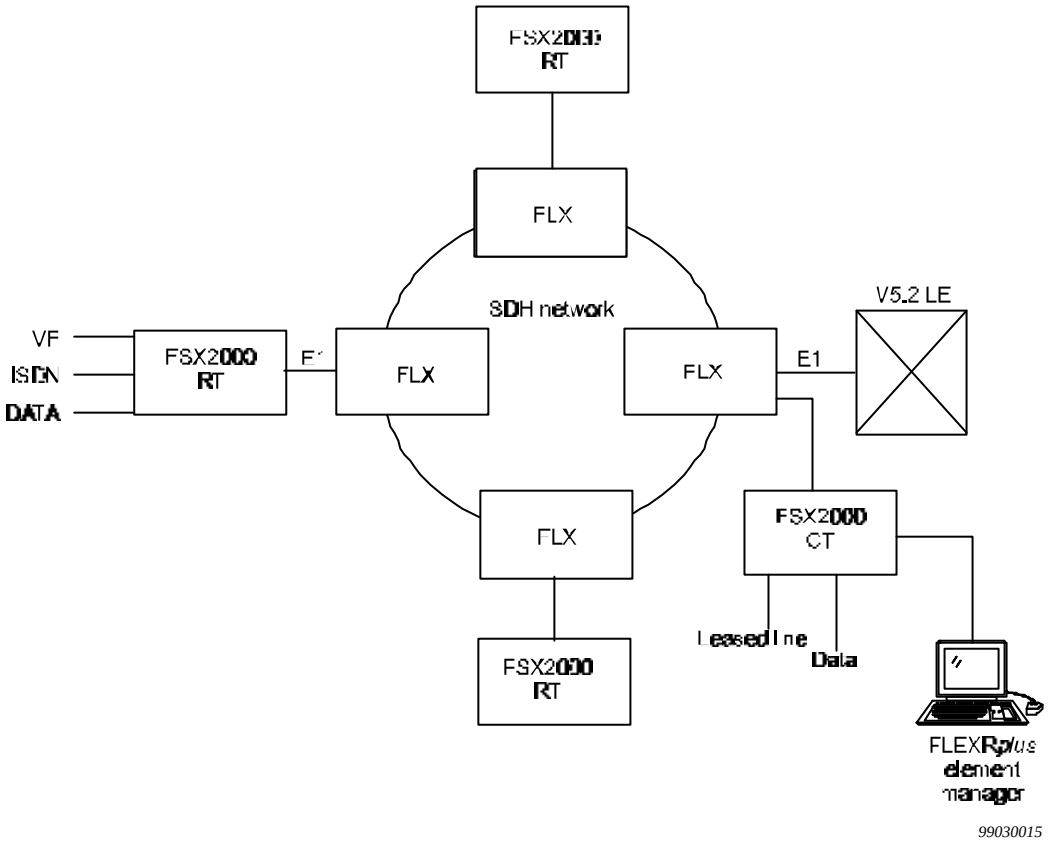


Figure 1.1 Access Network Configuration

The ALIAN CT can be used to provide leased lines services and NMS access such as FLEXR Plus Access.

Maximum 700 NEs can be managed by one FLEXR*plus* optionally.

2. SERVICE APPLICATIONS

This section describes the service application:

- Switched services
- Digital Leased Line Services

2.1 Subscriber Service Capabilities

Switched services such as:

- POTS lines with V5.2
- ISDN BRA lines with V5.2

from the remote terminal can be interfaced to the exchange digitally over E1 (2.048 Mb/s) digital circuits with V5.2 protocol. While V5.2 protocols allow a mixture of services to share the same trunk as well as support for concentration.

Digital Leased Line Services

- 2,048 Mb/s lines
- 64 kbit/s lines
- ISDN BRA (from one RT to another RT)

Figure 2.1 shows the subscriber service capabilities for ALIAN.

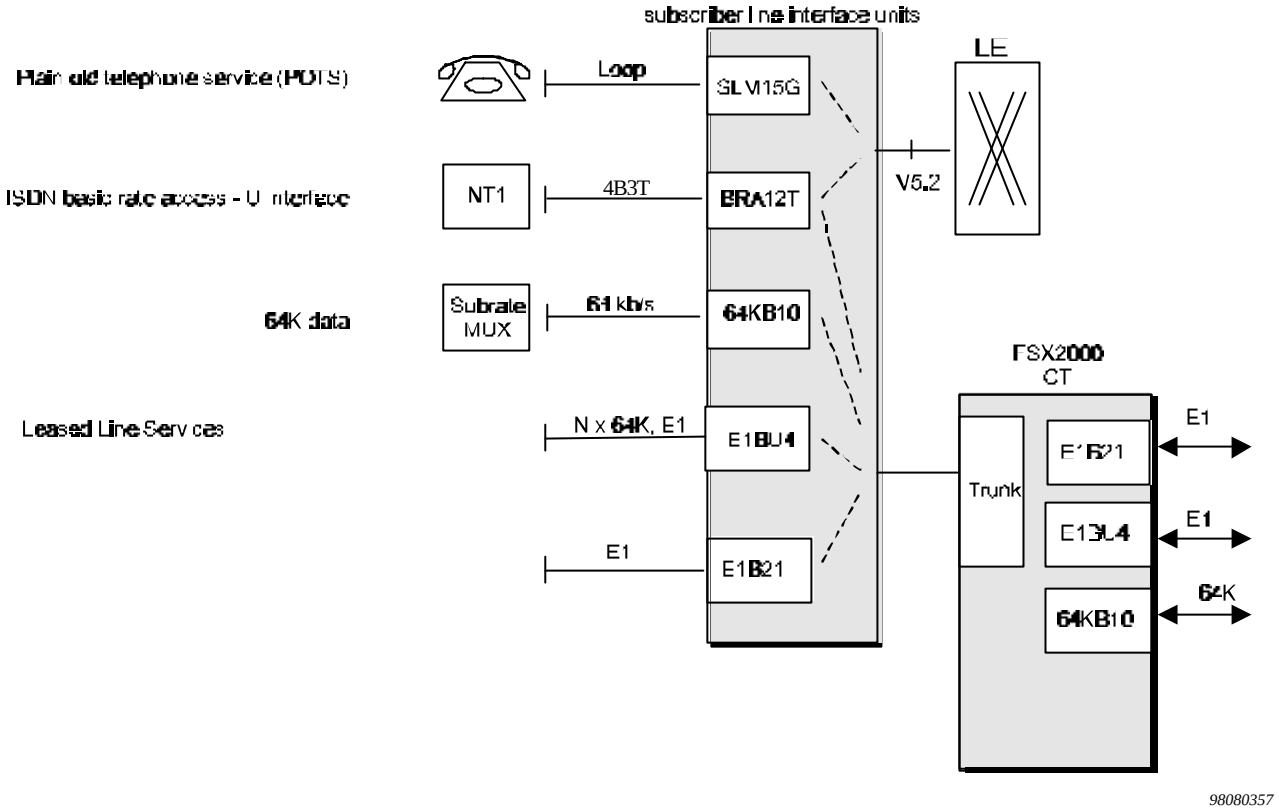


Figure 2.1 ALIAN Subscriber Service Capability

2.2 Switched Services

2.2.1 POTS Line Services with V5.2

Voice frequency services are supported by POTS lines shown in Figure 2.2. Suitable interfaces are available for the CT and RT for this purpose. Table 2.1 lists applications using the switched voice frequency services.

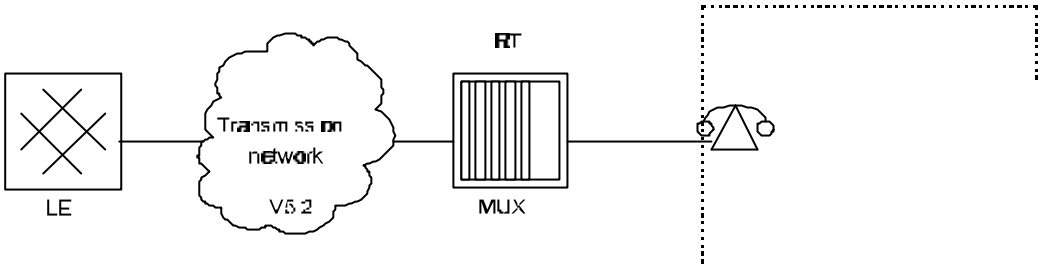


Figure 2.2 Switched voice frequency Line Services

Table 2.1 Switched VF Services

Application	Note
POTS with metering	• Subscriber metering supported at 12 kHz or 16 kHz transverse, line reversal is also supported. • Used for public telephones

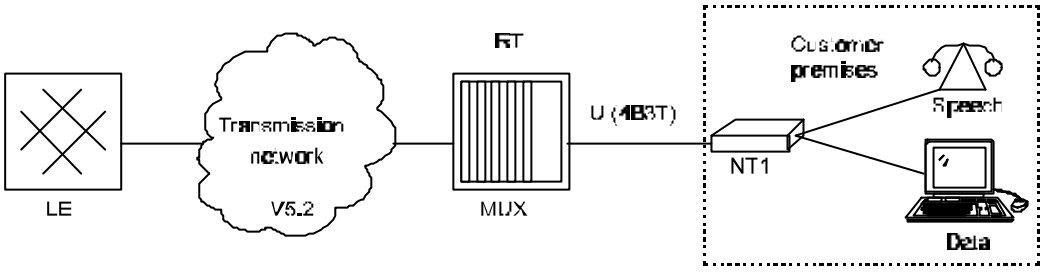
2.3 ISDN BRA Services

2.3.1 V5.2 Mode

2.3.1.1 Network Topology

A BRA12T port in V5 mode provides the U_{K0} line termination for an ISDN subscriber line as part of a V5.2 access network (AN). The two B channels are routed as V5.2 bearer channels to the switch (local exchange, LE); the D channel data are multiplexed in the V5.2 control channels via the ALIAN V5MC unit.

While a port is unblocked, the status of the U_{K0} interface is controlled from the LE. When a ports is blocked, the AN maintenance controls the U_{K0} interface; local and remote loops (NT1, repeater) can be inserted via FLEXR.



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2.3.1.2 D Channel Transport for V5.2

In order to minimize V5MC unit HDLC port requirements, the BRA12T unit concentrates the D-channels from the 12 NT1 units (operating at a peak rate of 16 kb/s) into a single 64 kb/s in the direction towards the V5MC unit. In the opposite direction, the 64 kb/s D-channel from the V5MC unit is expanded into separate D-channels towards the 12 NT1 units. This means a D-channel concentration factor of 12:4 on the BRA12T.

2.3.2 LL-B1B2 Mode

2.3.2.1 Network Topology

A BRA12T port in LL-B1B2 mode provides the line termination for a U_{K0} subscriber line used for two transparent 64 kb/s channels as shown in Figure 2.3

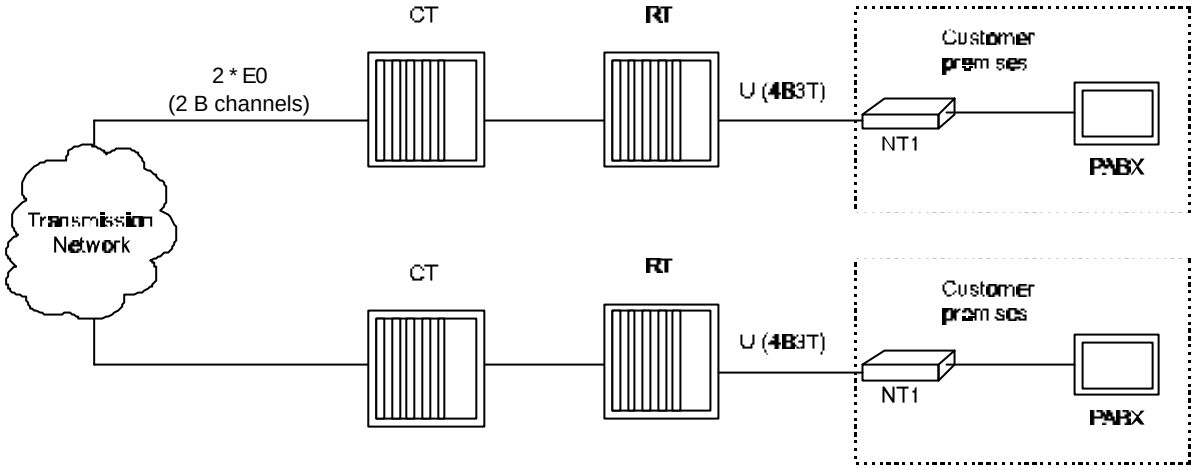

Figure 2.3 Network Topology for B1B2 Leased Lines

2.3.3 LL-2B+D Mode

2.3.3.1 Network Topology

A BRA12T port in LL-2B+D mode provides the line termination for a U_{K0} subscriber line used for two transparent 64 kb/s channels and one transparent 16 kb/s channel as shown in Figure 2.4.

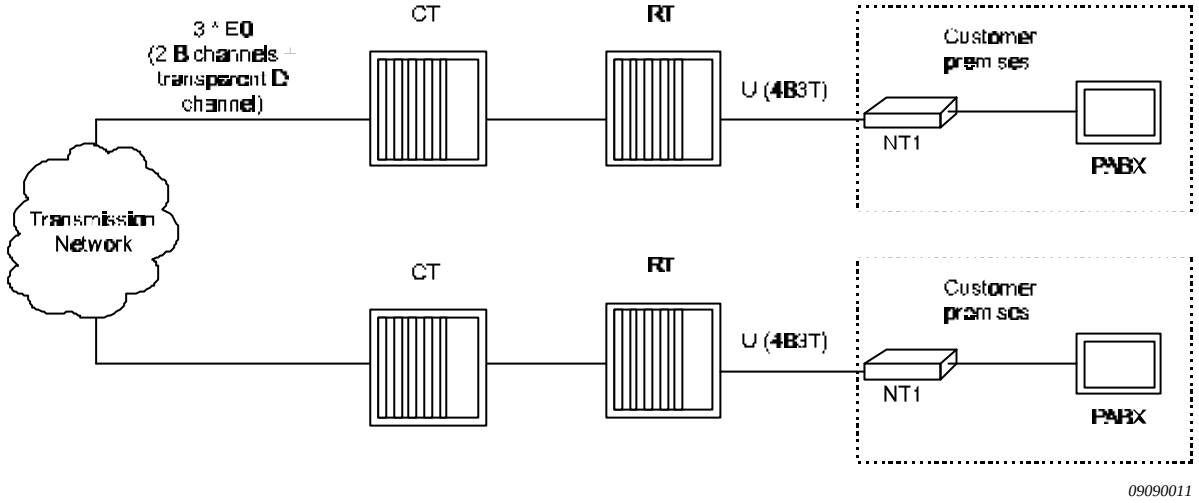

Figure 2.4 Network Topology for 2B+D Leased Lines

2.3.3.2 D Channel Transport

The transparent U_{K0} D channel is mapped to an E0 (64 kb/s) network channel. The two E0 channels carrying the U_{K0} B channel data and the E0 channel containing the U_{K0} D channel data must be routed to the partner BRA12T connected to the target PABX. The administration of the leased lines is independent from the V5.2 interface.

If port $2n$+1 and port $2n$+2 of the BRA12T are provisioned as leased line ports, the D channel data of these ports are multiplexed into a single E0 channel. Therefore the corresponding partner PABX's must be connected to adjacent BRA12T ports as well.

3. SYSTEM FUNCTIONS

This section describes the following ALIAN system functions:

- Concentration
- Grooming
- Protection
- Clocking
- Service facilities

3.1 Concentration

The ALIAN can utilize the concentration function at 64 kb/s in the V5MC unit of an ALIAN remote terminal (RT).

The V5MC is a single width, plug-in unit which allows the ALIAN to perform the role of an access network (AN) using a V5.2 compatible protocol. The V5MC accepts "C-channels" from any of up to sixteen 2.048 Mb/s transmit and receive highways connected to the ALIAN from the local exchange (LE). In acquiring the "C-channels" the V5MC deals with all of the V5.2 signaling protocols including PSTN, BCC, protection, link control, and control.

The processed protocol commands are passed to the internal ALIAN resources to allow dynamic allocation of trunk resources to a greater number of subscribers on an "as needs" basis (dynamic concentration). To cater for situations where all trunk resources are fully allocated, the V5MC provides a user definable congestion message (voice or tone).

The protocol processing, which is a both ways communication path, is used to propagate to and from the LE various line subscriber line states, "off-hook," or "cadenced ring" for an incoming call. See Figure 3.1 for an example of V5.2 concentration.

Features of the V5MC unit concentration capability are:

- Compatibility with the V5.2 standard ETS300-347 as specified in ALIAN V5.2 PICS document.
- Dynamic concentration of subscriber lines (n : 1) to accommodate the allocated trunk resources up to a maximum of 1,920 subscribers (e.g. 1,920 subscribers could be concentrated to 16 × E1 at a 4 : 1 concentration ratio.)
- User definable congestion message

- Supports up to 4 "C-channels", i.e. one active and one standby C-channel in Protection Group 1 and one active and one standby C-channel in Protection Group 2, on a maximum of sixteen 2.048 Mb/s trunk highways
- (four active C-channels in PG2 will be provided with the future system which will have up to 768 ISDN subscriber lines at the same time with the release of V5MC-H unit)
- The ability to concentrate POTS (including coin box operated) and ISDN services. Up to 288 ISDN (2B+D) subscriber lines and up to 768 ISDN (2B+D) subscriber lines in future release.

Figure 3.1 shows the V5.2 concentration function.

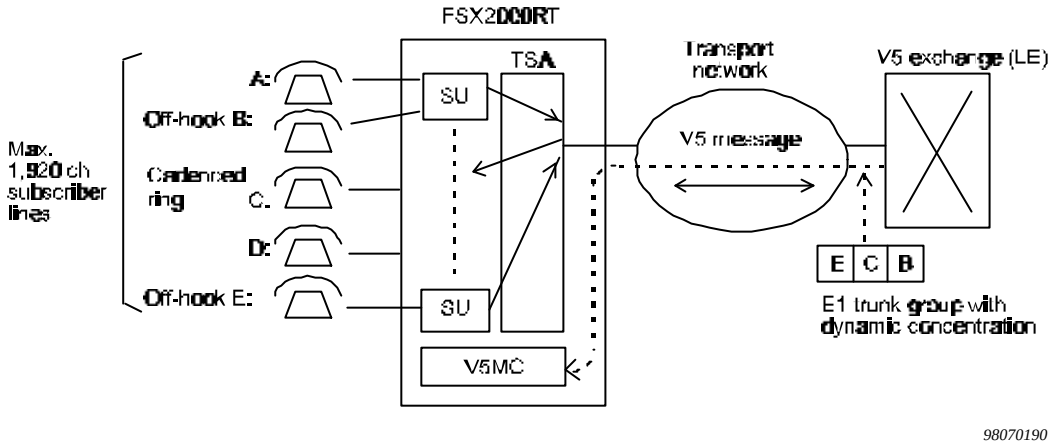

Figure 3.1 V5.2 Concentration Function

3.2 Grooming

A powerful feature of the ALIAN is its grooming capability. Grooming allows any physical channel at the RT to be mapped onto a specific E1 circuit without the need to locate the unit which supports the channel in a specific position in the equipment rack.

Grooming is used to transport leased line services and switched services back to the exchange on service specific E1 channels. Without the grooming function, each E1 channel bank at the RT would have to be reserved for specific services or a cross-connect switch would have to be used at the exchange to separate the services.

In the ALIAN UDLC configuration, the grooming function is performed by a Time Slot Assignment unit (TSA) which is integral to the CT and the RT. Figure 3.2 shows the TSA being used at the RT to map services into specific E1 circuits and at the CT to map the E1 circuits to specific service trunks.

Grooming ensures optimum utilization of transport bandwidth and eliminates the requirement for a cross-connect switch at the exchange. Grooming can also be used for routing purposes.

Figure 3.2 shows an example of non-switched services.

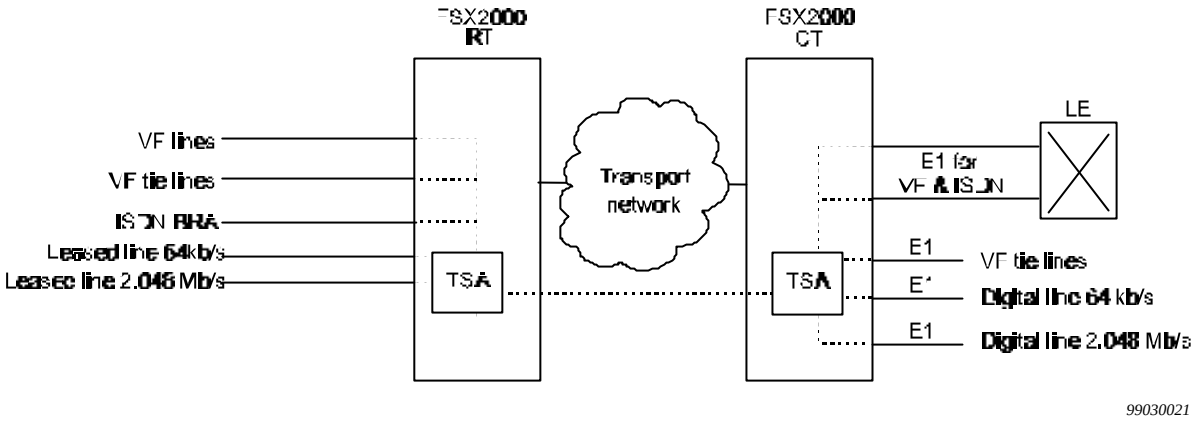

Figure 3.2 Grooming of Non-switched Services

Figure 3.3 shows the use of grooming for routing of point-to-point services.

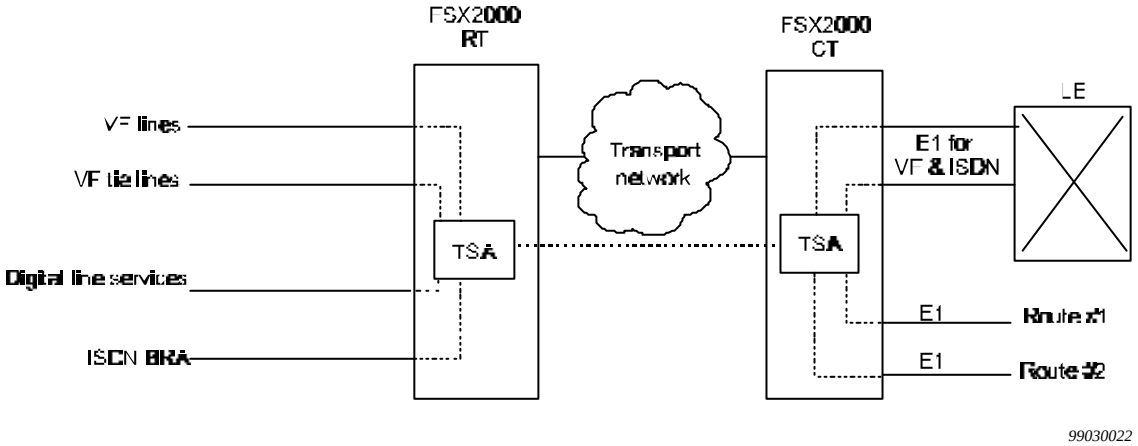

Figure 3.3 Use of Grooming for Routing of Point-to-Point Services

3.3 Redundant Protection Facility

The ALIAN has the following protection redundant facilities:

- Line Protection
- Unit protection

3.3.1 Line Protection

The switch modes supported by the ALIAN are listed below in descending order of priority:

Automatic

The auto mode is the normal mode of operation. In this mode, the active unit determines the unit switch decision. The active unit will switch to standby when the active unit has an alarm status greater than the standby unit. In auto mode, the switching time taken from fault detection to switching is 10 ms.

Lockout

The lockout mode is used for line maintenance. In this mode, the transmission cannot be switched from the active line to the standby line regardless of the line state.

Force

The force mode is also used for line maintenance. This mode is instructed by maintenance personnel to forcibly switch the transmission from the active line to the standby line regardless of the line state.

Lock-in

The lock-in mode can be enabled or disabled by maintenance personnel. The function disables the line switching for a given time even if a line failure occurs. This is to prevent successive switching due to failures under unstable conditions.

If switching occurs *n* times or more for *t* minutes, the switching function is locked in to disable automatic switching. (Switching in the lockout, force, or manual mode is still enabled.)

The lock-in state is automatically released *z* hours after lock-in starts. It can also be released forcibly by maintenance personnel.

Maintenance personnel can set the parameters as follows:

- Switch monitoring time (*t*): 1 to 255 (minutes)
- Switch count (*n*): 2 to 255 (times)
- Switch-disabled time (*z*): 1 to 255 (hours)

Manual

The manual mode is used for line maintenance. In this mode, the transmission can be switched from the active line to the standby line by an instruction from maintenance personnel. This function is available only when both active and standby lines are normal. If a failure occurs after switching in this mode, automatic switching will occur.

3.3.2 Unit Protection

The ALIAN allows its plug-in units related to main signals to form a redundant configuration as an option. Each plug-in unit in a redundant configuration has a self-diagnostic function to perform plug-in unit switching by detecting a failure.

See Table 3.1 for ALIAN plug-in unit switching.

Table 3.1 Plug-in Unit Switching

Unit	Load Share	Auto	Force	Manual	Lock-in	Lockout
PWR-H	✔	–	–	–	–	–
E1B21	–	✔	✔	✔	✔	✔
TSA & BEXP	–	✔	✔	✔	–	✔
V5MC	–	✔	✔	✔	–	–
IRG75S	–	✔	✔	✔	–	✔

3.4 Clocking

3.4.1 Electrical Clocking Architecture

Figure 3.4 shows the electrical CT and RT clocking architecture of ALIAN.

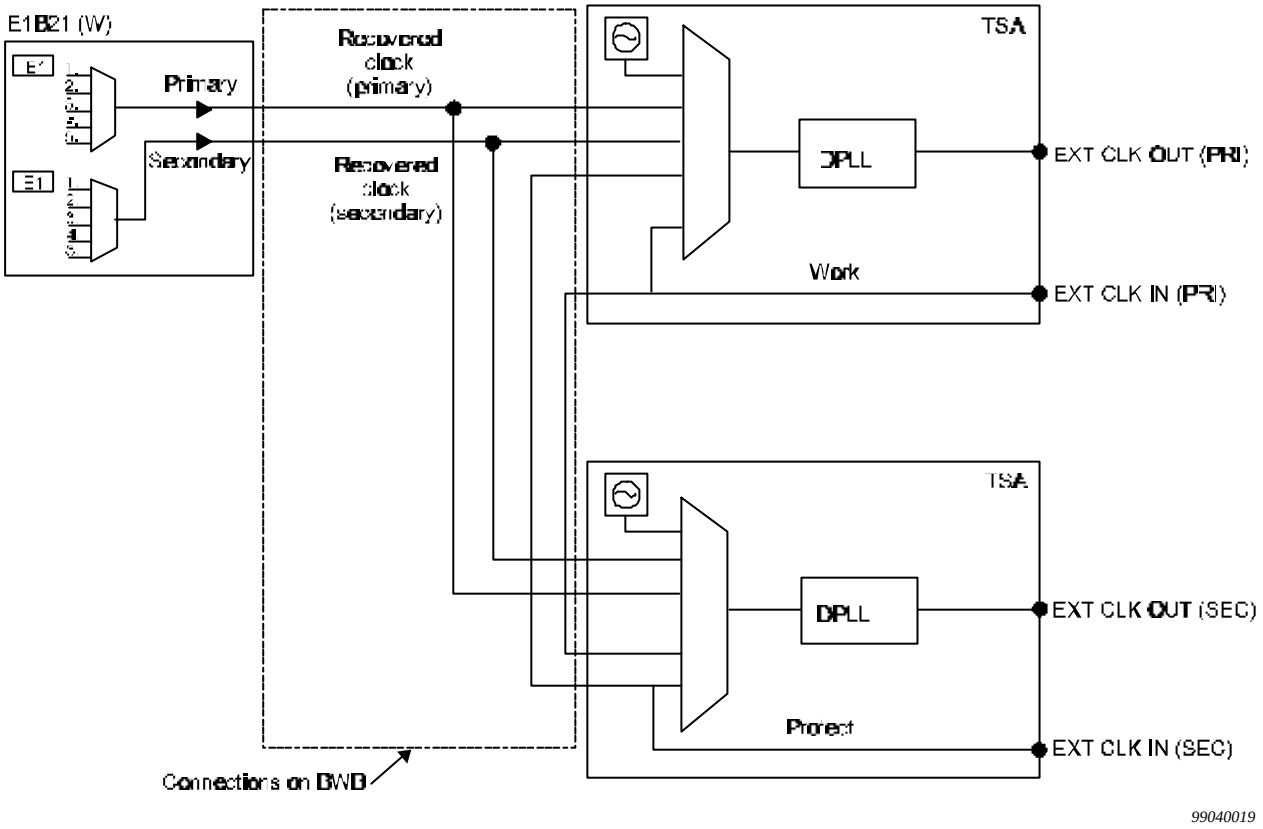

Figure 3.4 Electrical CT and RT Clocking Architecture

3.4.2 Synchronization Source

All external clock references sources support primary and secondary feeds. The TSA selects the clock source based on provisioning and clock source availability.

The following reference sources can be used to synchronize the ALIAN system:

- Recovered primary (sourced from a trunk unit)
- Recovered secondary (sourced from a trunk unit)
- External primary clock input (located on the work TSA unit)
- External secondary clock input (located on the protect TSA unit)
- Hold over mode (temperature stabilized)
- Internal oscillator

3.4.3 Synchronization Output

External clock output

A single external system reference clock output is provided on each TSA, on a 75Ω unbalanced BT43 output connector. The external clock is compliant with ITU-T G.703, Section 10. The external clock rate is 2.048 MHz. The external clock is enabled/disabled by FLEXR.

External clock input

Each TSA terminates a single clock input source on its front panel. The work unit connects to the external primary source and the protect unit connects to the external secondary source. These external clock signals are cross-connected between the work/protect pair using signals on the BWB. External clocks can only be applied to the TSA group 1 in a system. The physical interface is BT43 coaxial, 75Ω unbalanced. The clock rate is 2.048 MHz. The cable loss is 0 to 6 dB at 1.024 MHz.

3.4.4 Synchronization Source Switching

Automatic mode

The TSA unit supports a reference clock fallback table. If the preferred reference source becomes unavailable, the TSA automatically switches to the next preferred source. This process continues until all available reference sources have failed and the unit must fallback to holdover mode.

The unit automatically senses the return of any failed reference source reverts back to the highest priority source available.

The reference clock fallback strategy is provisional. Up to four clock references may be provisioned into the fallback table. The fallback table appears as follows:

- Priority #1 source
- Priority #2 source
- Priority #3 source
- Priority #4 source
- Holdover

Each priority source can be provisioned to any one of the six available reference sources i.e. Recovered primary, recovered secondary, external primary, external secondary, internal oscillator, and holdover.

Setting the clock sources to holdover mode can reduce the number of fallback sources. Holdover is the lowest priority the unit can accept and is used to terminate the priority chain.

Manual mode

In manual mode the reference source is provisioned to only one of the available sources. If the selected source fails the unit falls back to holdover mode. The unit reverts back to the failed source if it becomes available.

3.4.5 Clock Network

In the access network, clocking depends on the transport network. When the FLX integration transport is configured, clock distribution method is shown Figure 3.5.

CT interfaces - External clock available

Priority #1 External (primary)
Priority #2 External (secondary)
Priority #3 Holdover

CT interfaces - Exchange E1 available

Priority #1 Recovered clock (primary)
Priority #2 Recovered clock (secondary)
As an alternative, external clock can be used.

RT interfaces

Priority #1 Recovered clock (primary)
Priority #2 Recovered clock (secondary)
Priority #3 Holdover
Priority #4 Holdover

RT interfaces

Priority #1 External (primary)
Priority #2 External (secondary)
Priority #3 Holdover
As an alternative to recovered clock.

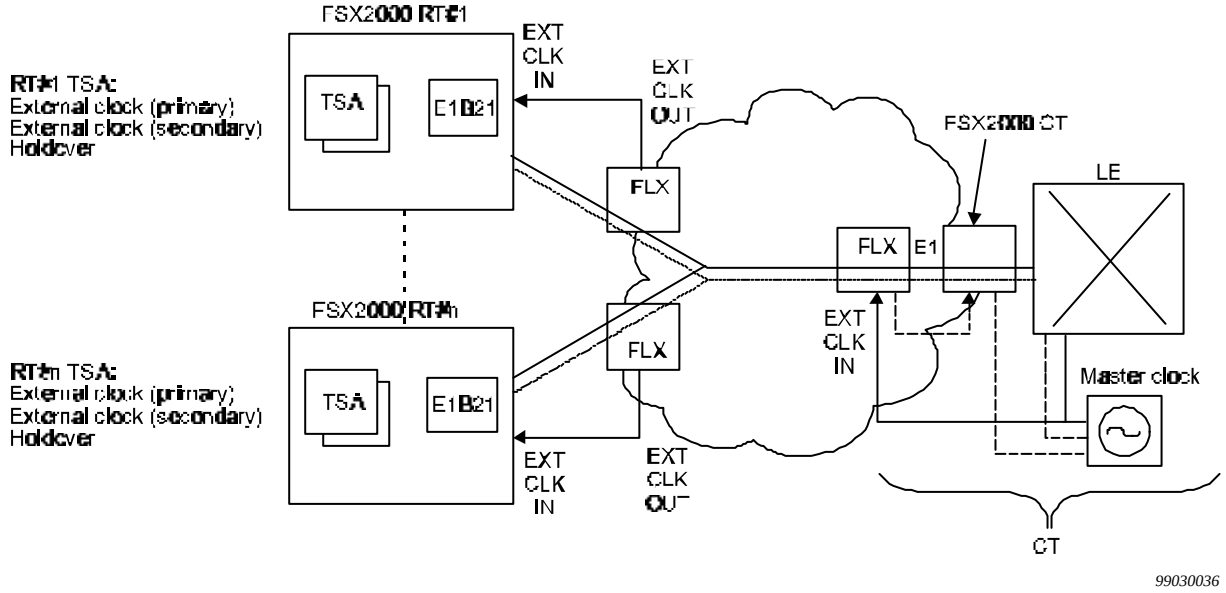

Figure 3.5 Clock Distribution Example

Clock distribution for the IDLC PDH transmission is shown in Figure 3.6.

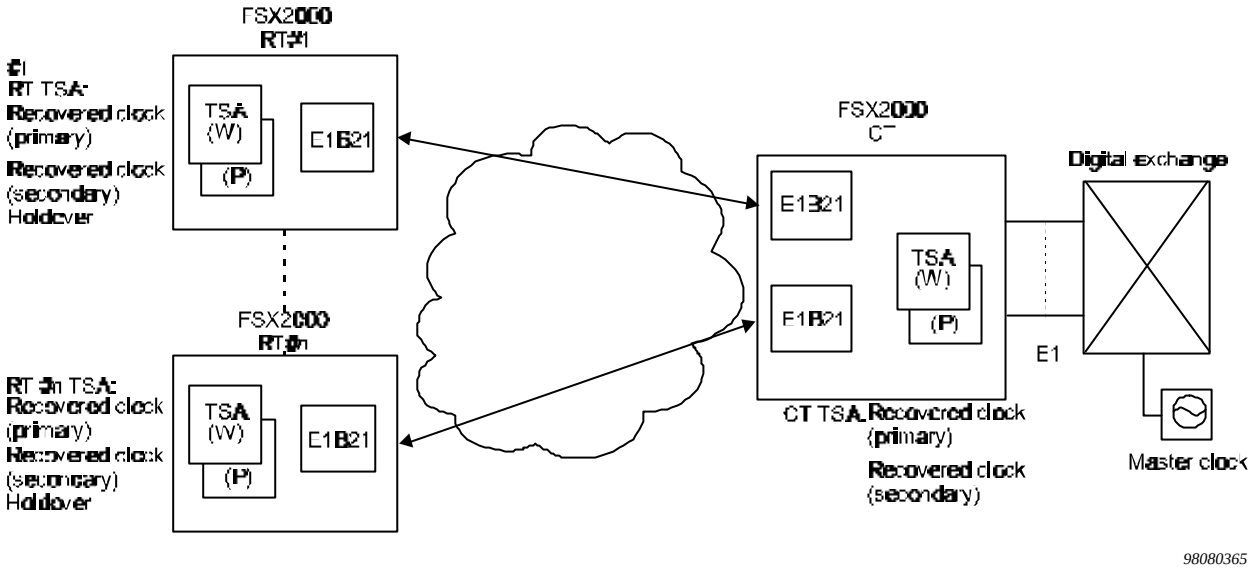

Figure 3.6 Clock Distribution for IDLC PDH

3.5 Service Facilities

This section describes the following ALIAN service facilities:

- Housekeeping
- Orderwire
- Subscriber line test

3.5.1 Housekeeping

This function is provided in the HOS unit, which is capable of performing shelf/cabinet housekeeping functions as follows:

- General purpose digital inputs for alarms
- Analog measurement inputs
- An interface for external temperature sensors
- Relay outputs
- Lamp indicators

3.5.2 Subscriber Line Test

Figure 3.7 illustrates the subscriber line test (SLT) system of the ALIAN. Subscriber line test is done by connecting subscriber line to the HOS unit via a dedicated backplane test bus and performing the required measurements.

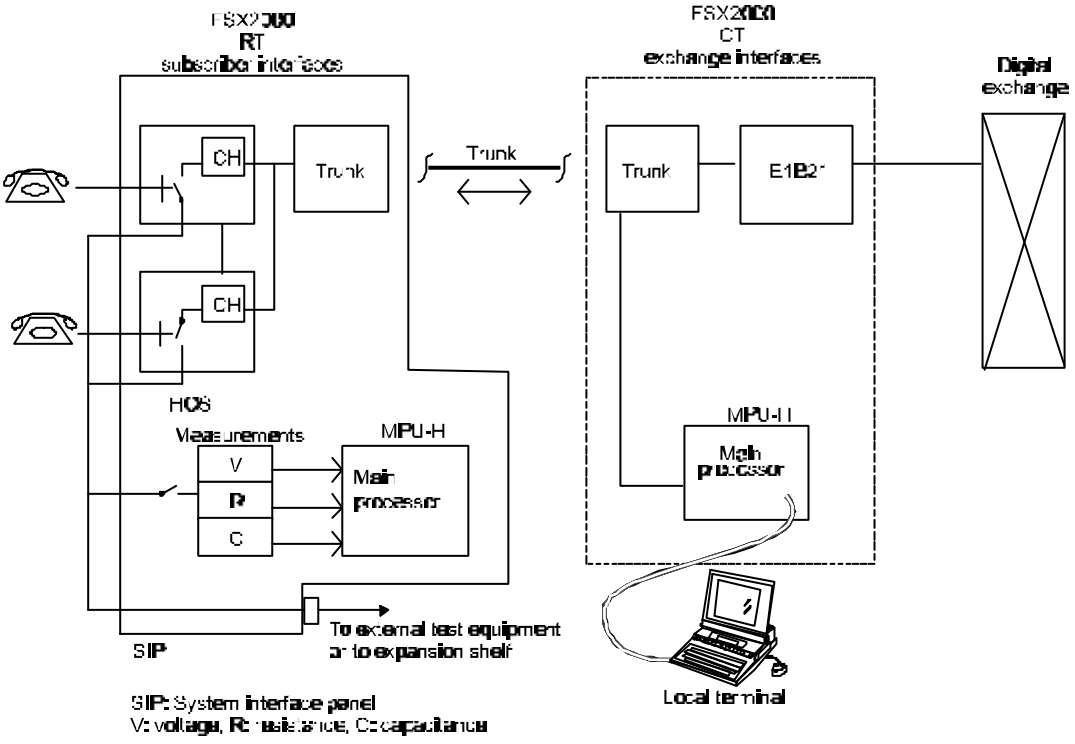

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Figure 3.7 Subscriber Line Test

3.5.3 Office Alarm

The MPU-H provides a rack alarm bus interface, which outputs various alarm conditions (i.e. audible and visual) as shown in Table 3.2. The alarm circuits are usually terminated on an alarm panel or IDC block. This allows the operator to select particular alarm conditions and to extend the alarms to a station alarm console.

All relay outputs ground/open the corresponding signal and they are software controlled by the MPU-H. They are DC isolated from the MPU-H digital circuits.

Note

Details of alarms are provided in Appendix.

Rack alarm outputs

The RAB outputs provide relay contact closure to ground.
The contact rating is 1A.

Rack alarm inputs

The RAB input is in the active state if the external input terminal is connected to ground via resistance less than 10kΩ. Resistance greater than 500kΩ between ground and digital input terminal will ensure inactive state of general purpose digital input.

Rack alarm circuits

The rack alarm bus (RAB) signals are shown in Table 3.2.

Table 3.2 RAB Signals for ALIAN

Signal Name	Type	Alarm Description	Unpowered State
AUDCR	Output	Audible critical alarm	Open
VISCR	Output	Visual critical alarm	Closed
AUDMJ	Output	Audible major alarm	Open
VISMJ	Output	Visual major alarm	Open
AUDMN	Output	Audible minor alarm	Open
VISMN	Output	Visual minor alarm	Open
AUDWR	Output	Audible warning alarm	Open
VISWR	Output	Visual warning alarm	Open
ACO	Input	Alarm cut off	Open

3.6 Maintenance

3.6.1 Loopback

The E1B21 supports a range of intrusive loopback tests (See Figure 3.8 Loopback capability.) in order to validate both the unit operation and the connection to remote equipment.

As these tests are disruptive, once commenced, the normal transmission of data is not possible. However, loopbacks do not cause an interruption to the incoming and outgoing overhead channels.

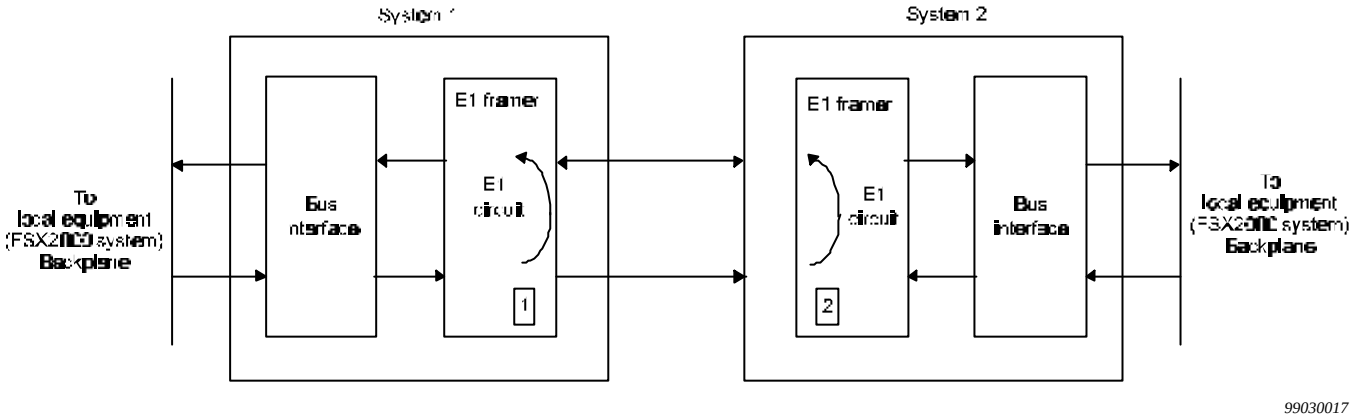

Figure 3.8 Loopback capability

E1 local loopback

When a local E1 loopback as per loop 1 in Figure 3.8 is activated, the outgoing E1 signal is passed through to the E1 output circuit unaffected.

E1 remote loopback

When a remote E1 loopback as per loop 2 in Figure 3.8 is activated, the incoming signal is passed through to the ALIAN system unaffected.

4. EQUIPMENT CONFIGURATION

This section describes the equipment configurations supported by the ALIAN and the operations in these configurations.

The ALIAN equipment is made up of the common management shelf (CMS), an optional expansion shelf (EXP).

The CMS accommodates the following common units:

- Power Supply (PWR-H) units
- Main Processor Unit (MPU-H)
- Network Management Interface (NMI) unit
- Time Slot Assignment (TSA) unit
- V5 Message Controller (V5MC) unit
- Housekeeping, Subscriber Line Test (HOS) unit
- System Interface Panel (SIP)
- Back Wiring Board (BWB)

The CMS can be used as a stand-alone system with the V5MC unit . It has sufficient spare slots to accommodate the trunk interfaces and some channel units.

Alternatively the CMS can act as a primary shelf having 480 or 1,920-line capacities. Generally when used as the primary shelf, an additional 6 slots should be reserved for up to 5 additional TSA units and 2 V5MC units. This leaves 4 slots remaining for channel units.

The EXP shelf requires one or two PWR-H units and one or two bus expansion (BEXP) units leaving a minimum of 17 slots for channel units. The CMS bus and control signals appear on the front of the TSA units and are extended to the EXP shelf via cables which terminate on the front of the BEXP units.

The CMS and the EXP shelf are identical shelves. Their function is determined by the plug-in units which are fitted to the shelves. Each shelf has an integral heat shield and cable tray. All cable terminations are made directly onto the plug-in units such that the system is entirely front access. Further details are provided on these two shelves in the following sections.

4.1 ALIAN Architecture

The CMS comprises two high-speed bus systems connected by a time slot assignment switch. The trunks are connected to one set of buses (trunk) and the channel units are connected to the other set of buses (tributary).

The functions of the TSA are as follows:

- Interchange timeslots between the two buses, in accordance with operator defined mapping tables.
- (The interchange function allows grooming of "like" services into common 2.048 Mb/s trunks.)
- Extend the tributary bus to up to 3 EXP shelves.
- Synchronize the internal clocks with the network clock.

The architecture of the ALIAN is shown in Figure 4.1.

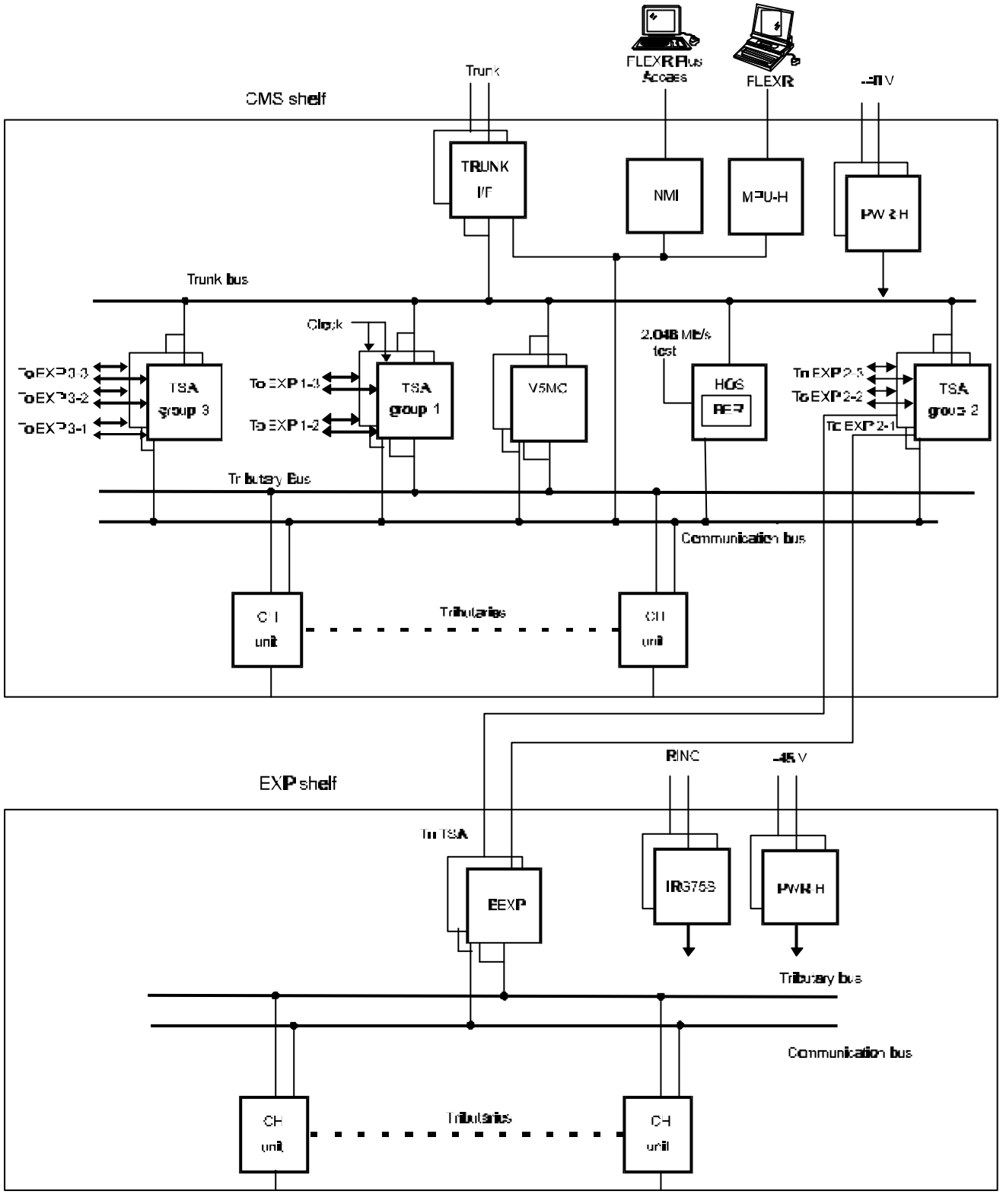

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Figure 4.1 ALIAN Architecture

As shown in Figure 4.1, the CMS can accommodate up to three 1 + 1 TSA units. TSA#1 performs the timeslot interchange function for the CMS and for the first two EXP shelves. TSA#2 performs the timeslot interchange function for EXP shelves 3, 4, and 5 and TSA#3 performs the timeslot interchange function for EXP shelves 6, 7, and 8.

The CMS supports a maximum of 8 shelves which equates to a POTS capacity of up to 1,920 lines (depending on POTS unit type used). However the actual limit is dictated by the concentration ratio used to assign trunk timeslots to physical lines. At present ETSI V5.2 limits the number of trunk 2.048 Mb/s circuits to 16.

In the case of 1,920 lines, the concentration ratio is equivalent to 4 : 1.
In the case of more than 1,920 lines, it is higher than 4 : 1.
In the case of less than 16 trunk 2.048 Mb/s circuits, it is also higher than 4 : 1.

The ALIAN has a maximum trunk capacity of 30 × 2.048 Mb/s circuits. The E1B21 trunk is able to provide 21 × 2.048 Mb/s per unit.

The ability to be able to use many units as both trunks and tributaries is a powerful feature of the ALIAN. It increases the utility of units and hence reduces inventory holdings and associated inventory costs.

The V5MC unit is responsible for handling the V5.2 signaling between the switching system and the ALIAN and for controlling the switching of incoming 64 kb/s timeslots to appropriate channel units. The V5MC is fitted to the RTs.

The V5MC has one active C-channel in PG2 for handling up to 288 ISDN (2B+D) subscriber lines.

The MPU-H is responsible for the management and administration of the ALIAN system.

The NMI is responsible for the routing of network management messages originating from a centralized network management system (FLEXR Plus) or from the ALIAN to their proper destinations. The NMI is more than just a store and forward device. It also has sophisticated routing software compatible with that used by the FLX SDH systems and therefore can be connected to the DCC of an SDH network via any FLX operating in that network.

If such a connection is made, then the NMS that is managing the FLXs can also manage the ALIANs via a unique TID. Another benefit is that service personnel logged into any ALIAN RT can interrogate other RTs as well as the FLXs in the network. Similarly, service personnel logged into any FLX can interrogate all the RTs in the network. This is a powerful network management feature.

In SDH networks where there can be many RTs, it is necessary to install an NMI in each RT. The NMI unit is able to communicate directly with the MPU-H in the RT to get status information on the RT.

The Housekeeping, Orderwire and Subscriber Line Test (HOS) unit is self-explanatory. The HOS performs a very wide range of subscriber line and channel tests as described in Section 5.

The System Interface Panel (SIP) brings the ring and SLT signals from the back plane to the front panel.

The Back Wiring Board (BWB) provides all electrical interconnections between the plug-in units within the ALIAN system.

4.2 Configuration

The ALIAN supports the equipment configuration for:

- CT/RT with POTS / ISDN BRA applications.

4.2.1 IDLC CMS Applications

4.2.1.1 ALIAN CT CMS

The CMS shelf contains 23 single pitch slots.

Figure 4.2 shows the bayface layout of the CMS shelf equipped as an CT.

ALIAN CT CMS

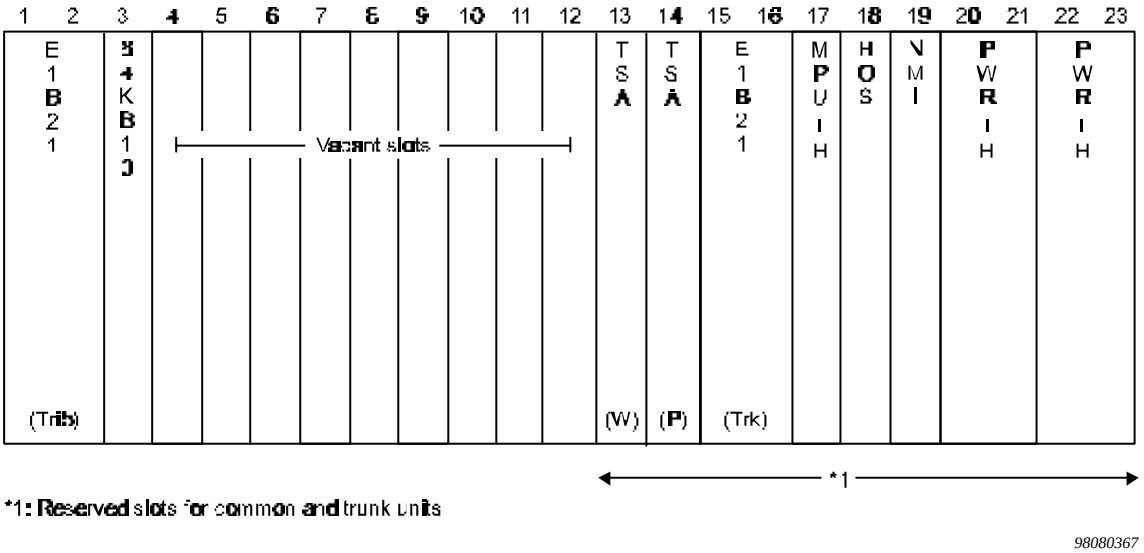

Figure 4.2 CMS Configured for IDLC CT Application
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4.2.1.2 ALIAN RT CMS

Figure 4.3 shows the bayface layout of the CMS shelf equipped as an RT.

ALIAN RT CMS

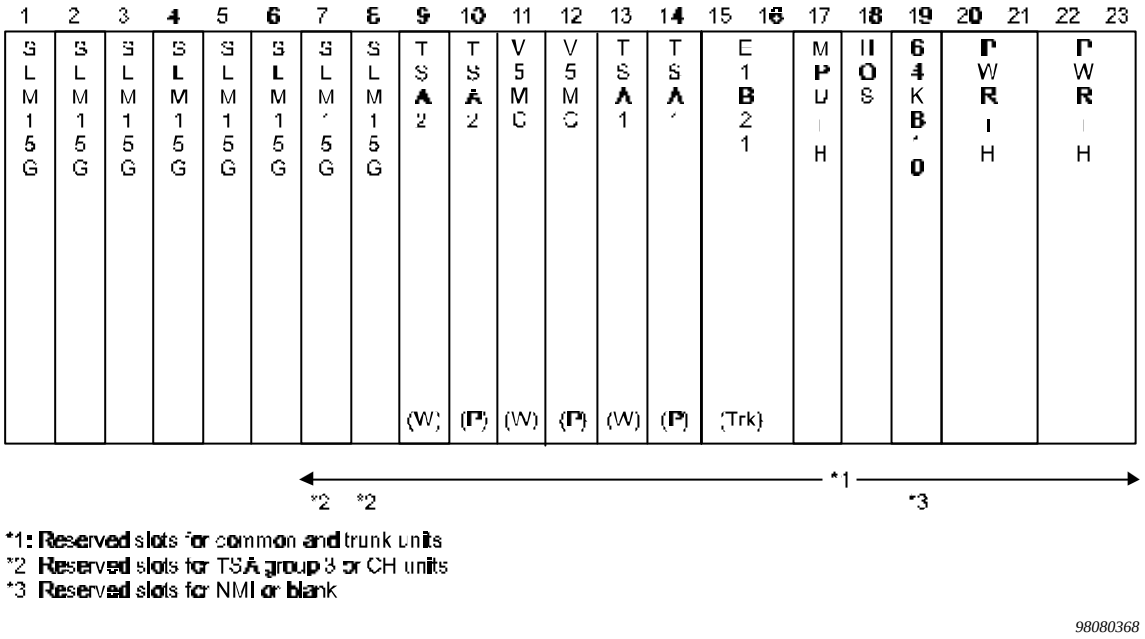

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Figure 4.3 CMS Configured for IDLC RT Application
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4.3 RT EXP Applications

Figure 4.4 shows the bayface layout of the shelf equipped as an RT EXP1.

RT EXP1

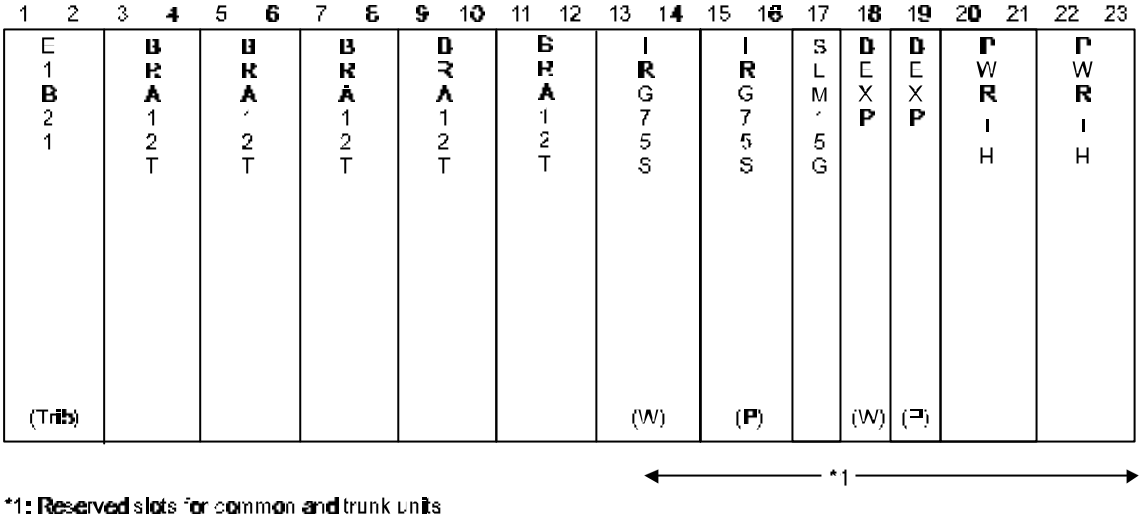

Figure 4.4 EXP1 Configured for RT Application
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Figure 4.5 shows the bayface layout of the shelf equipped as an RT EXP1.

RT EXP2

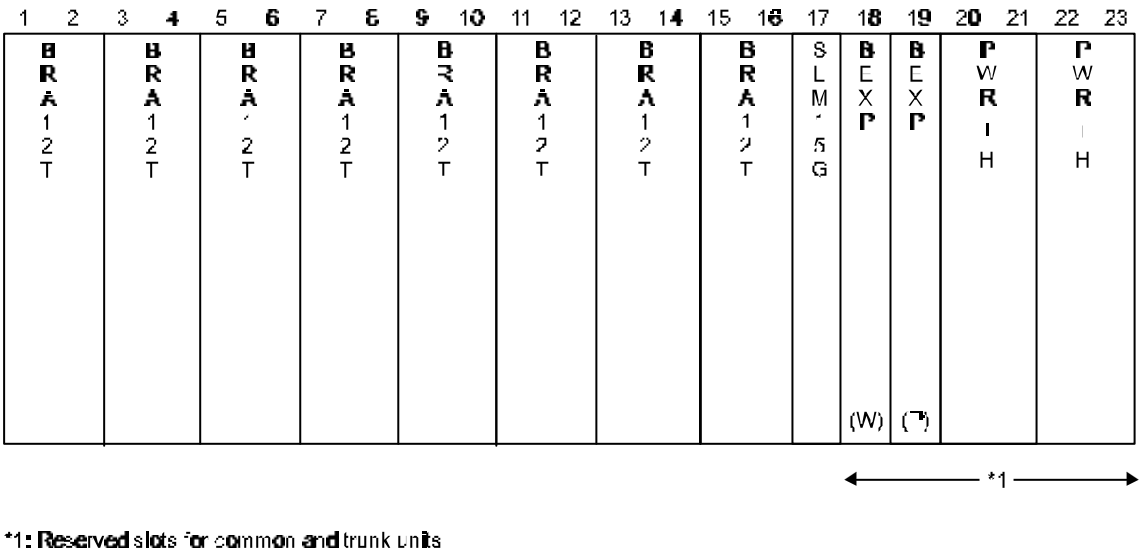
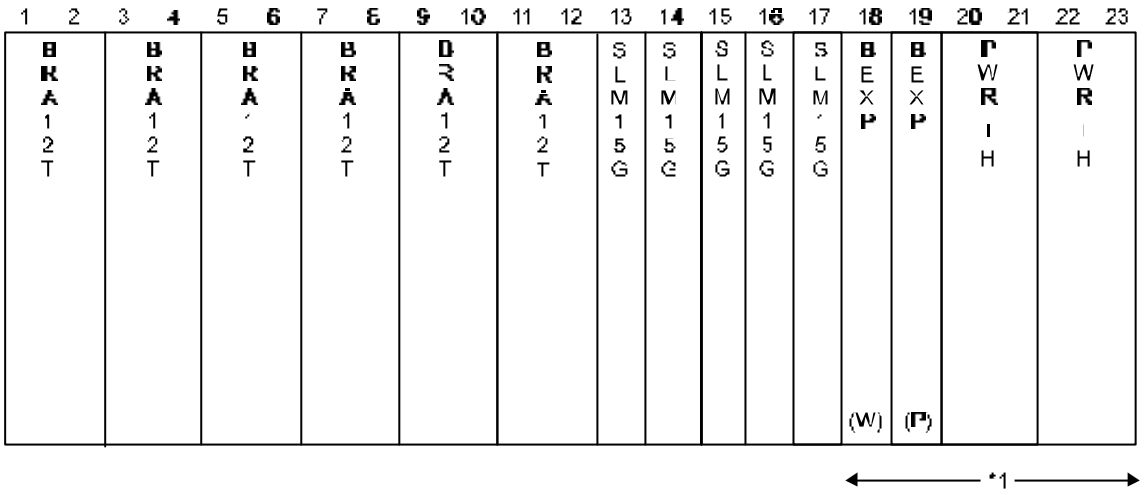


Figure 4.5 EXP2 Configured for RT Application

Figure 4.6 shows the bayface layout of the shelf equipped as an RT EXP1.

RT EXP3



*1: Reserved slots for common and trunk units

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Figure 4.6 EXP3 Configured for RT Application

4.4 Plug-In Unit Description

The ALIAN equipment configurations are implemented by various combinations of plug-in units listed below.

Table 4.1 details the presently available plug-in units and the pitch.

Table 4.1 ALIAN Plug-in Units

Unit	V5	CH Size	Description	Pitch
PWR-H	–	–	-48 ±5.2 V secondary power voltage	2
NMI	–	–	Network management interface to OSS	1
MPU-H	✔	–	Management of processor in each unit (for more than 3 EXP shelves)	1
HOS	✔	1	Housekeeping, orderwire, subscriber line test, and 2.048 Mb/s test	1
TSA	✔	–	Trunk to tributary cross-connect plus timing control	1
BEXP	–	–	Shelf to shelf bus expansion	1
V5MC	✔	–	V5.2 termination message control	1
SLM15G	✔	15	POTS subscriber line module	1
BRA12T	✔	12	ISDN BRA subscriber line module	2
E1B21	✔	21	Trunk or tributary E1 interconnection to transport system or switching system, 21 E1 circuits (120Ω)	2
E1BU4		4	Trunk or tributary E1 interconnection to transport system or switching system, 4 E1 circuits (120Ω)	1
IRG75S	–	–	Generation of continuous ring signal	2

4.5 ALIAN Shelf

4.5.1 Shelf Details

The CMS and EXP shelves comply with ETSI rack mounted equipment standards. The standard shelf layout is shown in Figure 4.7 below.

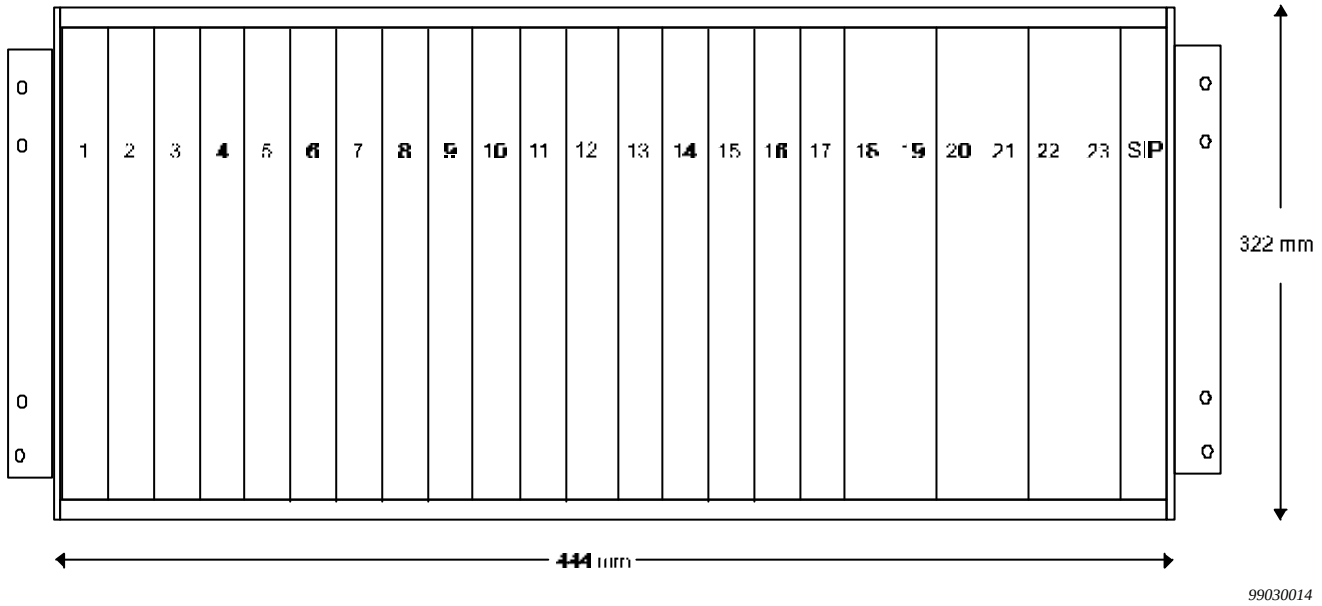

Figure 4.7 Shelf Layout
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Warning

The PWR-H units are only installed in shelf slots 18, 20 & 22.

Figure 4.8 shows the side view of the equipment and cable tray heat shield with cable management.

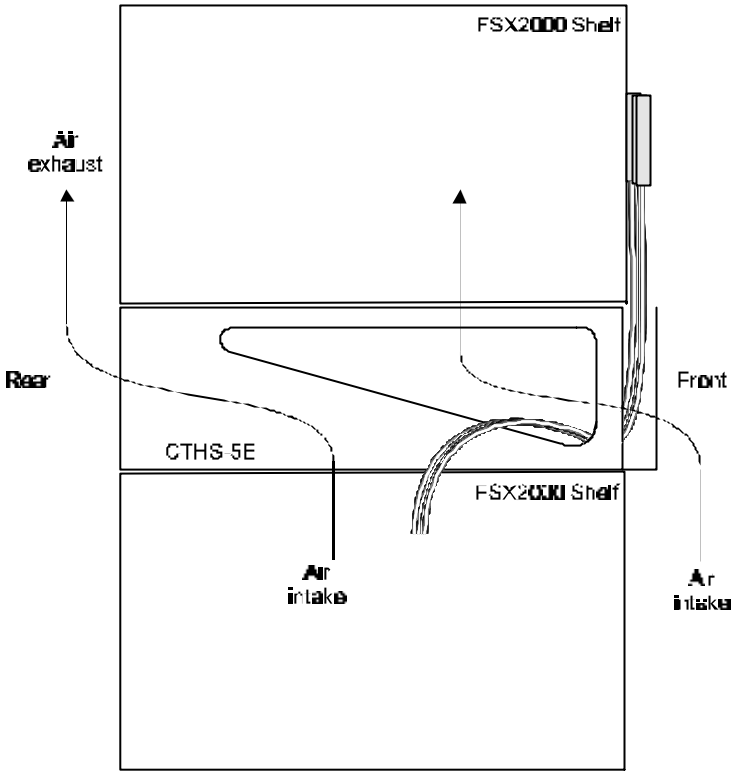

Figure 4.8 Cable Management

4.6 ECAB-V1

The EMC cabinet with SIA panel (ECAB-V1) is used to house the Advanced Line Interconnection Access Multiplexer (ALIAN) with EMI protection. Figure 4.9 shows the ECAB-V1 with ALIAN shelves and CTHS-5E cable tray heat shields fitted.

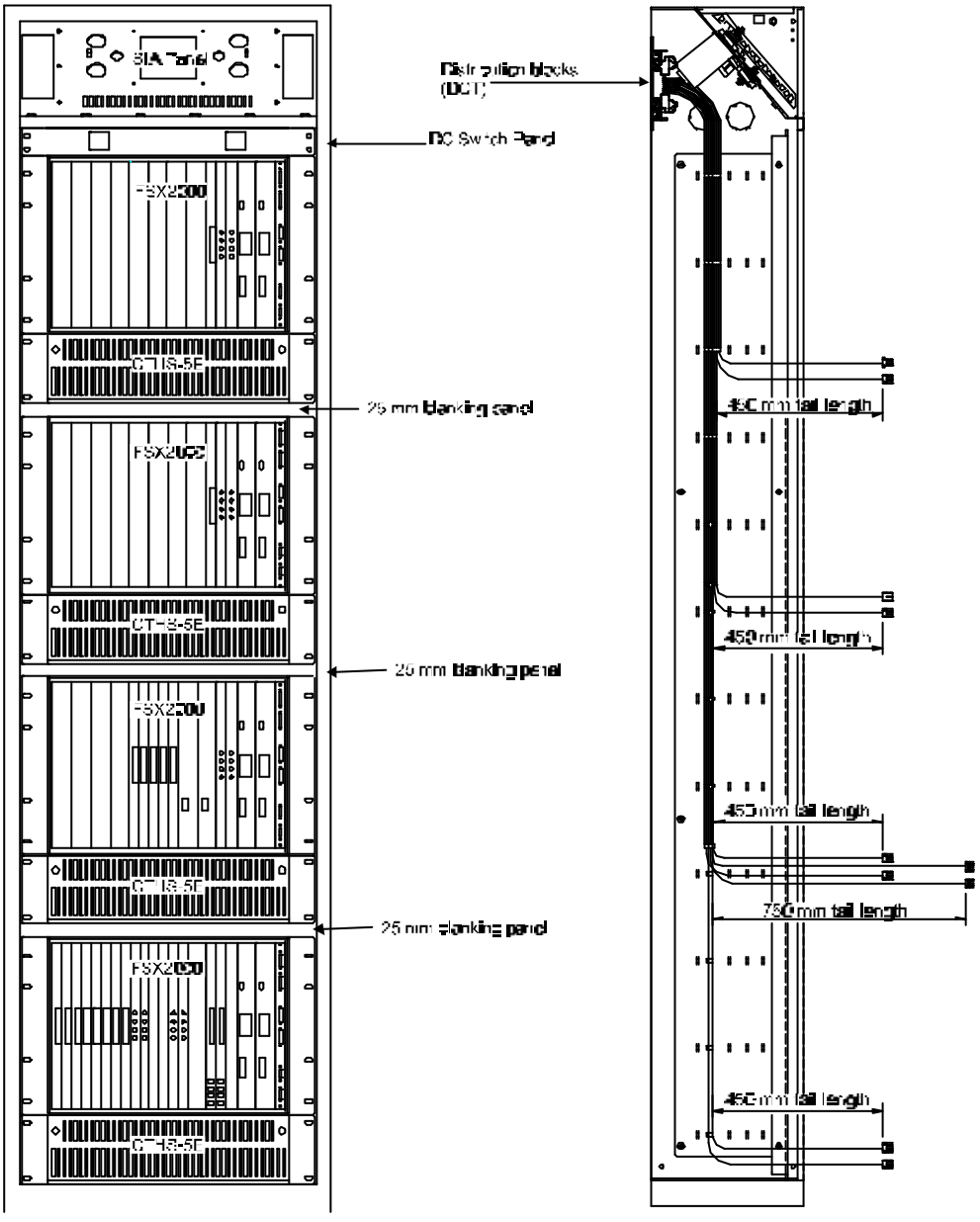

Figure 4.9 ECAB-V1

The EMC cabinet accommodates up to 4 × ALIAN shelves (each with a CTHS-5E cable tray heat shield), allowing for a 25 mm gap between the top of each shelf and the cable tray above, with 50 mm remaining at the top for the circuit breaker panel .

Multiple ECAB-V1 cabinets can be mounted side by side or back to back.

The external dimensions of the cabinet in accordance with the requirements of the narrow footprint Fujitsu Indoor Cabinet and ETSI mounting standards are:
2,200 mm (H), 600 mm (W), 300 mm (D).

4.6.1 Functional Description

The ECAB-V1 is constructed from 1.6 mm zinc anneal steel and finished in Fujitsu light gray powder coat.

The ECAB-V1 can be secured by bolting it to the floor or by attaching two upright brackets to the top of the cabinet which can then be secured to an overhead cable tray.

The ECAB-V1 consists of two chambers:

- Shielded equipment area
- Non-shielded cable termination area (outside SIA panel)

The ECAB-V1 has a front door that can be installed to be either right hand or left hand opening.

The door makes electrical contact with the cabinet around the perimeter of the door. There are no gaps between the door and the cabinet when the door is closed. The electrical resistance between the door and the cabinet does not exceed 0.5Ω when the door is closed.

The door has three locks with keys, one near the top of the door and the other near the bottom of the door. The door has three sets of pin and socket hinges with the center set being rotated to prevent the door from being removed.

An earthing cable is provided at the top of the door to earth the door to the protective earth (PE) stud in the SIA area.

The door and SIA panel have adequate ventilation slots to:-

- Allow air to flow into the cabinet through the slots in the door
- Allow air to flow out of the cabinet via slots in the SIA panel
- Allow 4 × ALIAN shelves to be installed in the cabinet, i.e. 1 × CMS shelf and 3 × EXP shelves

Knockout apertures (∅50 mm) are provided in the sides and rear of the cabinet behind the SIA panel to allow for cable reticulation between cabinets mounted side to side or back to back.

The SIA panel is fitted with:-

- Two cable entry slots for entry of the shielded external cables,
- One 63 A, 300 V ac 2 × 8.1µf power line filter
- One feed through connector
- Two blanking plugs
- One blank plate

The cable entry slots in the SIA panel have adjustable brackets that make contact with the shields of the external cables. in such a way that they make an electrical connection between the shields of the cables and the frame of the SIA panel.

A “normally open” door sensing switch is installed near the top of the cabinet (in the SIA panel area).

The shielded equipment area has two equipment mounting channels with ETSI clearances and equipment fixing points (25 mm pitch). The equipment shielded area is capable of accommodating four ALIAN shelves, four cable trays and four 25 mm blanking panels.

The equipment mounting channels are constructed in such a manner as to provide electrical bonding between the channels and the side walls of the cabinet.

Four re-enforced mounting holes are provided at the base of the cabinet to either anchor the cabinet to the floor or to level the cabinet with four screws accessible from within the cabinet.

When fitted with 1 × ALIAN CMS shelf and 3 × ALIAN EXP shelves configured in accordance with Figure 4.9, and cabled with the practices described herein, the ECAB-V1 shall comply to:-

- CISPR22 / EN55022 for class B emission standards
- EN60950 for Electrical safety
- EN300-386-2
- EN 50082-2 for Industrial Immunity

Two M6 studs, one at each side of the SIA Panel, are provided for connection of a protective earth (PE) cable to the cabinet. These studs make electrical contact with the cabinet metalwork.

The cabinet is fitted with 1 × 63A, 300V AC 2 x 8.1 uF power line filter, for the A and B feed power cables. The power line filter is mounted behind the SIA panel. The cabinet is also fitted with 4 × 10-way cable terminal blocks.

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5. MAINTENANCE FUNCTION

One of the important advantages of the ALIAN system architecture is the single ended maintenance philosophy which has been adopted for the system. This philosophy has been applied to the following functions:

- Subscriber line test See Figure 5.1 and Figure 5.2.
- PCM E1/E0 test See Figure 5.1.
- Supervision See Figure 5.1.

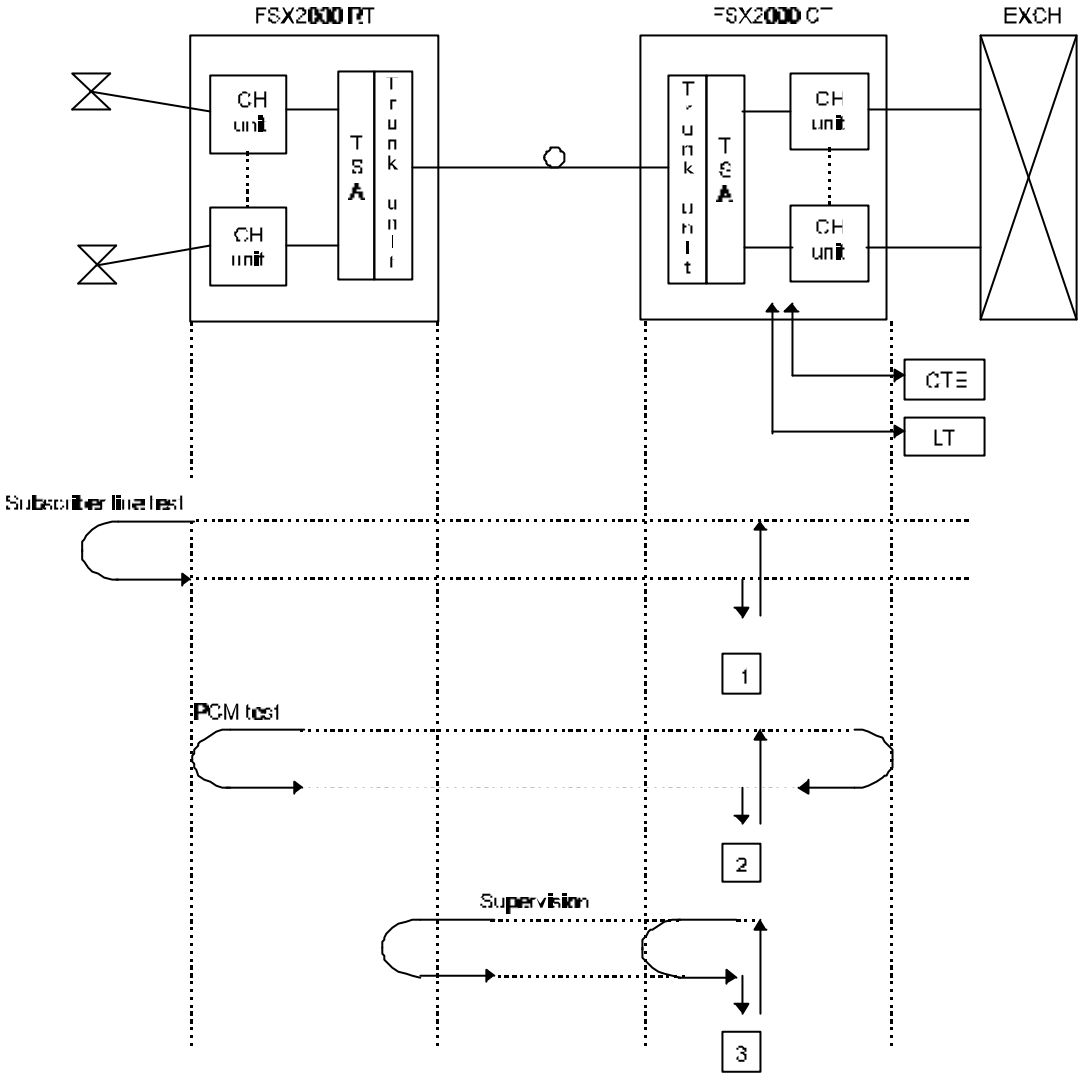
As illustrated in Figure 5.1, all the maintenance functions can be operated from the CT site via a local terminal (LT). Thereby, it is not normally necessary for maintenance staff to visit an RT site for routine maintenance or fault location.

The Housekeeping and Subscriber Line Test (HOS) unit provides test access to the ALIAN system. Two ports are provided so that a chain of HOS units can share one piece of test equipment. When one system is not using the test equipment the signal is repeated and passed onto the next system.

If the RT is located in an indoor or outdoor cabinet, then all abnormal conditions in the cabinet can also be logged on from the CT via DCC link. Typical items which can be supervised are:

- General purpose digital input for alarms
- Analog measurement inputs from cabinet/shelf sensors
- External temperature sensors

Figure 5.1 shows the ALIAN maintenance functions.



CTE: Channel test equipment (PCM tester)
LT: Local terminal

1. Subscriber line test (from Exch.)
2. Channel test (from CT)
3. Supervision (from CT)

Control/display by local terminal

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Figure 5.1 ALIAN Maintenance Functions

Figure 5.2 shows the subscriber line test can be controlled by sending commands from FLEXR connected to the CT to the HOS unit mounted in the CMS shelf. There are two types of subscriber line tests; metallic line test (MLT) and loop resistance test (LRT). The MLT checks DC/AC voltages, insulation, and capacitance. The LRT checks the resistance of a subscriber line.

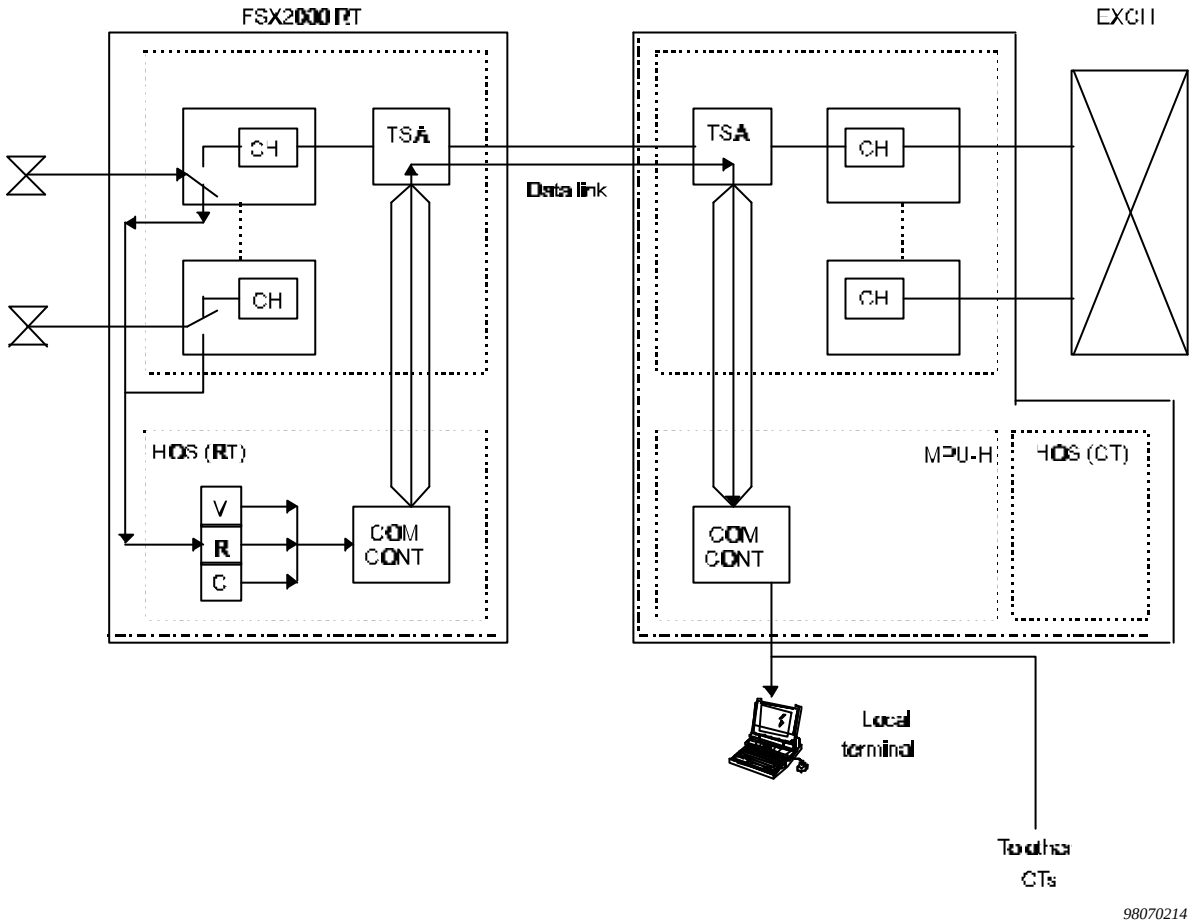

Figure 5.2 Subscriber Line Test Functions

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6. TECHNICAL SPECIFICATION

The ALIAN technical specifications are detailed in Table 6.1.

Table 6.1 ALIAN Technical Specifications

Characteristic	Description
Shelf dimensions	Height: 400 mm Width: 450 mm Depth: 280 mm
Environmental conditions ETS 300 019 Class 3.1.E Temperature • Normal operating range • Exceptional operating range	 5 °C to 40 °C -5 °C to 45 °C, <1% probability
Relative humidity • Normal operating range • Exceptional operating range	 5% to 85% 5% to 90% <1% probability
Supply voltage • Voltage range	 -42 V dc to -56 V dc
PCM coding	ITU-T G.711 A-law
VF characteristics	ITU-T G.712
PCM multiplexing	ITU-T G.703, G.704
Protection • PWR-H • TSA • V5MC • BEXP • IRG75S	 (1 + 1) share (1 + 1) (1 + 1) (1 + 1) (1 + 1)
Testing	This can select test path and monitor results of test. It is required to provide an LT and any measurement tool. • Subscriber line test (Metallic line test, Loop resistance test) • PCM E1/E0 test (built-in bit error test)
Supervision	Alarm monitoring Status monitoring Remote provisioning Remote control Physical inventory Housekeeping

Table 6.2 shows technical data and specifications for the ECAB-V1.

Table 6.2 ECAB-V1 Technical Data and Specifications

Parameter	Specifications
External dimensions	Height: 2,200 mm Width: 600 mm Depth: 300 mm
External finish	Fujitsu light gray color.
Cabinet temperature control (equipped cabinet)	The air temperature at the air inlet to the top shelf within the cabinet will not exceed 65 °C for ambient room temperatures up to 45 °C for an equipment heat load of 700 W.
Vermin resistance	The cabinet is vermin proof.
AC reticulation standards	Complies with the electrical safety standards of AS3000 and NE60950.
Earthing	Earthing of the cabinet is provided via the PE earth stud.
DC reticulation standards	Complies with the TNV standard of AS3000, NE60950 and Austel Australia TS001.