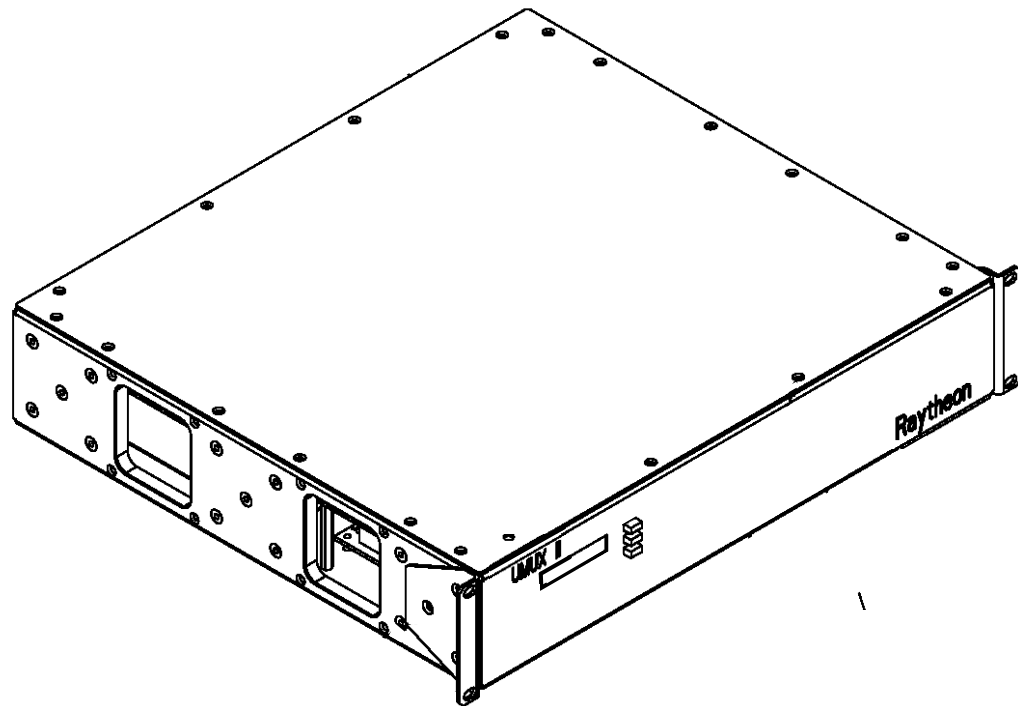

UMUX II

Multipurpose UDLT Multiplexer



**User's Manual/
Product Specification**
Raytheon Doc Number: TM-03-007-EG
Telecore Doc Number: 2AA-00760-0004

ABOUT THE COMPANY

Telecore, Inc. is a telecommunications research and development company. The company's unique vision supports both fundamental research and commercialization activities within one organization, funded by both private resources and programs. The company will achieve its long-term mission -- to be one of the world's telecommunications leaders -- by building on its track record of outstanding technical successes.

Telecore's products will produce a fundamental change in communications, in much the same way that the integrated circuit revolutionized data processing. Telecore's blend of world-class researchers and product developers place it at the forefront of the telecommunications industry.

Telecore, Inc.
P.O. Box 867411
Plano, Texas 75086

Document Change Revision Log

DOCUMENT REVISION	DATE	DESCRIPTION OF CHANGE	SECTIONS AFFECTED
2AA-00760-0000	06/12/03	New document – preliminary. Legacy mode only	All
2AA-00760-0001	09/15/03	Added Raytheon document number	Cover sheet
2AA-00760-0002	09/16/03	Added UMUX II Nomenclature, added Safety information, added 1.536Mbps operational example	Cover sheet/Footers, Page 6,36
2AA-00760-0003	10/10/03	Updated Figures 6,7,8,9 with Jxx numbers. Added document number to bottom of each page	All
2AA-00760-0004	11/05/04	Updated switch settings for DS1 MIL-188-114 mode on page 27. The following text was added “In addition, switches SW1-11 and SW1-12 must be set to the ON position.” Document revision was updated on every page. Add statement regarding RESYNC issue in MIL-188-114 1.544Mbps mode on sheet 26.	All

Table Of Contents

Product Description	7
Features	7
Network Interface	9
Timing	9
UMUX II Interfaces and Dimensions	10
Front Panel Interfaces.....	10
Rear Panel Interfaces.....	11
Connectors	12
UDLT Connectors J1-J24.....	13
J29 MIL-188-114 Connector.....	14
J32 Legacy UMUX DS1 Connector	14
J27 Quad T1/E1 Electrical Interfaces.....	15
J25 and J26 10/100 Mbit Ethernet Interfaces.....	16
Indicators.....	17
Configuration	19
Switches	21
Switch Definitions	21
DS1 Electrical Switch Settings.....	27
DS1 Fiber Switch Settings.....	27
DS1 MIL-188-114 Switch Settings.....	27
Examples.....	28
DS1 Electrical, Master UDLT timing, Slave line timing, ESF/B8ZS	28
DS1 Electrical, Master External, Slave External timing, D4/AMI	30
MIL-188 Interface, Master EXTERNAL, Slave EXTERNAL timing, D4/AMI.....	32
Fiber Optic Interface, Master UDLT, Slave line timing.....	34
Warranty Terms and Conditions.....	36
Shipping Return Address.....	37
Terms and Definitions.....	38

Table of Tables

Table 1: Rear Panel Connector I/O Definitions	12
Table 2: UDLT connectors pin definitions	13
Table 3: MIL-188-114 connector pin definitions	14
Table 4: Legacy UMUX DS1 connector pin definitions	14
Table 5: Quad T1/E1 Electrical interfaces connector pin definitions	15
Table 6: 10/100Mbit Ethernet connector pin definitions	16

Table of Figures

Figure 1: UMUX II Interfaces	10
Figure 2: UMUX II Front Panel Interfaces	11
Figure 3: UMUX II Rear Panel Interfaces	11
Figure 4: LCD Status and Examples	18
Figure 5: UMUX II Configuration Menus	20
Figure 6: DS1 Electrical, Master UDLT timing, Slave line timing set up diagram	29
Figure 7: DS1 Electrical, Master External, Slave External timing set up diagram	31
Figure 8: MIL-188 Interface, Master EXTERNAL, Slave EXTERNAL timing set up diagram	33
Figure 9: Fiber Optic Interface, Master UDLT, Slave line timing set up diagram	35

READ THIS FIRST

Safety Information

Caution
ELECTRICAL SHOCK HAZARD. This equipment is to be serviced by trained personnel only.
DANGER HAZARDOUS VOLTAGES INSIDE. Voltage or current hazard sufficient to cause shock.
The manufacturer requires that the unit be grounded. Ground the unit by attaching a ground wire between a known earth ground and the ground stud, E1, of the unit prior to plugging in the unit. Grounding the unit helps protect against damage caused by static voltage buildup and removes the risk of electric shock.
Never use an extension cord that does not have an earth ground connection. Never use an adapter that does not have an earth ground connection. If necessary, always use a suitable ground adapter. If possible, ground the extra wire on the ground adapter. Never use extension cords with non-polarized plugs or ones with broken off ground pins. Never break off the ground pin on electric equipment.
Always plug the power cord into the UMUX II first. Only after plugging the power cord into the UMUX II, plug the three-pronged AC plug into an AC outlet and power up the unit.
To disconnect the cord, always pull it out by grasping the plug. Never pull it out by the cord.
To avoid the risk of electrical shock, do not remove the cover. There are no user serviceable parts inside. Refer servicing to qualified service personnel. Additionally, opening the unit's cover, changing or modifying the equipment by the user (unless expressly approved by the manufacturer) shall void the warranty.
Use only the power supply cord supplied with the product. The UMUX II is equipped with a polarized alternating-current line plug (a plug having one blade wider than the other). This plug will fit into the power outlet only one way. This is a safety feature. Match the wide blade of plug to wide slot of the outlet and fully insert.
Warning: To prevent fire or shock hazard, do not expose the unit to rain, moisture or corrosive gases.
Utilize safety precautions when installing the UMUX II. The UMUX II like other commercial and home electronics contains hazardous voltages, do not attempt to open the product to inspect or service the unit. There are no user serviceable parts inside. If a failure occurs, please return through your RMA supply chain.
Operate the unit with the specified voltage. Using the wrong voltage risks fire and electrical shock.
At the first sign of smoke, an unusual smell or other problems indicating breakdown, disconnect external power cords. Should any solid or liquid fall into the unit, disconnect the AC power cord and have unit professionally checked before operating the unit again. Continued use risks fire and electrical shock.
Ventilation openings must not be blocked or covered. Air intake and exhaust openings are provided for ventilation and to ensure reliable operation of the product and to protect it from overheating. Air intake and exhaust opening should be cleaned on an annual basis to ensure longevity of the product.
Always make sure connectivity matches that chosen in System Configuration Display. When configured for phones, the unit supplies power. Therefore improper connectivity could damage connected equipment as well as risk fire and electrical shock.

Initial Configuration

*When changing the system configuration: Once the user presses the SELECT key to make the change permanent, the hardware/software will be reconfigured. **Because 48V phone power is supplied by the UMUX II in some modes, it is best to configure the UMUX II when it is disconnected from all external equipment.** Once the SELECT key is pressed, allow the unit a few minutes to reconfigure the system configuration. When system reconfiguration is complete, power the unit OFF, make the necessary cable connections, and power the unit back ON. When the unit powers up it will be configured in the new operating mode.*

Product Description

Raytheon's Command and Control Switching Systems (CCSS) products utilize the Motorola Universal Digital-Loop Transceivers (UDLT) technology for providing connectivity between the switches and the subscriber end instrument. The UDLT technology and requirement to provide -48V to the end instrument over the wire pair restricts remoting of the subscriber end instrument to a cable length of 2500 feet. The UDLT Multiplexer (UMUX) provides a low cost solution to remote 19 CCSS phones beyond the 2500-foot limit. In Fiber mode, the subscriber end instruments can be remoted up to 5000ft. In DS1 electrical mode the subscriber end instruments can be remoted up to 4000 ft.

Two separate products made up the original UMUX family of devices: the UMUX Master (UMUX-M) and the UMUX Slave (UMUX-S). The UMUX-M interface is designed for direct connection to the Electospace™ Secure Digital Switch. The UMUX-S interface is designed for direct connection to the Electospace™ CCSS phones. Using an external bandwidth manager, a single UMUX-M can be interconnected with up to five UMUX-S devices. Each voice channel is also separated from the corresponding in-band control/data channel for applications that must use voice compression to reduce the required network bandwidth.

The MUM (or UMUX II) is the second generation UMUX device which combines the functionality of both UMUX-M and UMUX-S into one unit. The UMUX II Legacy mode supports backward compatibility with the original UMUX devices.

Features

- Supports up to 19 CCSS phones
- AC input – 120 VAC, 50 or 60 Hz. No external D.C. power supply needed.
- UMUX II Switch timing derived from a UDLT link, line timed or external timing source (1.544 MHz)
- Front panel status indicators for network alarms and active timing source

- 50 pin TELCO connector for easy interconnection to a type 66 block
- Provides three network interfaces: DS1 Long/Short Haul T1, Fiber, MIL-188-114
- MIL-188-114 network interface provides contact closure crypto resync
- Supports 1.536 mode for MIL-188-114

Network Interface

The UMUX provides three network interfaces. Selection of the network interface is provided by means of rear panel dipswitches. Providing three different network interfaces allows the network architect a great deal of flexibility when planning and deploying the remote CCSS phones.

- Long/Short Haul T1 – Copper interface that supports cable distances of up to 4000 feet. Selectable Extended Super Frame (ESF) or D4 framing with Alternate Mark Inversion (AMI) or Bipolar 8 Zero Suppression (B8ZS) line coding.
- Fiber – ST interface that supports fiber distances up to approximately 1500 meters, 6 dB optical power budget, using 62.5/125µm multimode fiber.
- MIL-188-114 – copper interface that supports separate clock and data for installations that require external crypto equipment. Provides a contact closure output for a crypto resync signal.

Timing

The UMUX II SWITCH is capable of deriving timing from the network, a UDLT interface, or an external 1.544 MHz timing source. In network timing mode, the T1 interface can be selected as the timing source. When the UDLT timing mode is selected, internal timing verification circuitry derives timing from the first available active UDLT port. In external timing mode, a 1.544 MHz RS-422 clock is input on the MIL-188-114 rear panel connector. The UMUX II PHONE always derives timing from the selected network interface.

Timing source selection is provided by means of the LCD menus.

UMUX II Interfaces and Dimensions

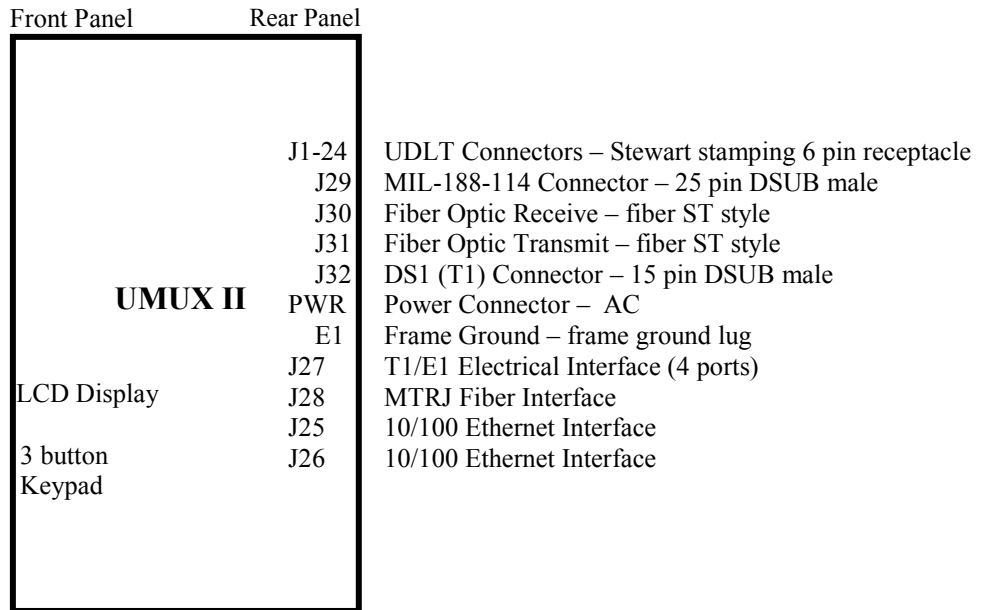


Figure 1: UMUX II Interfaces

Physical Characteristics

The UMUX-III is a 19-inch rack-mount unit, with a 2 U (3.5 inch) rack height. The unit is 16 inches deep, not counting rear mounting connectors/components. The unit weighs 15.25 lbs.

Front Panel Interfaces

The UMUX II front panel consists of an LCD display, and a three-button keypad interface. The LCD is a 2 by 16 character display provides real time display of the UMUX II operational status. Figure 2 is a graphic representation of the UMUX II front panel.

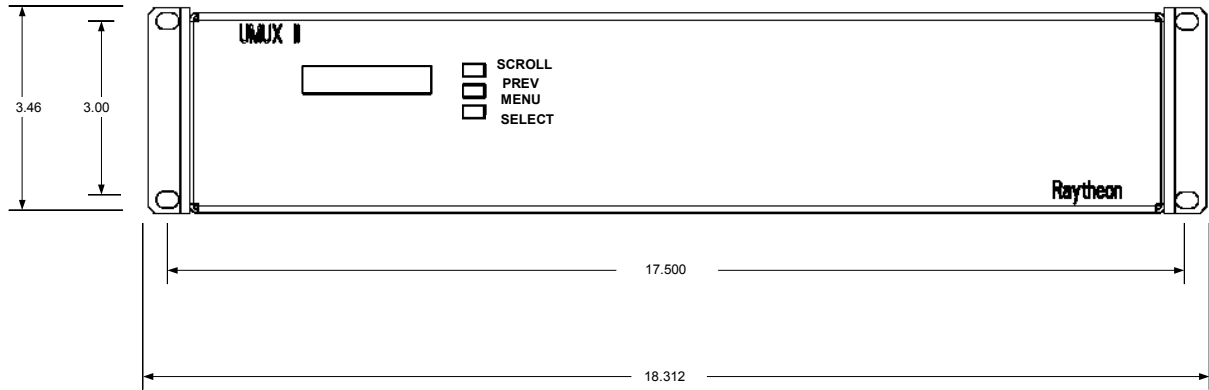


Figure 2: UMUX II Front Panel Interfaces

Keypad

The UMUX II provides three defined keys for the user input and query of run-time characteristics. The first key is defined to be the “SCROLL” key and allows the user to “scroll” through the menu items contained in the UMUX II. The second key is defined as the “PREV MENU” key provides a method for the user to “escape” or “back out” of a given sequence. The third key is the “SELECT” key, which causes the system to take an action.

LCD Display

The LCD is a 2-line, 16-character display that provides status and allows the user to provision the UMUX II. The display also contains a backlight that illuminates when a key is pressed.

Rear Panel Interfaces

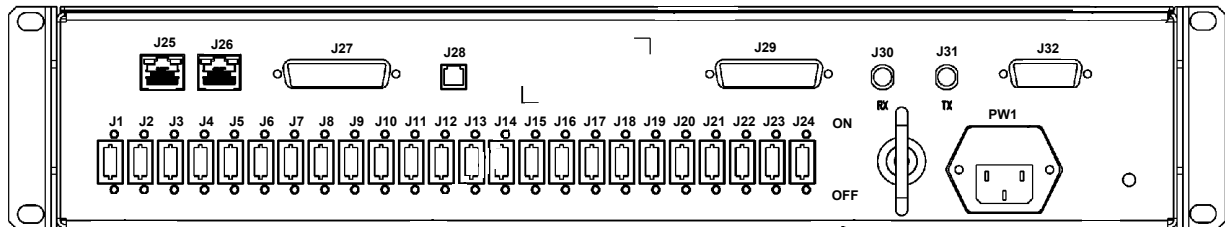


Figure 3: UMUX II Rear Panel Interfaces

Connectors

Table 1: Rear Panel Connector I/O Definitions

Designator	Function	Connector Type	MFG/MFG P/N	Mate Type
J1-J24	24 UDLT Interfaces	Stewart Stamping 6 position	Stewart Stamping/SS-620606-FF-P1-3-4/	Stewart Stamping Plug, P/N. SS310606
J25	10/100Mbps Ethernet #1	RJ-45 Receptacle w/LEDs	AMP/406549-1	Standard RJ-45 Plug (Cat 5 Network cable)
J26	10/100Mbps Ethernet #2	RJ-45 Receptacle w/LEDs	AMP/406549-1	Standard RJ-45 Plug (Cat 5 Network cable)
J27	Primary Rate T1/E1 4 ports	DB-25M	AMP/747842-4	Standard DB-25 Receptacle
J28	Fiber TX/RX MDA compatible	MTRJ (1310nm)	Agilent/HFBR-5903	Standard MTRJ connector.
J29	MIL-188-114 Network Interface	DB-25M	AMP/747842-4	Standard DB25 Receptacle
J30	Fiber Network Interface RX, UMUX compatible	Optical Fiber (850 nm)	Agilent HFBR-2416T	Standard Fiber ST Connector
J31	Fiber Network Interface TX, UMUX compatible	Optical Fiber (850 nm)	Agilent HFBR-1414T	Standard Fiber ST Connector
J32	1.544 Mbps T1 network interface, UMUX compatible	DB-15M	AMP/747841-4	Standard DB15 Receptacle
PW1	120VAC Power Input	Filtered/Fused Power Entry	Corcom, 6EHG1-2	AC power cord, NEMA 5-15 Plug to IEC-320 C13 receptacle, 6 ft., Supplied with unit.

UDLT Connectors J1-J24

Table 2: UDLT connectors pin definitions

Conn	Pin	Description	Pin	Description
J1	1	UDLT 1 (+)	6	UDLT 1 (-)
J2	1	UDLT 2 (+)	6	UDLT 2 (-)
J3	1	UDLT 3 (+)	6	UDLT 3 (-)
J4	1	UDLT 4 (+)	6	UDLT 4 (-)
J5	1	UDLT 5 (+)	6	UDLT 5 (-)
J6	1	UDLT 6 (+)	6	UDLT 6 (-)
J7	1	UDLT 7 (+)	6	UDLT 7 (-)
J8	1	UDLT 8 (+)	6	UDLT 8 (-)
J9	1	UDLT 9 (+)	6	UDLT 9 (-)
J10	1	UDLT 10 (+)	6	UDLT 10 (-)
J11	1	UDLT 11 (+)	6	UDLT 11 (-)
J12	1	UDLT 12 (+)	6	UDLT 12 (-)
J13	1	UDLT 13 (+)	6	UDLT 13 (-)
J14	1	UDLT 14 (+)	6	UDLT 14 (-)
J15	1	UDLT 15 (+)	6	UDLT 15 (-)
J16	1	UDLT 16 (+)	6	UDLT 16 (-)
J17	1	UDLT 17 (+)	6	UDLT 17 (-)
J18	1	UDLT 18 (+)	6	UDLT 18 (-)
J19	1	UDLT 19 (+)	6	UDLT 19 (-)
J20	1	UDLT 20 (+)	6	UDLT 20 (-)
J21	1	UDLT 21 (+)	6	UDLT 21 (-)
J22	1	UDLT 22 (+)	6	UDLT 22 (-)
J23	1	UDLT 23 (+)	6	UDLT 23 (-)
J24	1	UDLT 24 (+)	6	UDLT 24 (-)

Note: pins 2-5 are NC on all Connectors

J29 MIL-188-114 Connector

Table 3: MIL-188-114 connector pin definitions

Pin	Description	Pin	Description
1	Frame GND	14	TX Data (-)
2	TX Data (+)	15	TX CLK (+)
3	RX Data (+)	16	RX Data (-)
4	Frame GND	17	RX CLK (+)
5	Resync (+)	18	422CLKOut(+)
6	MIL SNGL	19	422CLKOut(-)
7	Frame GND	20	Frame GND
8	422 Spare In (-)	21	GND
9	RX CLK (-)	22	RS422 Spare
10	422 Spare In	23	RS422 Spare
11	Frame GND	24	422 Sync CMD
12	TX CLK (-)	25	422 Sync CMD
13	Resync (-)		

J32 Legacy UMUX DS1 Connector

Table 4: Legacy UMUX DS1 connector pin definitions

Pin	Description	Pin	Description
1	DS1 TX (+)	9	DS1 TX (-)
2	Frame	10	Frame GND
3	DS1 RX	11	DS1 RX (-)
4	Frame	12	Frame GND
5	DSP Debug	13	DSP Debug
6	Proc debug	14	Proc Debug
7	Proc Debug	15	Proc Debug
8	Frame		

J27 Quad T1/E1 Electrical Interfaces

Table 5: Quad T1/E1 Electrical interfaces connector pin definitions

Pin	Signal	Direction I/O	Description
1	Frm Gnd	N/A	Frame Gnd
2	T1 E1 TX1 P	O	T1 E1 TX Data Ch #1 Positive
3	T1 E1 TX1 N	O	T1 E1 TX Data Ch #1 Negative
4	Frm Gnd	N/A	Frame Gnd
5	T1 E1 TX2 P	O	T1 E1 TX Data Ch #2 Positive
6	T1 E1 TX2 N	O	T1 E1 TX Data Ch #2 Negative
7	Frm Gnd	N/A	Frame Gnd
8	T1 E1 TX3 P	O	T1 E1 TX Data Ch #3 Positive
9	T1 E1 TX3 N	O	T1 E1 TX Data Ch #3 Negative
10	Frm Gnd	N/A	Frame Gnd
11	T1 E1 TX4 P	O	T1 E1 TX Data Ch #4 Positive
12	T1 E1 TX4 N	O	T1 E1 TX Data Ch #4 Negative
13	Frm Gnd	N/A	Frame Gnd
14	T1 E1 RX1 P	I	T1 E1 RX Data Ch #1 Positive
15	T1 E1 RX1 N	I	T1 E1 RX Data Ch #1 Negative
16	Frm Gnd	N/A	Frame Gnd
17	T1 E1 RX2 P	I	T1 E1 RX Data Ch #2 Positive
18	T1 E1 RX2 N	I	T1 E1 RX Data Ch #2 Negative
19	Frm Gnd	N/A	Frame Gnd
20	T1 E1 RX3 P	I	T1 E1 RX Data Ch #3 Positive
21	T1 E1 RX3 N	I	T1 E1 RX Data Ch #3 Negative
22	Frm Gnd	N/A	Frame Gnd
23	T1 E1 RX4 P	I	T1 E1 RX Data Ch #4 Positive
24	T1 E1 RX4 N	I	T1 E1 RX Data Ch #4 Negative
25	Frm Gnd	N/A	Frame Gnd

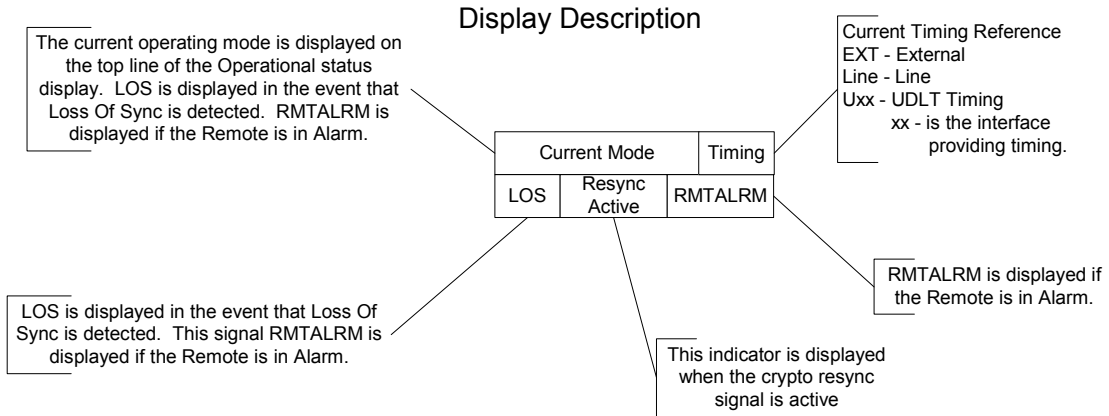
J25 and J26 10/100 Mbit Ethernet Interfaces

Table 6: 10/100Mbit Ethernet connector pin definitions

Pin	Signal Name	Direction I/O	Description
1	TX +	O	Transmit data Positive
2	TX -	O	Transmit data Negative
3	RX+	I	Receive data Positive
4	Termination	I	Termination
5	Termination	I	Termination
6	RX-	I	Receive data Negative
7	Termination	I	Termination
8	Termination	I	Termination

Indicators

The front panel display provides real time operational status for the UMUX II. This replaces the functionality (power, timing, loss of sync, and alarms) of the front panel visual indicators (LEDs) that the UMUX provided. Figure 4 shows the status screen of the UMUX II LCD screen.



**Legacy Mode Normal Operation Example
(External Timing)**

LEGACY NORM EXT
NORMAL OPERATION

**Legacy Mode Normal Operation Example
(Timing derived from UDLT Interface #20)**

LEGACY NORM U20
NORMAL OPERATION

**Legacy Mode Loss of Sync Example
(Timing derived from UDLT Interface #20)**

LEGACY MODE U20
LOS

**Legacy Mode Remote Alarm Example
(Timing derived from UDLT Interface #20)**

LEGACY NORM U20
LOS RMTALRM

**Legacy Mode Resync Active Example
(Timing derived from External Source)**

LEGACY NORM EXT
RESYNC ACTIVE

Figure 4: LCD Status and Examples

Configuration

The MUM (UMUX II) is configured via the front panel keypad and LCD as demonstrated in Figure 5. The rear panel switches from the UMUX are configured by the Legacy Edit Mode. The switch bank switch settings are discussed in the next section.

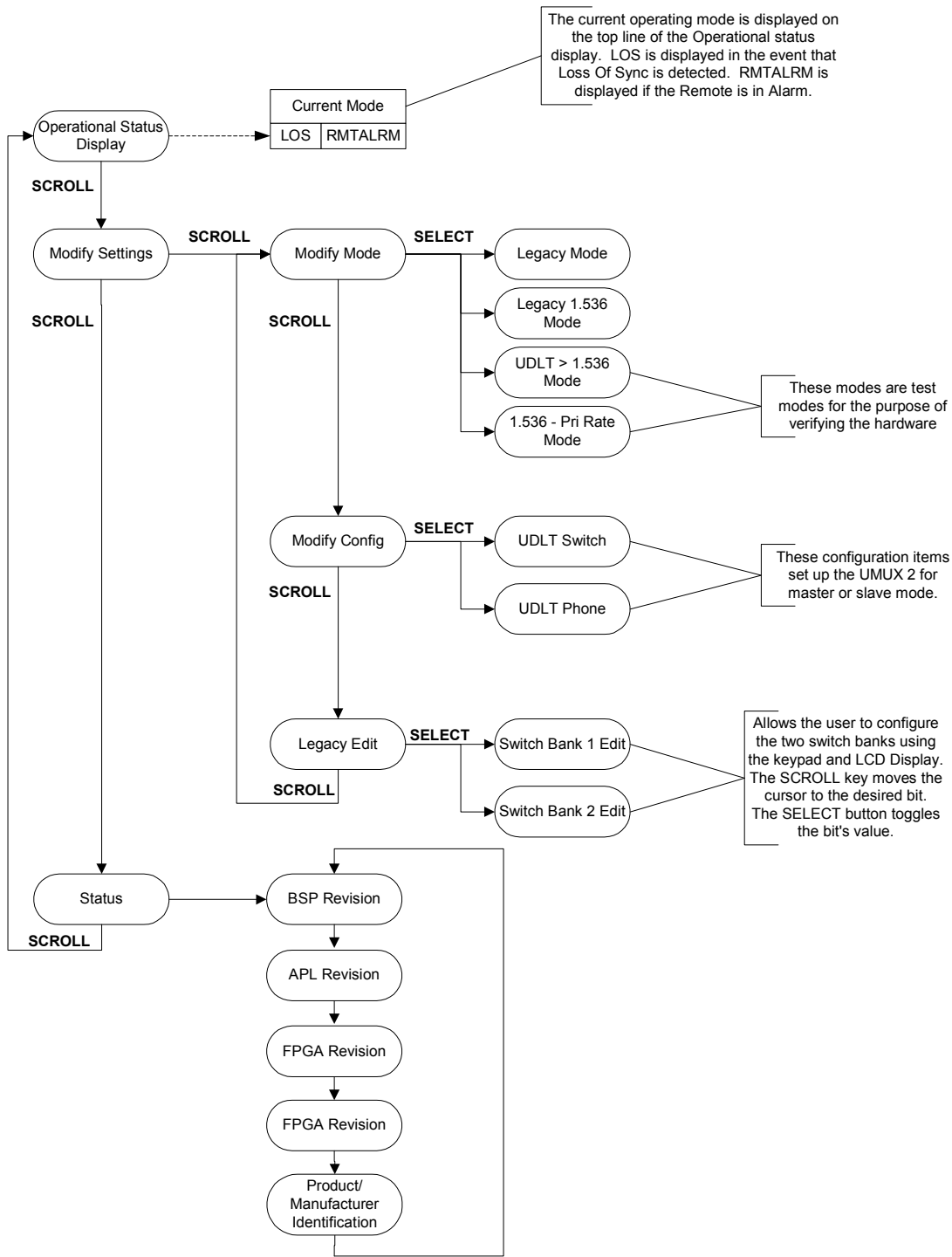


Figure 5: UMUX II Configuration Menus

Switches

The external configuration switch settings are available in the Legacy Mode Edit Menu (previously on the UMUX they were actual switches, accessible from the rear of the unit and are numbered from left to right looking from the rear of the unit). There are a total of 24 configuration switch settings.

Switch Definitions

Dipswitches SW1-1, SW1-2, SW1-3 and SW1-4 are relevant for the Long/Short Haul T1 Network Interface. They should be set according to the function and pulse. The PULSE column in the table below corresponds to the power output of the transmitter. The GAIN column corresponds to the amount of gain applied by the receive equalizer. For short haul applications, set the dipswitches according to the approximate cable length indicated in the PULSE column. For Long haul applications, use the 36 dB gain settings for longer cable lengths and the 26 dB gain settings for shorter cable lengths. Select the setting within each group that gives the best BER performance. In order to optimize the performance in long haul applications, it is necessary to measure pulse mask at the far end of the link and adjust the switch settings to best meet the pulse mask. This procedure is also recommended for short haul applications.

For Fiber or MIL-188 network interfaces, these switches should be set to OFF.

SW1-1	SW1-2	SW1-3	SW1-4	FUNCTION	PULSE	CABLE	GAIN
ON	ON	ON	ON	T1 Long Haul	0.0 dB pulse	100 Ω TP	36 dB
ON	OFF	ON	ON	T1 Long Haul	-7.5 dB pulse	100 Ω TP	36 dB
ON	ON	OFF	ON	T1 Long Haul	-15.0 dB pulse	100 Ω TP	36 dB
ON	OFF	OFF	ON	T1 Long Haul	-22.5 dB pulse	100 Ω TP	36 dB
OFF	ON	ON	ON	T1 Long Haul	0.0 dB pulse	100 Ω TP	26 dB
OFF	OFF	ON	ON	T1 Long Haul	-7.5 dB pulse	100 Ω TP	26 dB
OFF	ON	OFF	ON	T1 Long Haul	-15.0 dB pulse	100 Ω TP	26 dB
OFF	OFF	OFF	ON	T1 Long Haul	-22.5 dB pulse	100 Ω TP	26 dB
OFF	OFF	ON	OFF	T1 Short Haul	0-133 ft/0.6 dB	100 Ω TP	12 dB
ON	ON	OFF	OFF	T1 Short Haul	133-266 ft/1.2 dB	100 Ω TP	12 dB
OFF	ON	OFF	OFF	T1 Short Haul	266-399 ft/1.8 dB	100 Ω TP	12 dB
ON	OFF	OFF	OFF	T1 Short Haul	399-533 ft/2.4 dB	100 Ω TP	12 dB
OFF	OFF	OFF	OFF	T1 Short Haul	533-655 ft/3.0 dB	100 Ω TP	12 dB

Dipswitch SW1-5 is used to configure the DS1 Line Interface Unit in Facility (FAC) loopback mode. This loopback mode is used to test the facility by looping back the DS1 electrical signal when it comes into the unit. The normal configuration for this switch should be in the ON position. This switch is used during line testing and line fault isolation diagnostic testing.

SW1-5	SELECTION
ON	Normal
OFF	DS1 FAC Loopback

Dipswitch SW1-6 is used to configure the DS1 Line Interface Unit (LIU) in local loopback. LIU local loopback is used to test the local unit. This would include the framer, LIU, and all other associated equipment. Setting this switch to the OFF position configures the LIU to loop the received bipolar pair and clock (TPOS/TNEG/TCLK) to the transmit bipolar pair and clock (RPOS/RNEG/RCLK). The normal configuration for this switch is the ON position. This switch should be set to the OFF position in FIBER MODE.

SW1-6	SELECTION
ON	Normal
OFF	DS1 LIU Local Loopback

Dipswitches SW1-7 and SW1-8 are used to select the DS1 LIU interface data generation mode of operation for the UMUX. The primary use of these switches is for line diagnostic testing and for measuring/adjusting the pulse mask. Three selections are available. 1. Normal should be selected for normal unit operation. 2. Quasi-Random Signaling Source (QRSS) mode generates QRSS data as well as enables the QRSS detector in the receiver. This mode can be used for pulse mask testing as well as BER testing. 3. TAOS mode configures the electrical DS1 output to Transmit All Ones (TAOS). This is the BLUE ALARM condition (Unframed and 1's). Selecting either of these conditions overrides all other data select modes configured for the DS1 framer.

SW1-7	SW1-8	SELECTION
ON	ON	Invalid
OFF	ON	TAOS
ON	OFF	QRSS
OFF	OFF	Normal

Dipswitch SW1-9 provides the capability to generate an Isolated One (ISO One) data pattern in DS1 electrical mode. Setting this switch to the ON position will generate an isolated one data pattern for use in pulse mask testing. Normally, this switch will be OFF. It should be used when configuring a new circuit or diagnosing line problems.

SW1-9	SELECTION
ON	ISO One Enable
OFF	Normal

Dipswitch SW1-10 provides the capability to force a yellow alarm on the outgoing DS1 electrical line. Setting this switch to the ON position will cause a yellow alarm. Normally, this switch will be OFF. It should be used when configuring a new circuit or diagnosing line problems.

SW1-10	SELECTION
ON	GEN YLW Alarm
OFF	Normal

Dipswitches SW1-11 and SW1-12 determine the DS1 line-coding scheme as follows:

SW1-11	SW1-12	SELECTION
ON	ON	D4, AMI
ON	OFF	D4, B8ZS
OFF	ON	ESF, AMI
OFF	OFF	ESF, B8ZS

Dipswitches SW2-1 and SW2-4 select the DS1 timeslot partitioning and the summing option for the -01 revision of the UMUX. SW 2-1 should be left in the **off** position **unless** a -01 revision UMUX is being used **and** mode 8 functionality is required. SW 2-4 should be left in the **off** position on the UMUX II Phone unit **unless** a -01 revision UMUX is being used **and** SW 2-1 is in the **on** position for both the Master and Slave units **and** summing functionality is required. SW 2-4 should be left in the **off** position on the UMUX II Switch unit in **all** configuration options. Refer to the table below for strapping information:

SW2-1	UMUX II PHONE SW2-4	UMUX II SWITCH SW2-4	SELECTION
ON	ON	OFF	Group 8 Enable with Summing
ON	OFF	OFF	Group 8 Enable w/o Summing
OFF	ON	ON	Undefined mode, DO NOT USE!
OFF	OFF	OFF	Default setting, use for -00 revisions

Dipswitch SW2-2 is not used.

Dipswitch SW2-3 is reserved for new functionality. It should be set to the OFF position.

SW2-3	SELECTION
ON	LSB Stuff Enable
OFF	Normal

Dipswitch SW2-5 determines whether Zero Code Substitution (ZCS) is enabled. Some networks cannot pass the "00" code. This mode can be enabled to provide "FF"->"00" substitution to accommodate the network equipment. ZCS must be set the same on both ends of the link. When doing voice compression with IDNX, ZCS should be enabled.

SW2-5	SELECTION
ON	ZCS Enabled
OFF	ZCS Disabled

The combination of dipswitches SW2-6 and SW2-7 determines the desired DS-1 mode for the UMUX as follows:

SW2-6	SW2-7	SELECTION
ON	ON	INVALID
ON	OFF	DS1 MIL-188
OFF	ON	DS1 Fiber
OFF	OFF	DS1 Electrical

The combination of dipswitches SW2-8 and SW2-9 determines the timing source selection. For the UMUX II SWITCH, the three timing choices are: MIL-188 Timing (external), UDLT Timing, or Line Timing. For the UMUX II PHONE, the two choices are MIL-188 Timing (external), or Line Timing. SW2-8 OFF and SW2-9 OFF, configures the UMUX II PHONE for line timing. Line timing is derived from the selected network interface (i.e. fiber, MIL-188-114 or DS1 Electrical). Line Timing is the most common configuration for the UMUX II PHONE.

SW2-8	SW2-9	SELECTION
ON	ON	INVALID
ON	OFF	MIL-188 Timing
OFF	ON	UDLT Timing (Master only)
OFF	OFF	Line Timing

The MIL-188 RESYNC pair is a loop closure. The loop will cycle closed->open when the RED ALARM (LOS) condition is detected on the T1 link, and will continue until the LOS condition is cleared. The closure rate is selectable via dipswitch SW2-10. When this dipswitch is OFF, the loop closure time will be 1 second closed and 5 seconds open. Setting this dipswitch ON will select a loop closure rate of 1 second closed and 10 seconds open. In MIL-188-114 1.544Mbps mode, the re-synchronization detection is done on a clock and data presence basis only. In this configuration, the RESYNC may not be reliably activated if a failure occurs on the network side of the crypto.

SW2-10	SELECTION
ON	Resync 5 seconds
OFF	Resync 10 seconds

Dipswitches SW2-11 and SW2-12 are not used.

DS1 Electrical Switch Settings

The following switches are involved with configuring the DS1 Electrical mode: SW1-1, SW1-2, SW1-3, SW1-4, SW1-5, SW1-6, SW1-11, SW1-12, SW2-5, SW2-6, and SW2-7. Additionally, the timing switches SW2-8 and SW2-9, which are configuration dependant, need to be set. All other switches are typically set to the OFF position.

DS1 Fiber Switch Settings

The following switches are involved with configuring the DS1 Fiber mode: SW1-5, SW1-6, SW1-11, SW1-12, SW2-5, SW2-6, and SW2-7. Additionally, the timing switches SW2-8 and SW2-9, which are configuration dependant, need to be set. All other switches are typically set to the OFF position

DS1 MIL-188-114 Switch Settings

The following switches are involved with configuring the DS1 MIL-188-114 mode: SW1-5, SW1-6, SW2-5, SW2-6, and SW2-7. The timing switches SW2-8 and SW2-9, which are configuration dependant, need to be set. In addition, switches SW1-11 and SW1-12 must be set to the ON position. All other switches are typically set to the OFF position

Examples

DS1 Electrical, Master UDLT timing, Slave line timing, ESF/B8ZS

This example configures the UMUX II Switch to derive timing off a UDLT channel. The UMUX will use the first active UDLT channel it finds, searching sequentially through the UDLT channels until it finds a valid timing source. The UMUX II Phone is configured for line timing. ESF/B8ZS framing/zero code suppression is used for this example, however, four different line-coding schemes (determined by SW1-11 and SW1-12 settings) are supported: D4 AMI, D4 B8ZS, ESF AMI, and ESF B8ZS. See Figure 6 for a diagram of this set up. Set the switches on the UMUX devices as follows:

BOTH UMUX II DEVICES SET TO LEGACY MODE

UMUX II SWITCH		UMUX II PHONE	
SW1-1: OFF	SW2-1: OFF	SW1-1: OFF	SW2-1: OFF
SW1-2: OFF	SW2-2: OFF	SW1-2: OFF	SW2-2: OFF
SW1-3: ON	SW2-3: OFF	SW1-3: ON	SW2-3: OFF
SW1-4: OFF	SW2-4: OFF	SW1-4: OFF	SW2-4: OFF
SW1-5: ON	SW2-5: OFF	SW1-5: ON	SW2-5: OFF
SW1-6: ON	SW2-6: OFF	SW1-6: ON	SW2-6: OFF
SW1-7: OFF	SW2-7: OFF	SW1-7: OFF	SW2-7: OFF
SW1-8: OFF	SW2-8: OFF	SW1-8: OFF	SW2-8: OFF
SW1-9: OFF	SW2-9: ON	SW1-9: OFF	SW2-9: OFF
SW1-10: OFF	SW2-10: OFF	SW1-10: OFF	SW2-10: OFF
SW1-11: OFF	SW2-11: OFF	SW1-11: OFF	SW2-11: OFF
SW1-12: OFF	SW2-12: OFF	SW1-12: OFF	SW2-12: OFF

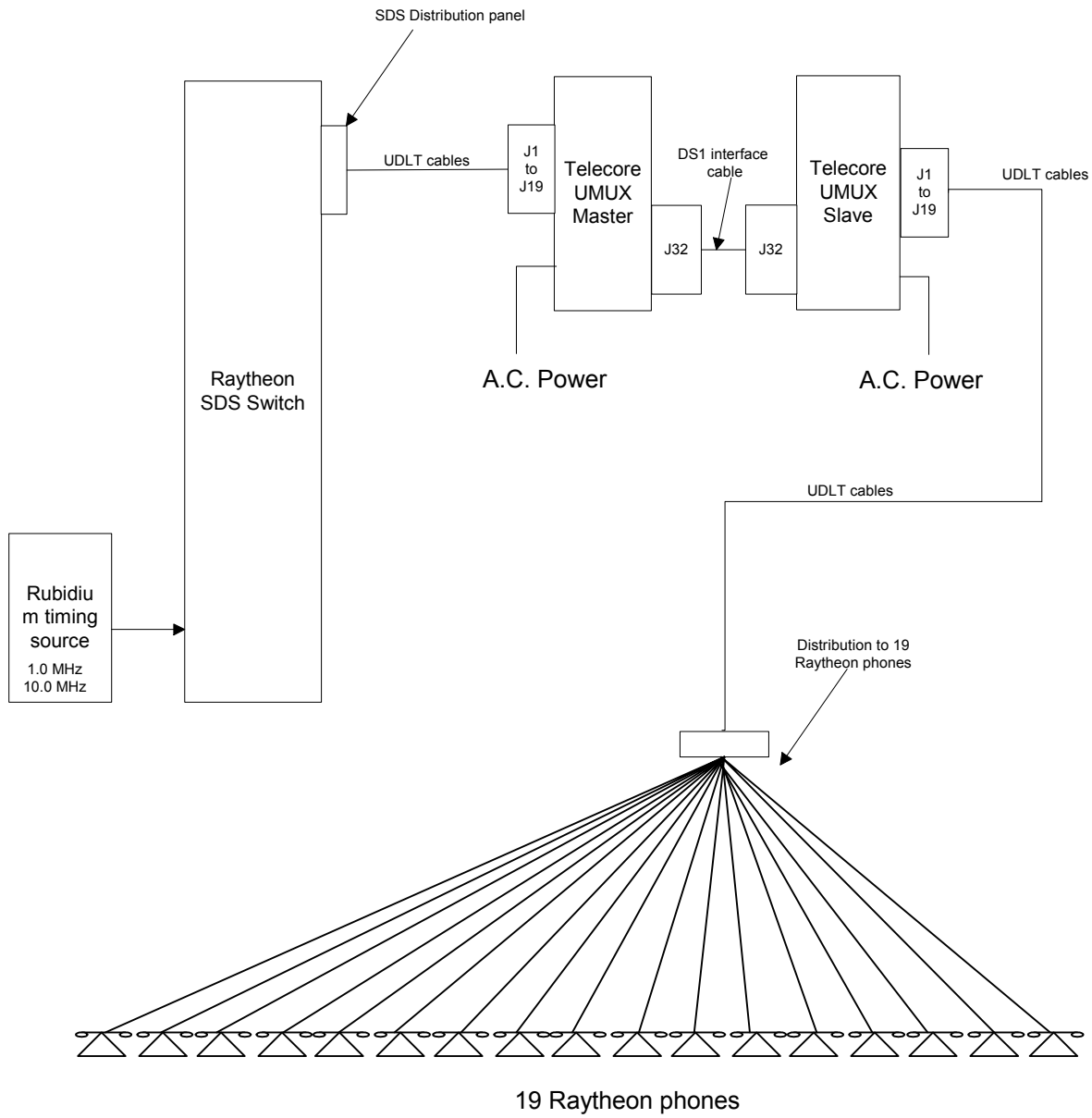


Figure 6: DS1 Electrical, Master UDLT timing, Slave line timing set up diagram

DS1 Electrical, Master External, Slave External timing, D4/AMI

This example configures the UMUX II Switch and UMUX II Phone to derive timing from an external source and uses D4/AMI framing format/line coding. See Figure 7 for a diagram of this set up with the switches configured as follows:

BOTH UMUX II DEVICES SET TO LEGACY MODE

UMUX II SWITCH		UMUX II PHONE	
SW1-1: OFF	SW2-1: OFF	SW1-1: OFF	SW2-1: OFF
SW1-2: OFF	SW2-2: OFF	SW1-2: OFF	SW2-2: OFF
SW1-3: ON	SW2-3: OFF	SW1-3: ON	SW2-3: OFF
SW1-4: OFF	SW2-4: OFF	SW1-4: OFF	SW2-4: OFF
SW1-5: ON	SW2-5: OFF	SW1-5: ON	SW2-5: OFF
SW1-6: ON	SW2-6: OFF	SW1-6: ON	SW2-6: OFF
SW1-7: OFF	SW2-7: OFF	SW1-7: OFF	SW2-7: OFF
SW1-8: OFF	SW2-8: ON	SW1-8: OFF	SW2-8: ON
SW1-9: OFF	SW2-9: OFF	SW1-9: OFF	SW2-9: OFF
SW1-10: OFF	SW2-10: OFF	SW1-10: OFF	SW2-10: OFF
SW1-11: ON	SW2-11: OFF	SW1-11: ON	SW2-11: OFF
SW1-12: ON	SW2-12: OFF	SW1-12: ON	SW2-12: OFF

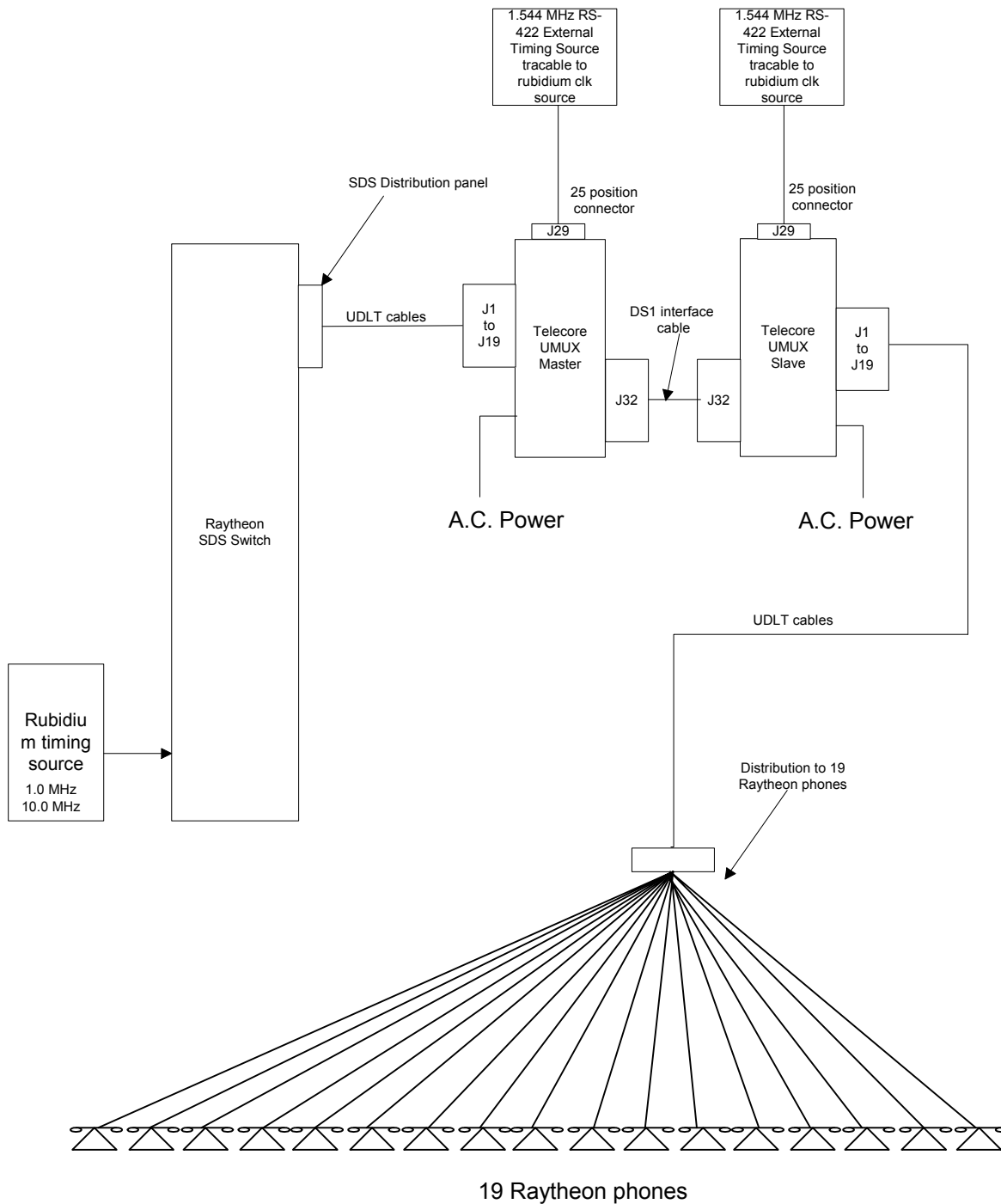


Figure 7: DS1 Electrical, Master External, Slave External timing set up diagram

MIL-188 Interface, Master EXTERNAL, Slave EXTERNAL timing, D4/AMI

The following example shows the MIL-188 interface in D4 AMI line coding with MIL-188 timing selected on both the UMUX II SWITCH and UMUX II PHONE devices. See Figure 8 for a diagram of this set up with the switches on the UMUX devices set as follows:

BOTH UMUX II DEVICES SET TO LEGACY MODE

UMUX II SWITCH		UMUX II PHONE	
SW1-1: OFF	SW2-1: OFF	SW1-1: OFF	SW2-1: OFF
SW1-2: OFF	SW2-2: OFF	SW1-2: OFF	SW2-2: OFF
SW1-3: ON	SW2-3: OFF	SW1-3: ON	SW2-3: OFF
SW1-4: OFF	SW2-4: OFF	SW1-4: OFF	SW2-4: OFF
SW1-5: ON	SW2-5: OFF	SW1-5: ON	SW2-5: OFF
SW1-6: ON	SW2-6: ON	SW1-6: ON	SW2-6: ON
SW1-7: OFF	SW2-7: OFF	SW1-7: OFF	SW2-7: OFF
SW1-8: OFF	SW2-8: ON	SW1-8: OFF	SW2-8: ON
SW1-9: OFF	SW2-9: OFF	SW1-9: OFF	SW2-9: OFF
SW1-10: OFF	SW2-10: OFF	SW1-10: OFF	SW2-10: OFF
SW1-11: ON	SW2-11: OFF	SW1-11: ON	SW2-11: OFF
SW1-12: ON	SW2-12: OFF	SW1-12: ON	SW2-12: OFF

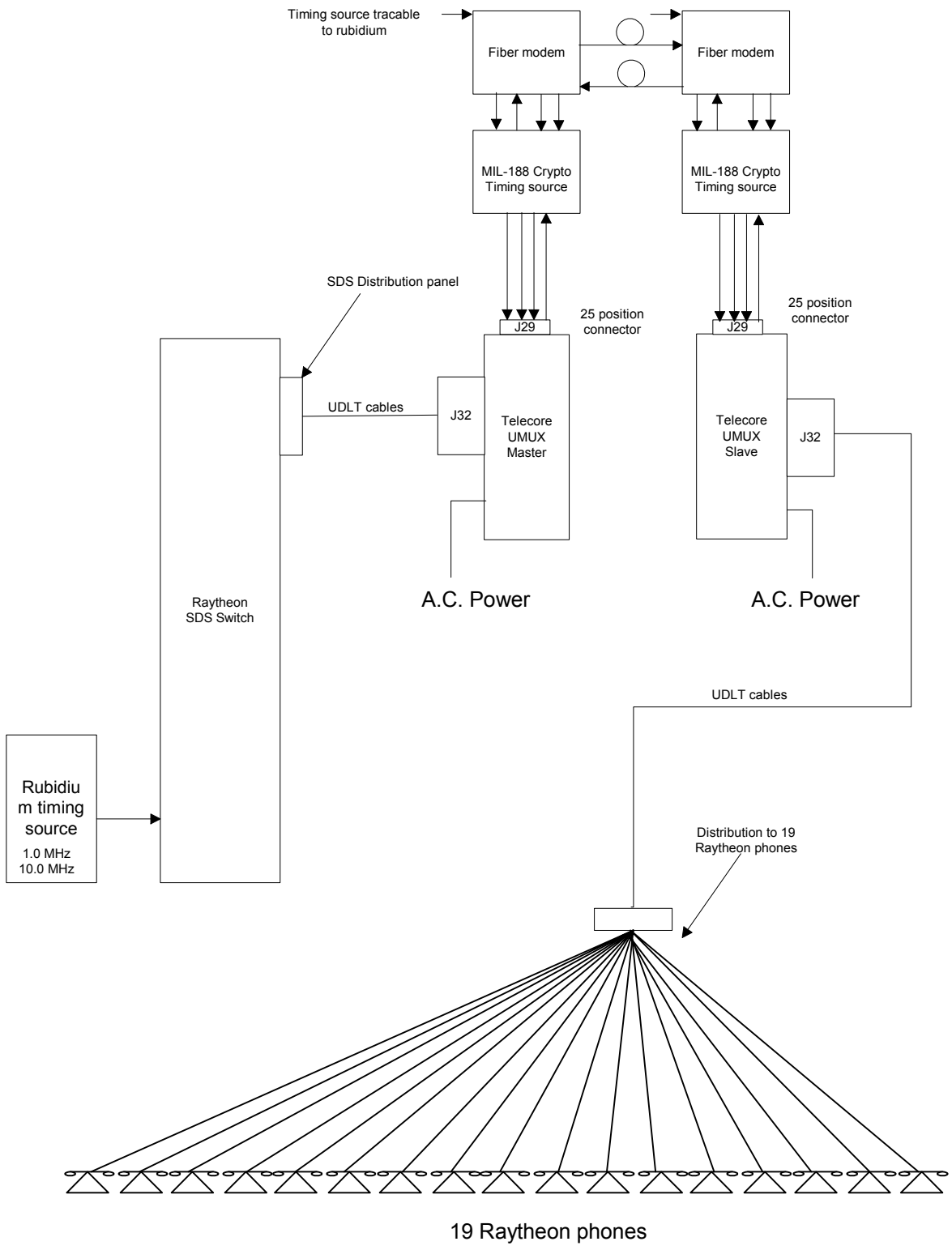


Figure 8: MIL-188 Interface, Master EXTERNAL, Slave EXTERNAL timing set up diagram

Fiber Optic Interface, Master UDLT, Slave line timing

This example shows the fiber optic interface using D4/AMI framing/line coding with UDLT timing selected on the UMUX II SWITCH and line timing selected on the UMUX II PHONE. In Fiber optic mode, always use D4/AMI. See Figure 9 for a diagram of this set up with the switches on the UMUX devices set as follows:

BOTH UMUX II DEVICES SET TO LEGACY MODE

UMUX II SWITCH		UMUX II PHONE	
SW1-1: OFF	SW2-1: OFF	SW1-1: OFF	SW2-1: OFF
SW1-2: OFF	SW2-2: OFF	SW1-2: OFF	SW2-2: OFF
SW1-3: ON	SW2-3: OFF	SW1-3: ON	SW2-3: OFF
SW1-4: OFF	SW2-4: OFF	SW1-4: OFF	SW2-4: OFF
SW1-5: ON	SW2-5: OFF	SW1-5: ON	SW2-5: OFF
SW1-6: OFF	SW2-6: OFF	SW1-6: OFF	SW2-6: OFF
SW1-7: OFF	SW2-7: ON	SW1-7: OFF	SW2-7: ON
SW1-8: OFF	SW2-8: OFF	SW1-8: OFF	SW2-8: OFF
SW1-9: OFF	SW2-9: ON	SW1-9: OFF	SW2-9: OFF
SW1-10:OFF	SW2-10:OFF	SW1-10:OFF	SW2-10:OFF
SW1-11:ON	SW2-11:OFF	SW1-11:ON	SW2-11:OFF
SW1-12:ON	SW2-12:OFF	SW1-12:ON	SW2-12:OFF

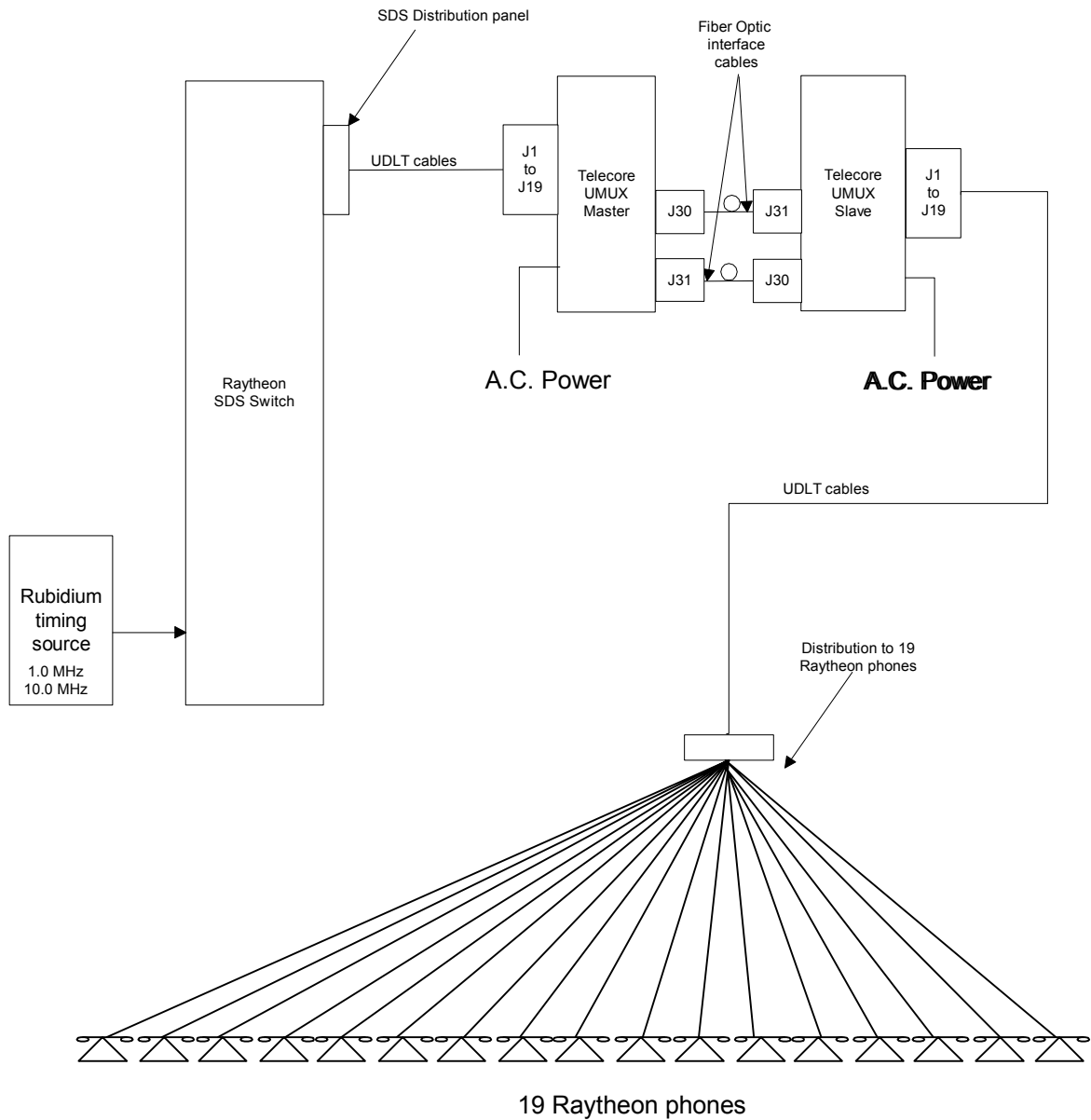


Figure 9: Fiber Optic Interface, Master UDLT, Slave line timing set up diagram

Legacy Mode with 1.536Mbps Interface, D4 Framing with AMI, Group 4, No Summing, MIL-188-114 timing

This example shows the Legacy Mode 1.536Mbps interface using D4/AMI framing/line coding with MIL-188-114 timing selected at both ends, Group and no summing. See Figure 10 for a diagram of this set up with the switches on the UMUX devices set as follows:

BOTH UMUX II DEVICES SET TO LEGACY 1.536MBPS MODE

UMUX II SWITCH		UMUX II PHONE	
SW1-1: OFF	SW2-1: OFF	SW1-1: OFF	SW2-1: OFF
SW1-2: OFF	SW2-2: OFF	SW1-2: OFF	SW2-2: OFF
SW1-3: ON	SW2-3: OFF	SW1-3: ON	SW2-3: OFF
SW1-4: OFF	SW2-4: OFF	SW1-4: OFF	SW2-4: OFF
SW1-5: ON	SW2-5: OFF	SW1-5: ON	SW2-5: OFF
SW1-6: ON	SW2-6: ON	SW1-6: ON	SW2-6: ON
SW1-7: OFF	SW2-7: OFF	SW1-7: OFF	SW2-7: OFF
SW1-8: OFF	SW2-8: ON	SW1-8: OFF	SW2-8: ON
SW1-9: OFF	SW2-9: OFF	SW1-9: OFF	SW2-9: OFF
SW1-10: OFF	SW2-10: OFF	SW1-10: OFF	SW2-10: OFF
SW1-11: ON	SW2-11: OFF	SW1-11: ON	SW2-11: OFF
SW1-12: ON	SW2-12: OFF	SW1-12: ON	SW2-12: OFF

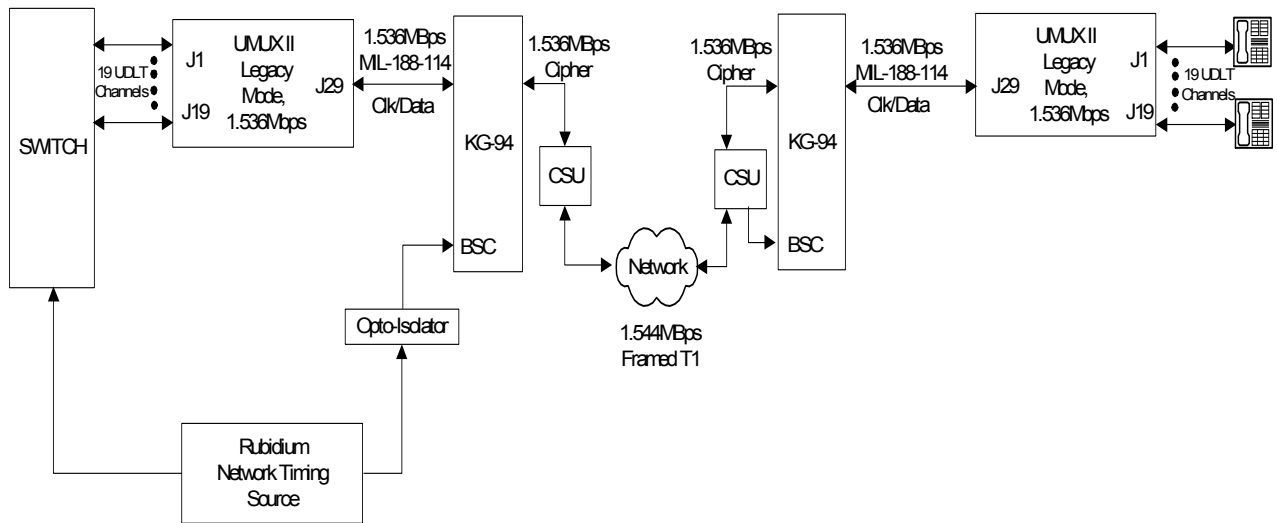


Figure 10: UMUX II Legacy 1.536Mbps Mode, Master UDLT, Slave line timing set up diagram

Warranty Terms and Conditions

Telecore, Inc. provides a manufacturer's warranty that for a period of ninety days commencing on date of shipment: Goods are and will be free from defects in design, material, and workmanship; will conform to and perform in accordance with the Specifications, if any; that it will convey good and valid title to all Goods; and that all Goods are being provided free and clear of any and all liens and encumbrances. This warranty will survive inspection, acceptance, and payment. This warranty shall be null and void in the event the Buyer or any third party attempts to repair or alter the Goods in any way without Telecore, Inc. advanced written authorization, or in the event the Goods are misused, including termination of non-compliant third party equipment on Telecore's interfaces, or damaged by Buyer, or shipped to any country other than that originally specified in Buyer's Purchase Order. Goods not meeting this warranty will be promptly repaired or replaced, at Telecore's option, upon return to Telecore's facility freight prepaid; provided, however, that Buyer has first obtained a return materials authorization number ("RMA Number") from Telecore authorizing such return. The RMA Number shall be placed on the exterior packaging of all returns. Telecore will pay shipping costs to return repaired or replacement Goods to Buyer. THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF TITLE, MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE HOWSOEVER ARISING.

Shipping Return Address

Equipment will be shipped to the following Supplier address as directed by the Supplier's Customer Service Department at the time the RMA number is assigned:

ADDRESS:

Telecore Inc
1800 North Glenville Dr.
Suite 116
Richardson, TX 75081-1953
ATTENTION: Customer Service

Terms and Definitions

MUM

Telecore's Multipurpose UDLT Multiplexer (UMUX II)

UMUX II

Telecore's second generation UDLT multiplexer which performs functionality of UMUX-M and UMUX II PHONE.

UMUX II Phone

Telecore's UDLT multiplexer which connects to the end instrument (phone) – equivalent of UMUX-S.

UMUX II Switch

Telecore's UDLT multiplexer which connects to the SDS, DSS, or MDS switch – equivalent of UMUX-M.

SDS

Raytheon's Secure Digital Switch

DSS

Raytheon's Digital Small Switch

MDS

Raytheon's Multi-level conferencing Digital Switch