BroadAccess

Installation Instructions

LI-4WE&M Card

Description

The LI-4WE&M card is a service which supports E&M signaling and transmission for either 2W or 4W subscribers.

Fixed time slot allocation, required for normal functioning of the 4WE&M line ports assigned to the LI-4WE&M card, is automatically configured for each 4WE&M line port when the card is installed in the cage. Permanent allocation is automatically assigned by the system. It can be disabled using management software. E&M type and gain are also set through the management software. Refer to the *BroadAccess Configuration Guide* supplied in the Service Manual and in the ClearAccess+ User Guide for more information about permanent allocation and LI-4WE&M line properties.

Table 1. LI-4WE&M Card – Features

Feature	Specification
Installed in	CU & RU
Max no. of cards per: CAGE40-M CAGE40-MIN	 15 4
No. of lines	Up to 5, depending on E&M type (see Table 2)
Interface	2W, 4W, 6W or 8W, depending on E&M type (see Table 2)

Table 2. E&M Types

Type	Signaling	No. of Lines Supported
Type I	2-wire E&M signaling	5 lines
	4-wire E&M signaling	5 lines
Type II	2-wire E&M signaling	4 lines
	4-wire E&M signaling	4 lines
Type III	2-wire E&M signaling	4 lines
	4-wire E&M signaling	4 lines
Type IV	2-wire E&M signaling	4 lines
	4-wire E&M signaling	4 lines
Type V	2-wire E&M signaling	5 lines
	4-wire E&M signaling	5 lines

⚠ **Note:** *Different E&M types can be used at CU and RU sides of the same BroadAccess system.*

Card Indicators

Card indicators are shown in Figure 1, and described from top to bottom in Table 3.

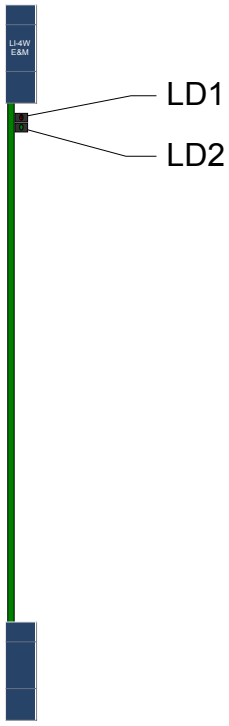


Figure 1. LI-4WE&M Card – Indicators

Table 3. LI-4WE&M Card – Indicator Descriptions

Indicator	Color	Status	Indication
LD1	Red LED	ON	Card failure
		OFF	Card functioning normally
LD2	Green LED	ON	Card functioning normally (fixed allocation)
		OFF	Card failure

⚠ **Note:** *A self-test or forced-test will cause the LEDs on the card to flash until the test procedure is completed. If a fault occurs, the red LED will remain ON.*

Configuration

There are no user configurable strapping options on this card.

Installation

⚠ **Note:** *System may remain powered while inserting card.*

⚠ **Caution:** *Modules can be damaged by electrostatic discharge (ESD). Before handling any modules connect your wrist to an equipment ground using an approved anti-static wrist strap. Ensure that all uninstalled modules are stored in anti-static packing material. When working with modules, always place the module on an electrically grounded approved anti-static mat.*

⚠ **Caution:** *Using excessive force when seating cards and modules into the backplane may result in severe physical damage to the backplane pins or module connectors, and if power is applied, may result in serious electrical damage to both the modules or the backplane.*

1. Place the grounded ESD wristband on your wrist.
2. Carefully remove card from package.
3. Slide the card into the cage as follows:
   - CAGE40-M - slots marked “1” to “15”.
   - CAGE40-MIN - slots marked “1” to “4”.

⚠ **Caution:** *Seat the card into the backplane by sliding it through the card guide while holding the ejector ears open. Fully seat the card by pressing the ejector ears in until they lock into place. Do not force the cards into the backplane. If excessive resistance is felt, remove the card and check for proper alignment in card guides or obstructions.*

4. If not already connected, connect cables to the cage as explained in “Cables”, below.

⚠ **Caution:** *If installing a new system, do not set the power cards main switch to ON until system installation is complete, as described in the installation guide for your specific cage.*

⚠ **Note:** ***For BroadAccess in Automatic Connection Mode:***
*Verify that a compatible card (see “*Compatibility*” in the* Card Installation Overview*) is installed in the corresponding slot of the cage at the other end of the link.*

For BroadAccess in Manual Connection Mode:
*Verify that a compatible card (see “*Compatibility*” in the* Card Installation Overview*) is installed in a suitable slot of the cage at the other end of the link, then use the management software provided with your system to perform line provisioning accordingly. For further details, see the BroadAccess Configuration Guide supplied in the Service Manual and in the ClearAccess+ User Guide.*

5. After both the CU and RU are installed, powered up, and links are connected, verify that indicator status is as described in "*Card Indicators*" above. Otherwise, refer to "*Alarms and Troubleshooting*" in the *BroadAccess Maintenance Guide* supplied in the Service Manual and in the *ClearAccess+ User Guide*.

6. Set parameters such as E&M type and Gain settings via the management software. Refer to the management software online help or the *BroadAccess Configuration Guide* for more information.

Cables

⚠ **Caution:** *Use caution when routing wires and cables. Avoid severe bending and routing over sharp edges. Use grommet material when possible to avoid wear to cable insulation.*

4WE&M lines are connected to the BroadAccess systems using one of the following methods:

- connection to BroadAccess distribution blocks
- connection to BroadAccess open cables

The distribution block and open cable connections for the various E&M types are detailed on the following pages as follows:

⚠ **Note:** *The connection of wires differs between E&M types, so it is important to refer to the connection figure for the appropriate type when connecting cables.*

Connection Procedure

⚠ **Caution:** *Ensure correct polarity when connecting E&M pairs. Failure to observe this note will cause system malfunction.*

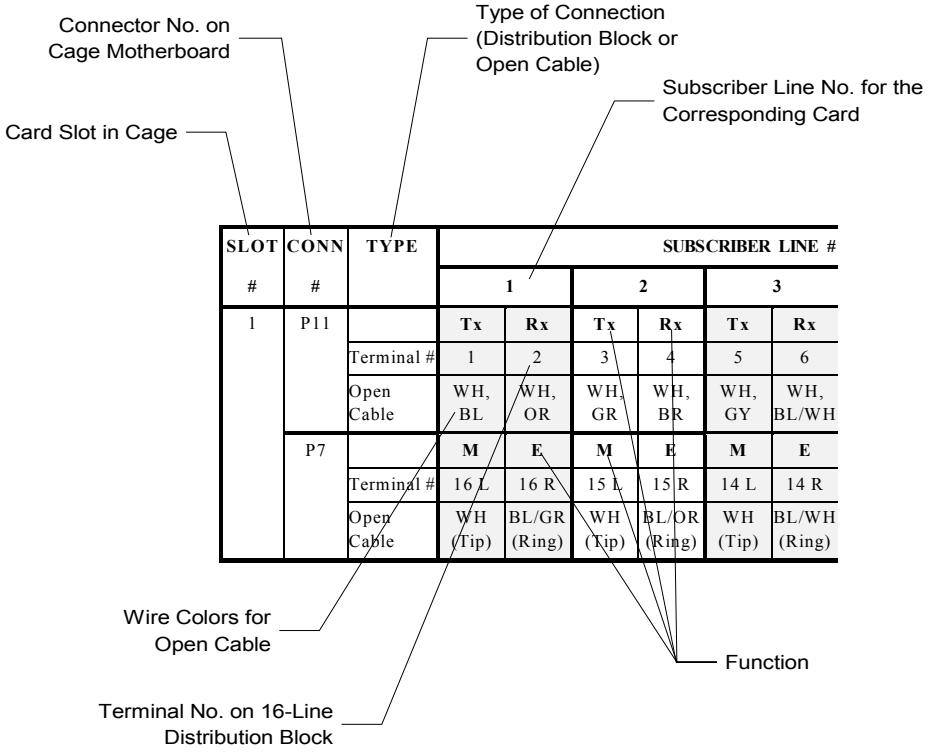
1. Identify M and E wires on the 4WE&M lines from the local exchange MDF and from subscriber equipment.

2. Connect the 4WE&M lines (Tx, Rx, E, M, SB and SG wires) to the distribution blocks or to the open cables, as described in the connection figures and tables below.

Figure 2 demonstrates how to use the information given in the connection tables (Table 4 to Table 7).

⚠ **Note:** *Figure 2 shows a general explanation for using the following tables. There are slight format changes between the tables and the figure, depending on connection type.*

⚠ **Note:** *Refer to the appropriate MDF Installation Instructions supplied with your system for the location of terminals on the distribution blocks.*



SLOT #	CONN #	TYPE	SUBSCRIBER LINE #					
			1		2		3	
1	P11		Tx	Rx	Tx	Rx	Tx	Rx
		Terminal #	1	2	3	4	5	6
		Open Cable	WH, BL	WH, OR	WH, GR	WH, BR	WH, GY	WH, BL/WH
	P7		M	E	M	E	M	E
		Terminal #	16 L	16 R	15 L	15 R	14 L	14 R
		Open Cable	WH (Tip)	BL/GR (Ring)	WH (Tip)	BL/OR (Ring)	WH (Tip)	BL/WH (Ring)

Figure 2. Explanation for Using Connection Tables

Figure 3 shows a general view of the E&M lines signaling with and without the BroadAccess system.

When M lead (subscriber A) is connected to GND, it is being detected by the M wire in the CU side. As a result on the RU side (subscriber B) M lead is also connected to GND.

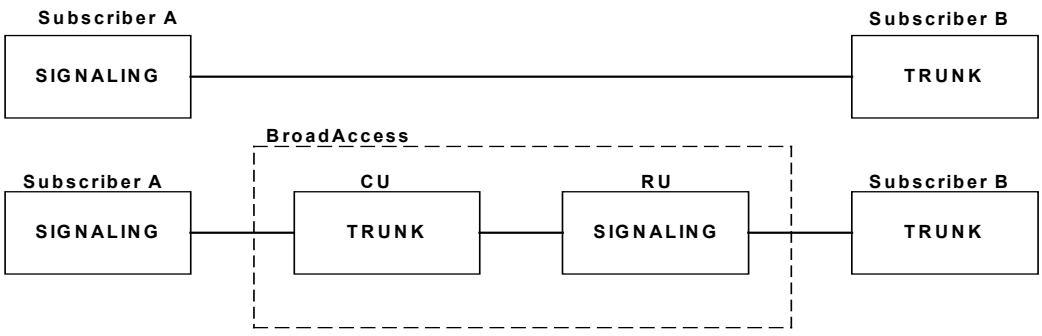


Figure 3. E&M Signaling

Figure 4 and Figure 5 show a general view of 2W and 4W configurations, respectively.

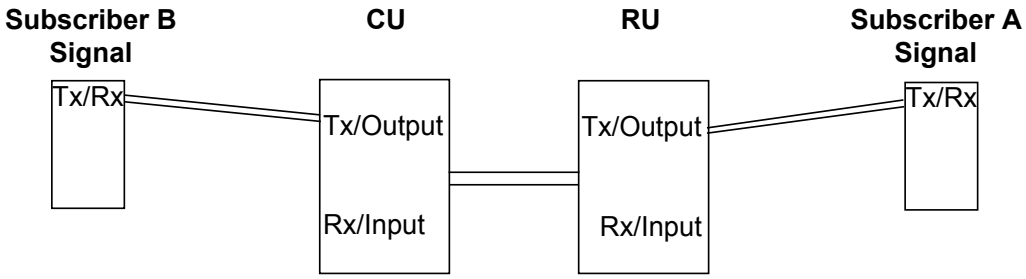


Figure 4. 2W Connection Diagram

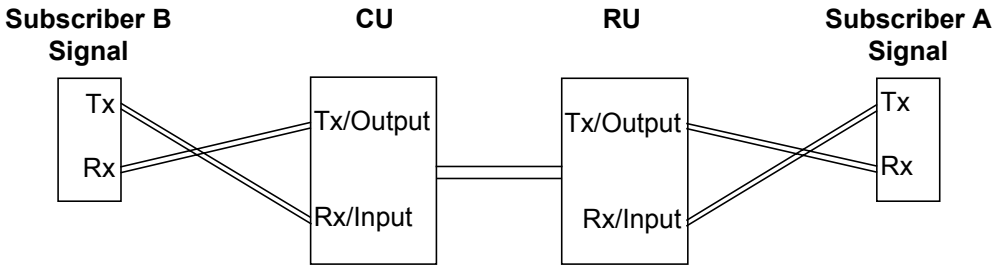
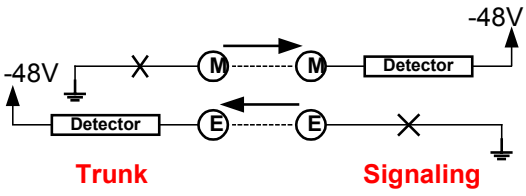


Figure 5. 4W Connection Diagram

Type I, Type V and PLR Type I E&M Signaling Connections

The following figures detail signaling connection diagrams for E&M type I, type V and PLR type I.

⚠ **Note:** *Figure 6, Figure 7 and Figure 8 detail the E&M signaling connection for both 2W and 4W configurations. See Figure 4 and Figure 5 for 2W and 4W configuration diagrams.*

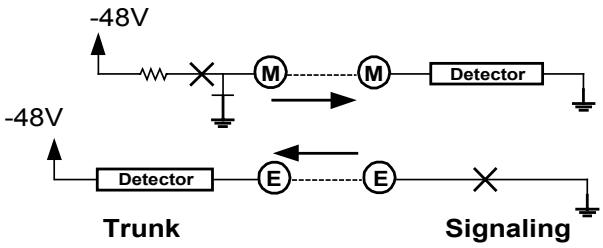


Trunk to Signaling
onhk = Open M
ofhk = Short M to GND

Signaling to Trunk
onhk = Open E
ofhk = Short E to GND

E&M Type V signaling

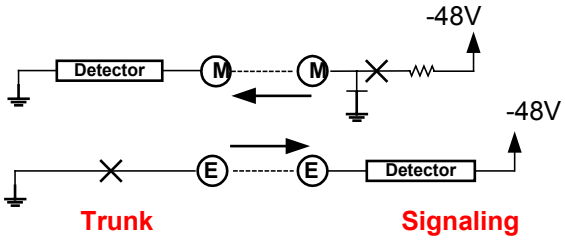
Figure 6. Type V Connection Diagram



Trunk to Signaling
onhk = Short M to GND
ofhk = Short M to -48V

Signaling to Trunk
onhk = Open E
ofhk = Short E to GND

Figure 7. Type I Connection Diagram



Trunk to Signaling
onhk = Open E
ofhk = Short E to GND

Signaling to Trunk
onhk = Short M to GND
ofhk = Short M to -48V

E&M PLR Type I signaling

Figure 8. PLR Type I Connection Diagram

Table 4 describes the 4WE&M type I, type V and PLR type I connections for CAGE40-M and CAGE40-MIN cages.

Table 4. Type I, Type V and PLR Type I 4WE&M Connections

Type	Subscriber Line # Per Card									
	1		2		3		4		5	
	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx
Channel #	1	2	3	4	5	6	7	8	9	10
Open Cable	WH, BL	WH, OR	WH, GR	WH, BR	WH, GY	WH, BL/WH	WH, BL/OR	WH, BL/GR	WH, BL/BR	WH, BL/GY
	M	E	M	E	M	E	M	E	M	E
Channel #	16 L	16R	15L	15R	14L	14R	13L	13R	12L	12R
Open Cable	WH (Tip)	GR/BR (Ring)	WH (Tip)	GR/WH (Ring)	WH (Tip)	OR/GY (Ring)	WH (Tip)	OR/BR (Ring)	WH, (Tip)	OR/GR (Ring)

WH=White, YE=Yellow, BL=Blue, OR=Orange, GR=Green, BR=Brown, GY=Gray, L=Left, R=Right
TRM = Distribution Block Terminal, CONN = Connector on System Backplane, N/A = Not Applicable

Table 5 describes the 2WE&M type I, type V and PLR type I connections for CAGE40-M and CAGE40-MIN cages.

Table 5. Type I, Type V and PLR Type I 2WE&M Connections

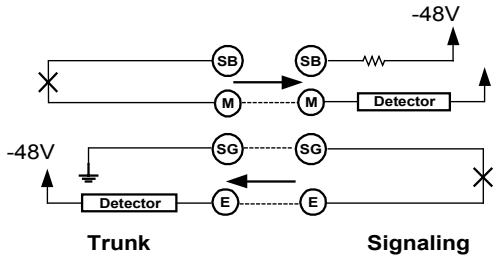
Type	Subscriber Line # Per Card									
	1		2		3		4		5	
	Tx/Rx		Tx/Rx		Tx/Rx		Tx/Rx		Tx/Rx	
Channel #	1		3		5		7		9	
Open Cable	WH, BL		WH, GR		WH, GY		WH, BL/OR		WH, BL/BR	
	M	E	M	E	M	E	M	E	M	E
Channel #	16 L	16R	15L	15R	14L	14R	13L	13R	12L	12R
Open Cable	WH (Tip)	GR/BR (Ring)	WH (Tip)	GR/WH (Ring)	WH (Tip)	OR/GY (Ring)	WH (Tip)	OR/BR (Ring)	WH, (Tip)	OR/GR (Ring)

WH=White, YE=Yellow, BL=Blue, OR=Orange, GR=Green, BR=Brown, GY=Gray, L=Left, R=Right
TRM = Distribution Block Terminal, CONN = Connector on System Backplane, N/A = Not Applicable

Type II, III and IV E&M Signaling Connections

The following figures detail signaling connection diagrams for E&M type II, type III, type IV and PLR type II.

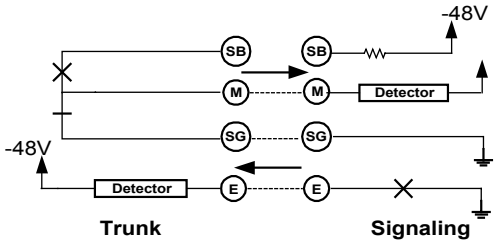
⚠ **Note:** *Figure 9, Figure 10, Figure 11 and Figure 12 detail the E&M signaling for both 2 wire and 4 wire configurations. See Figure 4 and Figure 5 for 2W and 4W configuration diagrams.*



Trunk to Signaling
onhk = Open M to SB
ofhk = Short M to SB

Signaling to Trunk
onhk = Open E to SG
ofhk = Short E to SG

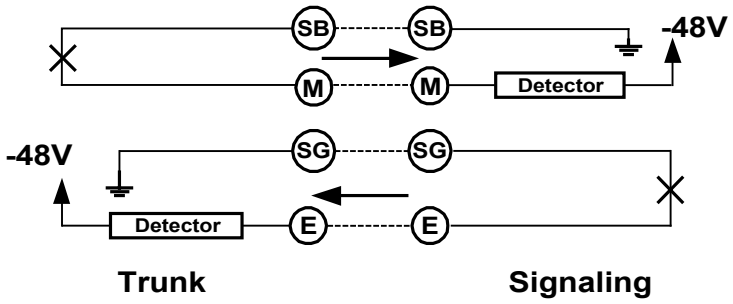
Figure 9. Type II Connection Diagram



Trunk to Signaling
onhk = Short M to SG
Open M to SB
ofhk = Short M to SB
Open M to SG

Signaling to Trunk
onhk = Open E
ofhk = Short E to GND

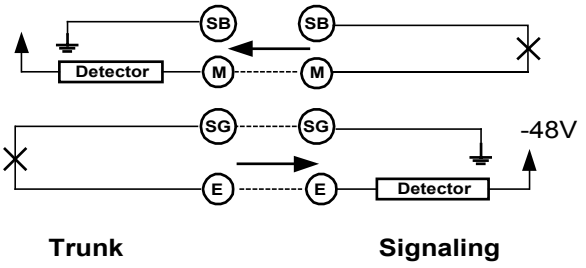
Figure 10. Type III Connection Diagram



Trunk to Signaling
onhk = Open M to SB
ofhk = Short M to SB

Signaling to Trunk
onhk = Open E to SG
ofhk = Short E to SG

Figure 11. Type IV Connection Diagram



Trunk to Signaling
onhk = Open M to SB
ofhk = Short M to SB

Signaling to Trunk
onhk = Open E to SG
ofhk = Short E to SG

Figure 12. PLR Type II Connection Diagram

Table 6 describes the 4WE&M type II, type III, type IV and PLR type II connections for CAGE40-M and CAGE40-MIN cages.

Table 6. Type II, Type III, Type IV and PLR Type II 4WE&M

Type	Subscriber Line # Per Card							
	1		2		3		4	
	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx
Channel #	1	2	3	4	5	6	7	8
Open Cable	WH, BL	WH, OR	WH, GR	WH, BR	WH, GY	WH, BL/WH	WH, BL/OR	WH, BL/GR
	M	E	M	E	M	E	M	E
Channel #	16 L	16R	15L	15R	14L	14R	13L	13R
Open Cable	WH (Tip)	GR/BR (Ring)	WH (Tip)	GR/WH (Ring)	WH (Tip)	OR/GY (Ring)	WH (Tip)	OR/BR (Ring)
	SB	SG	SB	SG	SB	SG	SB	SG
Channel #	12L	12R	111	11R	10L	10R	9L	9R
Open Cable	WH (Tip)	OR/GR (Ring)	WH (Tip)	OR/WH (Ring)	WH (Tip)	BL/GY (Ring)	WH (Tip)	BL/BR (Ring)

WH=White, YE=Yellow, BL=Blue, OR=Orange, GR=Green, BR=Brown, GY=Gray, L=Left, R=Right
TRM = Distribution Block Terminal, CONN = Connector on System Backplane, N/A = Not Applicable

Table 7 describes the 2WE&M type II, type III, type V and PLR type II connections for CAGE40-M and CAGE40-MIN cages.

Table 7. Type II, Type III, Type IV and PLR Type II 2WE&M Connections

Type	Subscriber Line # Per Card							
	1		2		3		4	
	Tx/Rx		Tx/Rx		Tx/Rx		Tx/Rx	
Channel #	1		3		5		7	
Open Cable	WH, BL		WH, GR		WH, GY		WH, BL/OR	
	M	E	M	E	M	E	M	E
Channel #	16 L	16R	15L	15R	14L	14R	13L	13R
Open Cable	WH	GR/BR	WH	GR/WH	WH	OR/GY	WH	OR/BR
	(Tip)	(Ring)	(Tip)	(Ring)	(Tip)	(Ring)	(Tip)	(Ring)
	SB	SG	SB	SG	SB	SG	SB	SG
Channel #	12L	12R	11L	11R	10L	10R	9R	9L
Open Cable	WH (Tip)	OR/GR (Ring)	WH (Tip)	OR/WH (Ring)	WH (Tip)	BL/GY (Ring)	WH (Tip)	BL/BR (Ring)

WH=White, YE=Yellow, BL=Blue, OR=Orange, GR=Green, BR=Brown, GY=Gray, L=Left, R=Right
TRM = Distribution Block Terminal, CONN = Connector on System Backplane, N/A = Not Applicable