

1. Purpose

This document provides installation instructions for each XCel-4e STR. Installation instructions are also included on the inside of the lid of the STR units. This document is provided with each STR shipped to customers and is also available separately. In addition, an up to date copy is included as an attachment to the *XCel System Practice* with each XCel COT Shelf shipped. CTDI recommends that one copy of the complete *System Practice* be kept in each Central Office that is equipped with XCel Systems.

2. Products

This Installation Note is relevant for the following CTDI products:

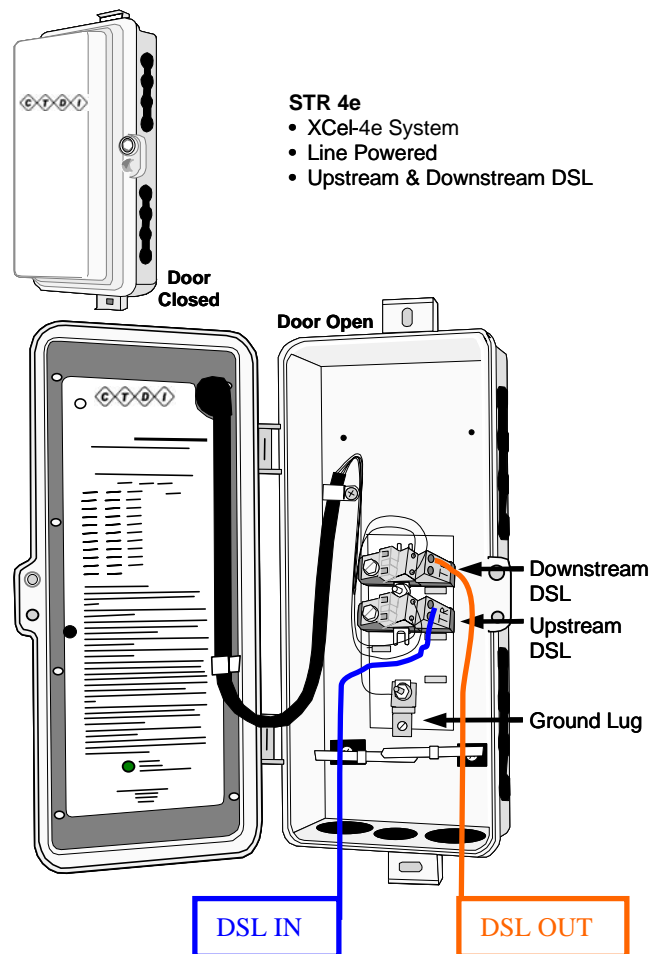
System / Product Name	Part #	Description
XCel-4e Systems		
STR 4e	990485	Straight Through Repeater for XCel-4e

3. Overview

a XCel-4e loop signal. The STR is packaged in a standard CTDI gray plastic housing with flanges for pole or wall mounting. The STR has upstream and downstream DSL connections with protectors in the base of the housing. The installation instructions on the lid specify the TIP and RING pair and GROUND connections. There are no provisioning switches in the STR 4e.

4. Summary: Engineering & Installation Steps

1. Verify that the loop has been designed in accordance with the CTDI Config8r™
2. Mount the STR housing to a pole, or other designated mounting location.
3. Ground the STR unit properly to an adequate local ground.
4. Using separate cable, connect the downstream DSL pair to the unit.
5. Using separate cable, connect the upstream DSL pair to the unit.
6. After the loop is completely built, apply power by seating the CTU in the Central Office.
7. The STR will automatically link in the standard XCel linking process.



ATTENTION!

When wiring the repeater it is important to use

two separate cables to prevent cross talk! Do not use pairs in the same sheath. (See diagram above)

Installation Note 010268

XCel-4e Straight Through Repeater (STR-4e)



5. Unit Grounding

Verify that the ground established is in accordance with standard industry and local practices with respect to the OSP element, the ground wire clamp and the earth ground rod.

CAUTION: XCel Outside Plant (OSP) elements require proper grounding in accordance with standard telco and local practices for reliable extended operation and lightning protection. Units not properly grounded will be subject to damage from lightning and power surges and are not covered by warranty. Do NOT use the cable sheath ground to ground OSP devices. The ground must be established to a properly installed ground rod.

6. Identification of Upstream and Downstream ADSL Cable Pairs

The installation instructions on the lid of the unit specify the color-coded DSL and Ring/Tip wiring.

Table 6-1: STR 4e Wire Assignments

Wire Assignment	Tip	Ring
4e DSL Out	Yellow / Blue	Blue / Yellow
4e DSL In	Yellow / Orange	Orange / Yellow
Ground	Black	

NOTE: The XCel-4e system is not sensitive to ADSL pair Tip and Ring polarity.

If you do not know which cable pair goes toward the central office (Upstream) you can:

- Request that the system be powered up in the office and look for the presence of the DSL line powering voltage on the upstream pair, **or**
- Request the upstream pair be shorted and use your Volt/Ohm meter to detect the correct pair.

7. System Turn-up and Link-up

The installation instructions and linking sequence are on the inside lid of the enclosure. Table 7-1 details the LED display indications that will be present during the linking process for the XCel-4e ADSL loop. The two Green LEDs in the faceplate of the STR unit have three standard states for installation and troubleshooting.

- 7.1** Once all OSP units are in place and properly connected, including the STR, the linking process is initiated when the CTU-4e is seated in the XCel Shelf.
- 7.2** The CTU-4e powers the loop and begins the signal linking with each unit in the loop beginning with the first unit downstream from the CTU, and ending with an RTU-4e at the end of the loop.
- 7.3** At an STR, the Downstream Link LED will not begin to BLINK until the Upstream Link LED is steady, indicating that the STR has linked with the CTU and any additional upstream STRs.
- 7.4** If the loop and span are within the specified distance limitations and are free of load coils the linkup will typically occur in three to five minutes. Allow ten minutes for linking before beginning troubleshooting.
- 7.5** Section 5.6 *System Turn-Up and Verification* of the XCel System Practice, details the XCel-4e loop turn-up sequence for an XCel-4e System with a STR and a RTU.

Table 7-1: STR 4e LED Indications

LED	QTY	COLOR(S)	State	Description
Upstream Link	1	Green	Off	No link
			Blinking Green	Establishing DSL link - upstream
			Solid Green	DSL link established - upstream
			Winking once every 5 seconds	System Communication Heartbeat
			Blinking Green synchronized with Downstream Link LED	POST (Power On Self Test) - Failed
			Blinking Green alternating with Downstream Link LED	STR is booting up or being downloaded with new firmware
Downstream Link	1	Green	Off	No link
			Blinking Green	Establishing DSL link - downstream
			Solid Green	DSL link established - downstream
			Winking once every 5 seconds	System Communication Heartbeat
			Blinking Green synchronized with Upstream Link LED	POST (Power On Self Test) - Failed
			Blinking Green alternating with Upstream Link LED	STR is booting up or being downloaded with new firmware

8. Loop Link-up Trouble Conditions

8.1 For complete troubleshooting guidelines, see the XCel System Practice, Section 7, *Troubleshooting*.

8.2 If the OSP units appear to power up, but no DSL link can be established, one of the following conditions likely exists: (these states do not prevent line powering, but do block the DSL signal).

- There is a load coil in the loop. Checking for an unknown load coil is recommended.
- DSL loop limits have been exceeded, **or**
- DSL in/out connections are reversed at a repeater.

8.3 If the linking cycle is not successful, the CTU-4e will initiate a re-linking attempt/sequence:

- Upstream or Downstream LED's will BLINK (on/off, 1 per sec.) for approximately 5 minutes.
- The STR will then be powered down (LEDs OFF) for 60 seconds.
- The linking process will begin again after the 60-second power down period and continue to repeat until the in/out reversal is cleared.

9. XCel-4e System Reach & Planning

NOTE: The XCel System Practice, Section 3.1.6, XCel-4e System Planning, addresses various options and sensitivities for deploying the XCel-4e System, including spectrum management with standard ADSL lines in the same cable binder group as the XCel-4e.

NOTE: The Configur8r software tool is the **ONLY** planning tool that can properly support the power and performance engineering of a XCel-4e System. Do **NOT** engineer a XCel-4e loop without the proper Configur8r. XCel-4e System loops should not be installed without using the Configur8r software tool.

Installation Note 010268

XCel-4e Straight Through Repeater (STR-4e)



9.1 **Span Reach.** See Table 9-1 for XCel-4e Span Reach Planning. Make certain the Configur8r Software tool used for planning loops that include use of STR-4e units is current.

SPAN Reach

Span Reach is the distance between two active XCel-4e loop units on a particular cable type/grade. Examples:

- CTU 4e – RTU 4e (with no repeater), **or**
- CTU 4e – STR 4e, **or**
- STR 4e – RTU 4e

Table 9-1: XCel-4e Span Reach

XCel-4e MAX Span Reach for 8 Mbps (Feet)				
	19 AWG	22 AWG	24 AWG	26 AWG
PIC UG	17,000 ft	14,300 ft	11,350 ft	9,000 ft
XCel-4e MAX Span Reach for 1.5 Mbps (Feet)				
	19 AWG	22 AWG	24 AWG	26 AWG
PIC UG	28,200 ft	23,841 ft	19,016 ft	14,000 ft
XCel-4e MAX Span Reach for 8 Mbps (Meters)				
	19 AWG	22 AWG	24 AWG	26 AWG
PIC UG	5,181 m	4358 m	3459 m	2743 m
XCel-4e MAX Span Reach for 1.5 Mbps (Meters)				
	19 AWG	22 AWG	24 AWG	26 AWG
PIC UG	8594 m	7220 m	5731 m	4267 m

10. Replacement Protector Options

Note: Protectors normally shipped with new products are identified with arrows.



CTDI reserves the right to use any listed gel-fill protector in new product shipments.

This STR 4e is shipped with gel-filled protectors installed to provide lightning protection for the unit on each CTDI ADSL line. The protectors for the transport pair lines require higher breakdown voltage than protectors for the POTS or ADSL lines. *Tables 10-1* and *10-2* specify APPROVED and NON-APPROVED replacement protectors for the XCel-4e ADSL lines.

Table 10-1
APPROVED Station-Type
Replacement Transport Line Protectors

MFG	MODEL Number	Part #	TYPE	
TII	AD-03-W-FS	AD-03W-FS	Gas Tube	Gel
Corning	SPD 127-XV-S	SPD 127-XV-S	Hybrid Gas Tube & Solid State	Gel
Corning	SPD 356-XY	SPD 356-XY	Hybrid Gas Tube & Solid State	Non-Gel 356-Style
Surge-Tek	ST 356 IDC-350V-D	ST 356 IDC-350V-D	Gas Tube	Gel



Table 10-2
NON-APPROVED Station-Type
Transport Line Protectors

MFG	Model Number	Part #	TYPE	
TYCO	GSSP-0302-00-WOQB-A	225177-000	Gas Tube	Gel
TYCO	GSSP-0202-00-WOQB-A	455509-000	Gas Tube	Gel
TYCO	GSSP-0101-00-WOQB-A	301767-000	Gas Tube	Gel
TII	AD-M2-W-FS	AD-M2-W-FS	Gas Tube	Gel
TII	AD-02-W-FS	AD-02-W-FS	Gas Tube	Gel
TII	AD-01-W-FS	AD-01-W-FS	Gas Tube	Gel
TII	356M2	356M2	Gas Tube	Non-Gel, 356-Style
Corning	SPD 356-SW	SPD 356-SW	Gas Tube	Non-Gel, 356-Style

CONTACTING CTDI
1373 Enterprise Drive
West Chester, PA 19380
Tech Support
1-800-297-2424 or 1-510-979-2200
Fax 510-226-8785

Websites
www.ctdi.com
www.godigital.com