

1. Purpose

This document provides installation instructions for each XCel-4a 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. GoDigital recommends that one copy of the complete *System Practice* be kept in each Central Office that is equipped with XCel Systems.

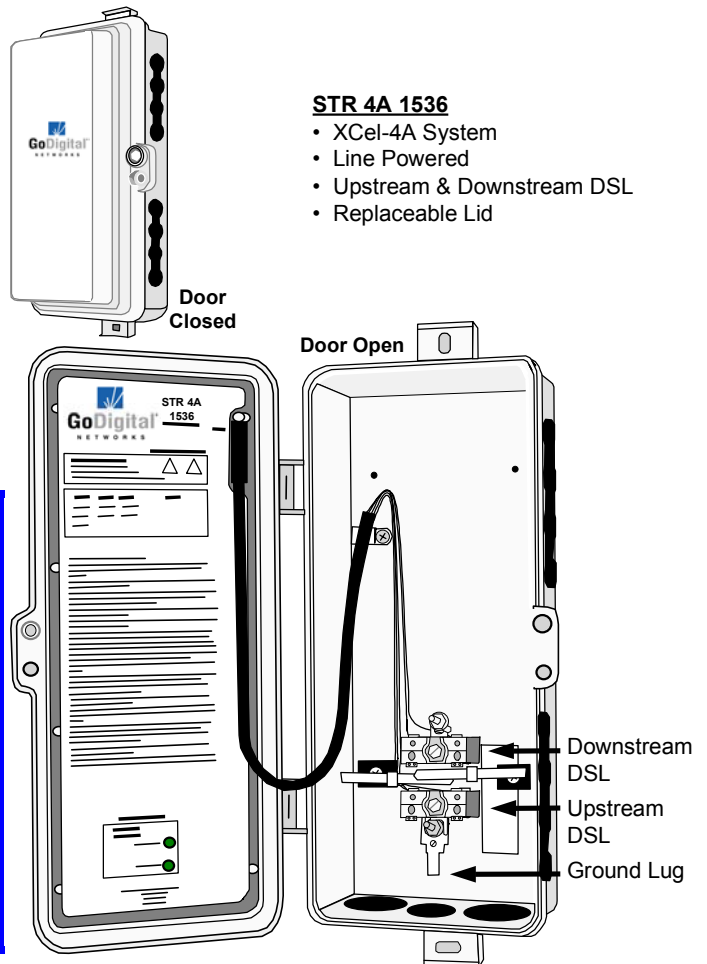
2. Products

This Installation Note is relevant for the following GoDigital products:

System / Product Name	Part #	Description
XCel-4a Systems		
STR 4A 1536	990262	Straight Through Repeater for XCel-4a

3. Overview

A Straight through Repeater (STR) is used to repeat a XCel-4a loop signal. The STR is packaged in a standard GoDigital 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 4A. For ease of maintenance, the lid of the STR 4A can be quickly removed with the use of the cable disconnect on the lid.



4. Summary: Engineering & Installation Steps

1. Verify that the loop has been designed in accordance with the GoDigital Configu8r™
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. Connect the downstream DSL pair to the unit.
5. 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.

5. XCel 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 a cable sheath ground to ground OSP devices. The ground must be established to a properly installed ground rod.

Installation Note

XCel-4a Straight Through Repeater (STR 4A 1536)



6. Identification of Upstream and Downstream SHDSL Cable Pairs

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

Table 6-1: STR 4A Wire Assignments

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

NOTE: The XCel-4a system is not sensitive to DSL 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. XCel-4a 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-4a SHDSL 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 4A is seated in the XCel Shelf.
- 7.2 The CTU 4A 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 4A at the end of the loop.
- 7.3 At an STR, the RT Downstream LED will not begin to BLINK, until the CT 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-4a loop turn-up sequence for an XCel-4a System with multiple STRs and an RTU.

Table 7-1: STR 4A LED Indications

LED	QTY	COLOR(S)	State	Description
CT Upstream Link	1	Green	Off	No link
			Blinking Green	Establishing SHDSL link - upstream
			Solid Green	SHDSL link established - upstream
			Blinking Green synchronized with RT Down stream	POST (Power On Self Test) - Failed
			Blinking Green alternating with RT Down stream	STR is being downloaded with new firmware
RT Downstream Link	1	Green	Off	No link
			Blinking Green	Establishing SHDSL link - downstream
			Solid Green	SHDSL link established - downstream
			Blinking Green synchronized with CT Up stream	POST (Power On Self Test) - Failed
			Blinking Green alternating with CT Upstream	STR is being downloaded with new firmware

8. XCel 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 powering 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 230 kHz DSL signal).
- There is a loading coil in the loop. A check for an unknown load coil is recommended.
 - DSL loop limits have been exceeded, or
 - DSL connection is reversed at a repeater.
- 8.3 If the linking cycle is not successful, the XCel-4a CTU will initiate a re-linking attempt/sequence:
- CT Upstream and RT Downstream LEDs 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 reversal is cleared.

9. XCel-4a System Reach & Planning

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

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

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

SPAN Reach

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

- CTU 4A – RTU 4A (with no repeater), or
- CTU 4A – STR 4A
- STR 4A – RTU 4A, etc

Table 9-1: XCel-4a Span Reach

XCel-4a SPAN Reach (feet and meters)				
Feet	19 AWG	22 AWG	24 AWG	26 AWG
PIC UG	24,850 ft	17,580 ft	13,650 ft	10,170 ft
PIC AER	23,710 ft	16,660 ft	12,760 ft	9,380 ft
Pulp UG	21,240 ft	15,520 ft	12,320 ft	9,800 ft
Pulp AER	20,250 ft	14,750 ft	11,550 ft	9,080 ft
Meters	19 AWG	22 AWG	24 AWG	26 AWG
PIC UG	7,570 m	5,350 m	4,160 m	3,090 m
PIC AER	7,220 m	5,070 m	3,880 m	2,850 m
Pulp UG	6,470 m	4,730 m	3,750 m	2,980 m
Pulp AER	6,170 m	4,490 m	3,520 m	2,760 m
41.5 dB @ 230 kHz				

Installation Note

XCel-4a Straight Through Repeater (STR 4A 1536)



10. Replacement Protector Options

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

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

This STR 4A is shipped with gel-filled protectors installed to provide lightning protection for the unit on each GoDigital SHDSL line. The protectors for the SHDSL 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-4a SHDSL lines.

Table 10-1
APPROVED SHDSL Line Protectors

Approved XCel OSP DSL Line Protectors:		
MFG	MODEL or PART #	Type
TII	AD-03-W-FS	Gel
Corning (Siecor) *	SPD 127-XV-S *	Gel
Other approved DSL replacement protectors		
Corning (Siecor)	356-XY	356

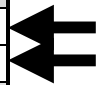


Table 10-2
NON-APPROVED SHDSL Line Protectors

NON-Approved XCel OSP DSL Line Protectors:		
MFG	MODEL or PART #	Type
TYCO *	GSSP-0302-00-WOOB-A *	Gel
TYCO	GSSP-0202-00-WOOB-A	Gel
TYCO	GSSP-0101-00-WOOB-A	Gel
TII	AD-M2-W-FS	Gel
TII	AD-02-W-FS	Gel
TII	AD-01-W-FS	Gel
TII	356M2	356
Corning (Siecor) *	356-SW *	356

CONTACTING GODIGITAL

GoDigital Networks Corporation
41652 Boscell Road
Fremont, CA 94538

1-800-297-2424
1-510-979-2200
Fax 510-226-8785

Email

GoDigital Sales: sales@godigital.com
Technical Assistance: product.support@godigital.com