Installation Note

RTU 8P, Remote Terminal Unit Gel-Filled Protectors

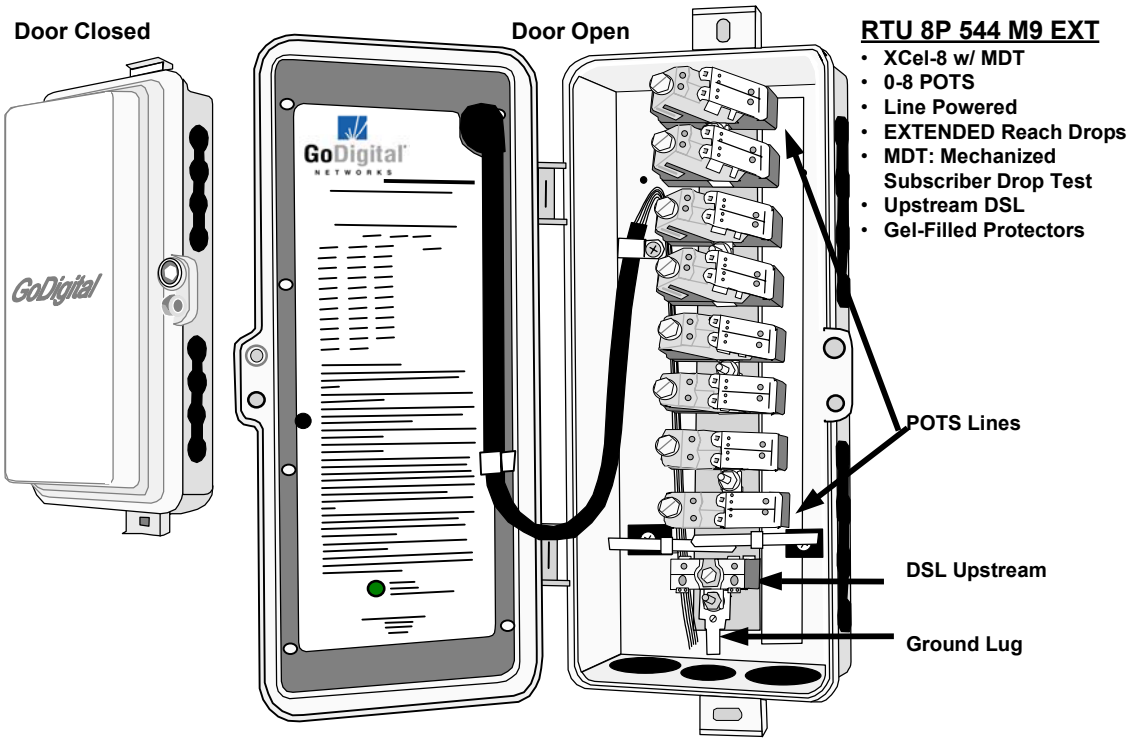
1. Purpose

This document provides installation instructions for line powered XCel/GDSL-8 Remote Terminal Units (RTUs) with gel-filled protectors. Installation instructions are also included on the inside of the lid of the RTU unit. This document is provided with each RTU package shipped to customers and is also available separately. In addition, an up to date copy will be included as an attachment to the ***System Practice*** with each XCel/GDSL COT Shelf shipped. GoDigital recommends that one copy of the complete ***System Practice*** be kept in each Central Office that is equipped with XCel/GDSL Systems.

2. Products

This Installation Note is relevant for the following GoDigital products:

System / Product Name	Part #	Description
XCel-8 Systems with Mechanized Drop Test (MDT) and Gel-Filled Protectors		
RTU 8P 544 M9 EXT	990128-A	XCel-8 RTU, 0 - 8 POTS Lines, w/ MDT & EXT Reach Drops, Gel-Filled



3. Overview

RTU units are packaged in standard GoDigital gray plastic housing with flanges for pole or wall mounting. The RTU units have an upstream DSL and service line drops. All pairs have separate protectors in the base and are labeled. The installation instructions on the lid specify the TIP and RING pair and GROUND connections. An RTU 8P has eight standard POTS drops. There are no provisioning switches in the RTU. All eight lines can be available at the unit. However, if an ADR is upstream, the previously selected lines (at the ADR) will not be available at the RTU.

NOTE The Configur8r software tool is the ONLY planning tool that can properly support the power and performance engineering of a XCel/GDSL-8 System. Do NOT engineer an RTU8 EXT loop without the proper Configur8r. If the Configur8r being used to engineer a XCel/GDSL-8 loop with an RTU 8P EXT does not specifically reference the RTU 8P EXT as an option for terminating the last element in the loop, then customers should call GoDigital and get a current Configur8r. XCel/GDSL-8 System loops should not be installed without using the Configur8r software tool.

4. Summary of Engineering and Installation Steps

1. **Verify that the loop has been designed in accordance with the GoDigital Configur8r™ System Design tool, with the proper loop span reach.**
2. **If EXTended drop units are used, verify that the number of LONG and SHORT drops were correctly designated in the Configur8r, and the correct OSP unit is being used.**
3. **Mount the RTU housing to a pole, or other designated mounting location.**
4. **Ground the RTU unit properly to an adequate local ground.**
5. **Connect the upstream DSL pair to the RTU unit.**
6. **Connect the drops to the drop protector terminals. Zero to eight (0 to 8) drops as appropriate.**
7. **If ADRs are upstream in the loop, reconfirm that no conflict exists in the ADR channel selection for the specifically desired drops at the RTU.**
8. **After the loop is completely built, apply power by seating the CTU in the Central Office.**
9. **The RTU will automatically link in the standard XCel/GDSL linking process.**

5. 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 for DSL lines in new product shipments.

This RTU is shipped with gel-filled protectors installed to provide lightning protection for the unit on each POTS line and each DSL line. The protectors for the DSL lines require high breakdown voltage and as a result, DSL protectors are a different protector than the POTS protector in a new unit shipped. Tables 1 and 2 specify APPROVED and NON-APPROVED replacement protectors for the DSL and POTS lines.

Table 1: SERVICE Line Protectors

Approved XCel OSP POTS Line Protectors:		
MFG	**MODEL or PART #**	**Type**
TYCO *	GSSP-0302-00-WOOB-A *	Gel
Other approved ADSL replacement protectors		
TYCO	GSSP-0202-00-WOOB-A	Gel
TYCO	GSSP-0101-00-WOOB-A	Gel
TII	AD-03-W-FS	Gel
TII	AD-M2-W-FS	Gel
TII	AD-02-W-FS	Gel
TII	AD-01-W-FS	Gel
Corning (Siecor)	SPD 127-XV-S	Gel
TII	356M2	356
Corning (Siecor)	356-XY	356
Corning (Siecor)	356-SW	356

Table 2 : DSL Line Protectors

Approved XCel OSP DSL Line Protectors, Gel Filled:		
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

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
Corning (Siecor)	356-SW	356
TII	356M2	356

6. XCel-8/GDSL-8 System Reach & Planning

6.1 EXT SHORT and EXT LONG Drop Reach with RTU 8P EXT

Signal loss is the limiting factor with the RTU 8P EXT units for "LONG" drops. These limitations were not applicable with the standard RTU8 because the resistance and drop power were the limiting factor. See Tables 3 and 4 for RTU 8P EXT unit SHORT and LONG Drop Reach.

6.2 STANDARD Drop Reach with RTU 8P See Table 5 for STANDARD Drop Reach with the RTU 8P.

6.3 **The XCel/GDSL Configur8r System Design** software tool automatically makes these adjustments and will assume that all drops are at maximum range unless noted.

6.4 Make certain the Configur8r Software tool used for planning loops that include use of RTU 8P EXT units is current. New releases of the Configur8r software for the XCel/GDSL-8 system include the option of using an RTU 8P EXT at the end of a loop and the ability to select the number of long drops that needed.

7. RTU 8P EXT Drop Reach Limitations

7.1 Basic EXTended Reach Drop Limits

Table 3 specifies the Maximum Recommended EXTended reach limits for LONG and SHORT in accordance with signal loss, per TR-057. Maximum resistance values are estimates and actual resistance and reach will vary based on condition of cables. 4.0 dB of the allowable signal loss is reserved for the XCel/GDSL transport and equipment and the remaining 4.0 dB are available for the drop.

EXTENDED Reach Drops 8.0 dB Signal Loss		EXT Reach SHORT	EXT Reach LONG*
26 Ga.	Drop Reach	2,910 ft	6,800 max*
	Calculated Res.	270 ohms	630 ohms
24 Ga.	Drop Reach	4,630 ft	9,140 max*
	Calculated Res.	270 ohms	532 ohms
22 Ga.	Drop Reach	7,370 ft	11,610 max*
	Calculated Res.	270 ohms	425 ohms
19 Ga.	Drop Reach	14,780 ft	16,720 max*
	Calculated Res.	270 ohms	305 ohms
* EXTended Reach LONG is always limited by signal loss not by drop resistance			

Table 3

7.2 Alternate EXTended Reach Drop Limits

Table 4 provides alternative EXTended reach limits for LONG and SHORT drops based on some local Telco practices. This Standard supports drops with signal loss up to 8.5 dB, adding reach to very difficult subscriber locations. 4.0 dB of the allowable signal loss is reserved for the XCel/GDSL transport and equipment and the remaining 4.5 dB are available for the drop.

EXTENDED Reach Drops 8.5 dB Signal Loss		EXT Reach SHORT	EXT Reach LONG*
26 Ga.	Drop Reach	2,910 ft	6,800 ft
	Calculated Res.	270 ohms	*630 Ohms*
24 Ga.	Drop Reach	4,630 ft	10,137 ft
	Calculated Res.	270 ohms	*599 Ohms*
22 Ga.	Drop Reach	7,370 ft	12,857 ft
	Calculated Res.	270 ohms	*478 Ohms*
19 Ga.	Drop Reach	14,780 ft	18,592 ft
	Calculated Res.	270 ohms	*344 Ohms*
* EXTended Reach LONG is always limited by signal loss not by drop resistance			

Table 4

8. RTU 8P STANDARD Drop Reach

Table 5 provides the standard reach drops. This Standard supports drops with resistance of 560 ohms. This includes 430 ohms for the CPE leaving 130 ohms for the drop pair.

STANDARD Reach Drops (130 Ohms)		
26 Ga.	Drop Reach	1,400 ft
	Calculated Res.	130 Ohms
24 Ga.	Drop Reach	2,230 ft
	Calculated Res.	130 Ohms
22 Ga.	Drop Reach	3,550 ft
	Calculated Res.	130 Ohms
19 Ga.	Drop Reach	7,110 ft
	Calculated Res.	130 Ohms
* Standard Reach is always limited by drop power available and resistance (560 ohms total = 430 ohms for CPT + 130 Ohms for drop).		

Table 5

9. Installation

The installation instructions are on the inside lid of the enclosure

9.1 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/GDSL 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.

CAUTION: Do NOT use a cable sheath ground to ground OSP devices. The ground must be established to a properly installed ground rod.

10. Turn-up and Link-up

Once the Upstream DSL pair is properly connected and the loop is powered by the XCel/GDSL-8 linecard or CTU, the linking process will start. If the loop or span is within the specified distance limitations and is free of load coils the linkup will be completed typically within three minutes. Please allow five minutes for completion before beginning troubleshooting.

10.1 An Upstream or a Downstream element (STR or ADR) exists and is connected in the loop. **LED Indication:** The LED will blink on and off (1 per second) continuously. There will be no power down cycle. Note: This is the same LED indication that will be seen if the loop distance is too great or if a load coil exists.

11. LED indications

11.1 Green LED - blinking several times per second, constant rate

The unit is receiving power from an upstream element and is attempting to link.

11.2 Green LED - solid on

The unit is linked with an upstream element.

11.3 Green LED – fast blink, 4 times per second

A customer served from this location is off-hook.

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