

## Series 5 Total Reach® DDS-DP Total Reach All-Rate DDS Dataport Installation and Maintenance

### CONTENTS

1. GENERAL.....	1
2. OPTIONS .....	2
3. INSTALLATION .....	3
4. TESTING .....	4
5. DEPLOYMENT GUIDELINES .....	5
6. MAINTENANCE .....	6
7. WARRANTY AND CUSTOMER SERVICE...	6

### FIGURES

Figure 1. Series 5 Total Reach DDS-DP .....	1
Figure 2. Total Reach DDS Circuit Diagram .....	2
Figure 3. Option Switch .....	2
Figure 4. OCU Loopback at the DDS-DP .....	4
Figure 5. DDS-DP Bidirectional Loopback .....	4
Figure 6. DDS-DP Response to DDS-R ACE LBK Button .....	5

### TABLES

Table 1. Option Settings .....	2
Table 2. Compliance Codes .....	3
Table 3. LED Indication .....	4
Table 4. Cable Type and Temperature Loss Data@13.3 kHz .....	5
Table 5. DDS Insertion Loss Measurements .....	5

## 1. GENERAL

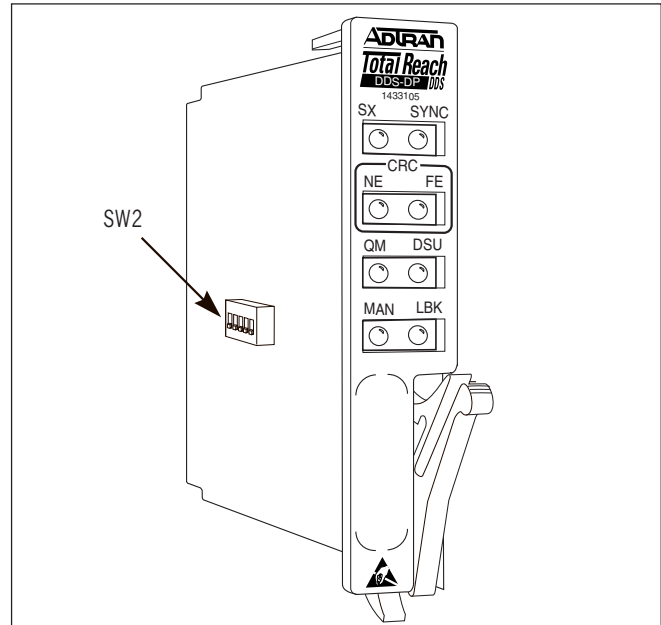
This practice provides installation and maintenance procedures for the ADTRAN Series 5 Total Reach DDS-DP All-Rate DDS Dataport. **Figure 1** is an illustration of the ADTRAN Series 5 Total Reach DDS-DP, P/N 1433105L1.

### Revision History

This document has been revised to incorporate the response to the loopback pushbutton function of the DDS-R ACE remote unit, and add reference to false latching loopback prevention at 64 kbps.

### Description

The ADTRAN Series 5 Total Reach DDS-DP is a functional replacement for the SLC® Series 5 OCU DP, CLEI 5SCU48, delivering data at rates up to 64 kbps using a single copper pair. Used in combination with the DDS-R termination unit, the Series 5



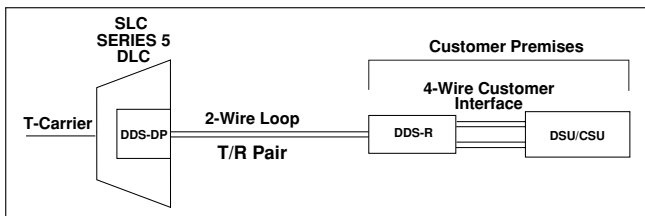
**Figure 1. Series 5 Total Reach DDS-DP**

DDS-DP can accommodate extended loop lengths, eliminating the need for DDS repeaters. The Series 5 DDS-DP span powers the DDS-R located at the customer premises. The DDS-R converts the 2-wire signal to the traditional 4-wire Alternate Mark Inversion (AMI) signal for presentation to the customer.

The DDS-DP occupies a single channel position in the AT&T® SLC Series 5 or Series 5 compatible channel bank. It provides the interface between a DS0 time slot of the T-carrier data stream and the 2-wire metallic loop extending to the customer premises. The Series 5 Total Reach DDS-DP will interoperate over the carrier system with another DDS-DP, OCU DP, DS0 DP, 1/0 DCS, or switch and can be located in an end office, hub office, intermediate office, or Digital Loop Carrier (**Figure 2**). The 2-wire loop is connected using the odd pair Tip (pin 31) and Ring (pin 32) on the Series 5 backplane.

### NOTE

The Series 5 Total Reach DDS-DP must be used with an appropriate DDS-R unit.



**Figure 2. Total Reach DDS Circuit Diagram**

**Features**

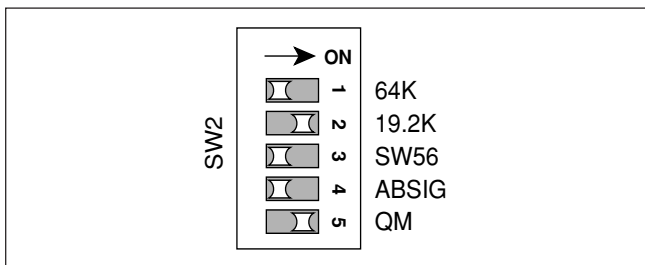
- 2-wire deployment
- Repeaterless operation
- Bridged tap tolerant
- Span power for remote DDS-R termination unit
- Utilization in SLC Series 5 channel bank
- Loop Quality Monitor and A/B signaling options
- Bidirectional OCU loopback capability
- False latching loopback prevention at 64 kbps
- Response to remote end initiated loopback

**2. OPTIONS**

The Series 5 DDS-DP is provisioned through the SLC Series 5 system and circuit board DIP switch SW2. This arrangement provides feature options not available through the SLC Series 5 channel bank intelligent system. Use the SLC Series 5 Craft Interface Unit (CIU) to provision intelligent channel bank features supported by the Series 5 Total Reach DDS-DP. See **Figure 3** and **Table 1** for option description and provisioning.

**NOTE**

Select OCU DP, CLEI 5SCU48, when provisioning via the CIU.



**Figure 3. Option Switch**

**Error Correction**

When Error Correction is enabled, the DDS-DP provides an error detection and correction capability that maintains data integrity across the carrier facility.

**Table 1. Option Settings**

Software Provisioning via Series 5 BCU	
Function	Description
Rate	Select 2.4, 4.8, 9.6, or 56 kbps
Error Correction (EC)	If rate is 2.4 through 19.2, select: MVEC or NONE (SCEC not available at these rates on this card.) If rate is 56 through 64 kbps, select: SCEC or NONE (MVEC is N/A at these rates.)
Zero Code (ZC)	Yes or No
Secondary Channel (SC)	Yes or No
Hardware Provisioning via DIP Switch SW2	
64K	SW2-1 (64K) ON selects 64 kbps Clear Channel
19.2K <sup>1</sup>	SW2-2 (19.2K) ON selects 19.2 loop rate
Switched 56	SW2-3 (SW56) ON enables Switched 56 OFF disables Switched 56
A/B Signaling	SW2-4 (ABSIG) ON the unit determines the state of the A and B signaling bits using signals present on the channel bank backplane. OFF the unit derives signaling from the incoming data stream.
Quality Monitor	SW2-5 (QM) ON enables QM OFF disables QM
<sup>1</sup> For 19.2 kbps Error Correction select 19.2 on SW2 and enable 9.6 MVEC with SLC Series 5 CIU.	

For subrate and 19.2 kbps rates, error correction and data transmission is accomplished over a single DS0 time slot using a Majority Vote Error Correction (MVEC) algorithm. For error correction at these rates, MVEC must be selected in the BCU via the SLC Series 5 CIU.

For rates of 56 and 64 kbps, error correction requires one additional DS0 time slot for the error correcting parity byte. The DDS-DP only allows SCEC, the parity byte error correction scheme, at 56 and 64 kbps. When error correction is desired for 19.2 kbps service, provision 9.6 kbps and MVEC via the CIU and select 19.2K on SW2.

## Zero Code

When Zero Code is enabled, the DDS-DP allows DS0 bytes of all zeros to enter the T-carrier data stream. On Alternate Mark Inversion (AMI) facilities, this function should be disabled. B8ZS carrier facilities that accommodate 64 kbps clear channel operation do not require the zero code to be suppressed, therefore zero code is automatically enabled when the 64 kbps rate has been selected.

## Rate Selection

When 64K (SW2-1) is ON, the DDS-DP operates at 64 kbps clear channel.

When 19.2K (SW2-2) is ON, the DDS-DP operates at 19.2 kbps.

When SW56 (SW2-3) is ON, the DDS-DP enables Switched-56 operation.

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### NOTE

Only one rate should be selected. Service rates of 64 kbps, 19.2 kbps, and Switched-56 are not supported by the SLC Series 5 BCU. These operating modes must be provisioned by enabling switches on SW2. A manual rate setting overrides BCU rate settings. The DDS-DP does not support 38.4 kbps.

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## A/B Signaling

When A/B Signaling (SW2-4) is OFF, the unit derives signaling from the incoming data stream. When A/B Signaling is ON, the unit determines the state of the A and B signaling bits using signals present on the backplane of the channel bank. This method assumes that proper signaling has been maintained throughout network tandems and cross-connect systems.

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### NOTE

A/B Signaling option is only applicable when SW56 is selected; otherwise it is a “don’t care.”

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## Quality Monitor

When Quality Monitor (SW2-5) is ON, the DDS-DP monitors the incoming 2-wire loop and 4-wire customer interface data for errors. If excessive errors are detected, the unit blocks the customer’s data transmission and sends Abnormal Station Code to the network. Customer data transmission is automatically restored when the trouble condition is cleared.

## Latching Loopbacks

Latching loopbacks are always enabled on the SLC series 5 Total Reach DDS-DP.

## False Latching Loopbacks Immunity

ADTRAN’s protected Loopback family of channel unites includes an algorithm compatible with SARTS, Hekimian, TPI, and other test systems that virtually eliminates false latching loopbacks. Immunity is automatically enabled at 64 kbps.

## 3. INSTALLATION



After unpacking the unit, inspect it for damage. If damage is discovered, file a claim with the carrier, then contact ADTRAN. Refer to *Warranty and Customer Service*.

## Compliance

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### CAUTION

This product is intended for installation in a restricted access location in a Type B or E enclosure only.

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Max input current @ max load = 165 mA @ -48 VDC.

Max output current @ max load = 41 mA @ -140 VDC. See **Table 2** for Compliance Codes.

**Table 2. Compliance Codes**

Code	Input	Output
Power Code (PC)	F	C
Telecommunication Code (TC)	–	X
Installation Code (IC)	A	–

## Tip/Ring Pair

The DDS-DP plugs directly into a SLC Series 5 channel bank. No special wiring is required. The 2-wire loop uses the T/R (Tip and Ring) of the odd pair, pins 31 and 32 of the SLC Series 5 backplane. The DDS-R is not polarity sensitive, therefore the unit will operate even when the T/R pair is reversed.

## Span Power

Span powering is accomplished using -130 VDC measured from Tip to Ring. Voltage measured from Tip to GND should be -130 VDC or less depending on voltmeter impedance. Voltage from Ring to GND should indicate approximately 0 V.

## Synchronization and LED Indication

The DDS-DP and DDS-R typically require 30 to 90 seconds to achieve synchronization. Once synchronized, the SYNC LOSS indicator LED will turn OFF. If synchronization cannot be achieved, check the T/R pair for open or short circuit conditions or load coils. See **Table 3** for LED indications.

**Table 3. LED Indication**

Indicator	Description
SX	ON indicates no sealing current present on the local loop; check for continuity and proper DDS termination at remote end (DDS-R).
SYNC	ON indicates that there is no sync between the DDS-DP and the remote DDS-R; check for continuity, load coils, and other abnormal line conditions.
NE CRC	ON indicates that there are errors on the incoming data stream; check for the abnormal line conditions closer to the DDS-DP (NEAR END).
FE CRC	ON indicates that there are errors occurring towards the remote DDS-R; check for the abnormal line conditions closer to the DDS-R (FAR END).
QM	ON indicates that the Quality Monitor Disconnect has occurred.
DSU	Yellow indicates the absence of the customer DSU/CSU as determined by the DDS-R. Disconnected DSU/CSU, invalid framing pattern, or no RX signal from the DSU/CSU triggers a yellow LED.  Green indicates presence of the customer DSU/CSU as determined by the DDS-R.
MAN	ON indicates rate has been manually selected using SW1.
LBK	ON indicates OCU or CSU loopback activation, or if a DS6 session is active. Flashing if DDS-R has activated DDS-DP loopback towards customer.

## 4. TESTING

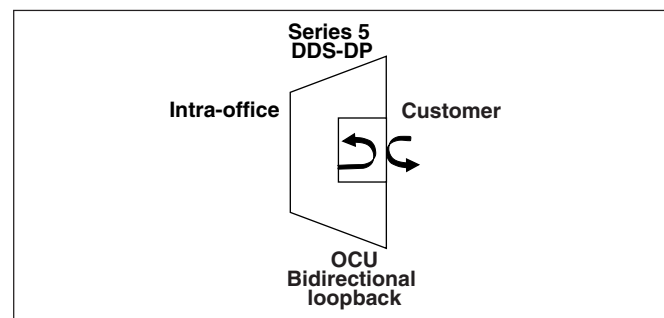
Testing for the DDS-DP is accomplished using the same test procedures for 4-wire OCU and OCU DP units.

### NOTE

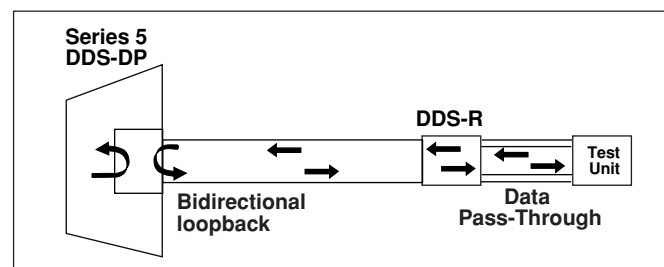
If 64 kbps is selected, the unit will only respond to latching loopback sequences. Alternating sequences are not valid at this rate.

## DDS DP Bidirectional Loopback Support

The DDS DP will execute a bidirectional loopback when performing an OCU loopback at the DDS-DP as shown in **Figure 4**. During a bidirectional loopback the DDS-R enables test data to pass through the 4-wire interface to the customer premises. This allows a standard portable test set at the customer premises to verify the integrity of both the 4-wire and 2-wire loops by transmitting a test pattern to the DDS DP and examining the returning data for synchronization and errors. A bidirectional loopback and pass through is shown in **Figure 5**. During a bidirectional loopback initiated at the DDS DP the DDS-R LBK LED will flash. Refer to remote unit documentation for LED descriptions.



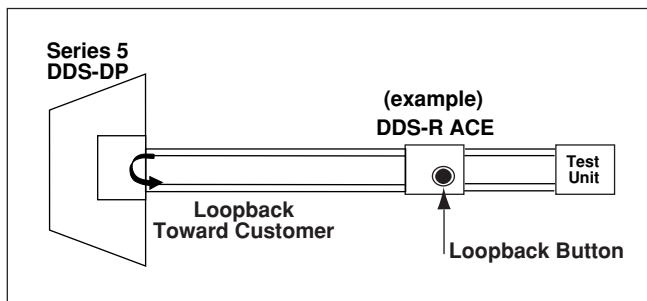
**Figure 4. OCU Loopback at the DDS-DP**



**Figure 5. DDS-DP Bidirectional Loopback**

## Loopback Pushbutton (Remote Unit)

The DDS-DP initiates a loopback in response to a remote unit with a loopback pushbutton feature, **Figure 6**. This allows a field technician or craft personnel to conduct loop testing from the remote end independent of the test center or CO.



**Figure 6. DDS-DP Response to DDS-R ACE Loopback Button**

## 5. DEPLOYMENT GUIDELINES

The DDS-DP and DDS-R use technology designed to eliminate the need for repeaters and concerns over impairments caused by typical noise and bridged tap. Listed below are the loop design guidelines for Total Reach DDS. See **Table 4** and **Table 5** for more information.

- All loops must be nonloaded.
- Actual Measured Loss (AML) should not exceed 50 dB at 13.3 kHz (135  $\Omega$  termination), the Nyquist frequency of Total Reach DDS.

### NOTE

The 50 dB AML limit includes 6 dB of signal margin to account for potential near-end cross talk (NEXT) from other digital services that may be provisioned in the same binder group.

- Loop length should not exceed 50 kft.
- Bridged tap length should not exceed 12 kft.
- Background noise level should not exceed 34 dBm.
- Impulse noise should not exceed -40 dBm, (+50 dBm).

### NOTE

Measure noise with 50 kbit weighting characteristic approximating a filter with a passband of 40 Hz to 30 kHz. Background noise level or impulse noise level is referenced from 56/64 kbps data rate in TR62310.

**Table 5. DDS Insertion Loss Measurements**

Total Reach DDS 13.3 kHz compared to 28 kHz for traditional DDS service		
Line Configuration	@ 13.3 kHz	@ 28 kHz
27 kft 26 AWG	50.12 dB	65.35 dB
36.25 kft 24 AWG	50.00 dB	62.50 dB
50 kft 22 AWG	50.24 dB	59.33 dB

**Table 4. Cable Type and Temperature Loss Data @ 13.3 kHz**

Plastic Cable	dB Loss/kft	Paper Cable	dB Loss/kft
19 Gauge PIC (0° F)	0.5302	19 Gauge PULP (0° F)	0.5616
19 Gauge PIC (70° F)	0.6083	19 Gauge PULP (70° F)	0.6415
19 Gauge PIC (120° F)	0.6610	19 Gauge PULP (120° F)	0.6955
22 Gauge PIC (0° F)	0.912	22 Gauge PULP (0° F)	0.9454
22 Gauge PIC (70° F)	1.0258	22 Gauge PULP (70° F)	1.0606
22 Gauge PIC (120° F)	1.1015	22 Gauge PULP (120° F)	1.1370
24 Gauge PIC (0° F)	1.2571	24 Gauge PULP (0° F)	1.2900
24 Gauge PIC (70° F)	1.3982	24 Gauge PULP (70° F)	1.4324
24 Gauge PIC (120° F)	1.4917	24 Gauge PULP (120° F)	1.5268
26 Gauge PIC (0° F)	1.6751	26 Gauge PULP (0° F)	1.6823
26 Gauge PIC (70° F)	1.8469	26 Gauge PULP (70° F)	1.8568
26 Gauge PIC (120° F)	1.9608	26 Gauge PULP (120° F)	1.9718

## **6. MAINTENANCE**

The DDS-DP does not require maintenance for normal operation.

## **7. WARRANTY AND CUSTOMER SERVICE**

ADTRAN will replace or repair this product within ten (10) years from the date of shipment if it does not meet its published specifications or fails while in service. Refer to ADTRAN *U.S. and Canada Carrier Networks Equipment Warranty*, document 60000087-10.

Contact Customer and Product Service (CAPS) prior to returning equipment to ADTRAN.

For service, CAPS requests, or further information, contact one of the following numbers:

### **ADTRAN Sales**

Pricing/Availability  
(800) 827-0807

### **ADTRAN Technical Support**

Pre-sales Applications/Post-sales Technical Assistance  
(800) 726-8663

Standard hours: Monday-Friday, 7 a.m. - 7 p.m. CST  
Emergency hours: 7 days/week, 24 hours/day

### **ADTRAN Repair/CAPS**

Return for Repair/Upgrade  
(256) 963-8722

### **Repair and Return Address**

ADTRAN, Inc.  
CAPS Department  
901 Explorer Boulevard  
Huntsville, Alabama 35806-2807