WorldDSL G.SHDSL Line Units
Quick Installation Guide

Overview

The WD92xGN and WD92xGL are rate selectable one/two-pair high-speed Digital Subscriber Line (SHDSL) units that conform to ITU-T recommendation G.991.2 for SHDSL (hereafter referred to as "G.SHDSL").

Rate selectable G.SHDSL offers an extended transmission range and spectral compatibility with leading DSL technologies. Transmission ranges vary according to the data rate selected, wire size, and noise environment. With 2-pair G.SHDSL, data rates are available up to 4.608 Mbps. With 1-pair G.SHDSL, data rates are available up to 2.304 Mbps (see Specifications below for details).

IMPORTANT

Use of this product in a manner other than defined in this installation guide may cause damage to equipment or injury to personnel.

Falls der Gebrauch von diesem Produkt nicht gemaess der Definition im Installations Handbuch eingehalten wird, besteht die Gefahr, dass Schaden am Geraet oder sogar Koerperverletzungen entstehen koennten.

Note: Throughout this guide, WD92xGNs and WD92xGLs can represent both STU-C's and STU-Rs.

- STU-C stands for the G.SHDSL Terminating Unit for the CO and STU-R stands for G.SHDSL Terminating Unit for the Remote.
- For WD92xGN or WD92xGL, the "x" represents the different versions (such as, 920, 921, 924).
- For line powering, WD92xGL is capable of serving as both an STU-C or an STU-R with the proper jumper setting. However, the firmware will allow only STU-C to feed the line power. If a WD92xGL is configured as an STU-R, the firmware will automatically disable the line power output.

WD92xGN and WD92xGL Line Units

The default configuration for WD92xGN is STU-R. The default configuration for WD92xGL is STU-C. All units can operate in both one-pair, two-pair, and 1+1 application mode.

WD92xGNs and WD92xGLs accept the data terminal equipment (DTE) payload at their G.703, Nx64k port, and Ethernet and transport the payload to the remote unit at the selected DSL data rate. Traffic can be sent simultaneously on all three interfaces using WD924Gx-1B-01.

The exchange office DTE allocates the payload to the G.703,, Nx64k, and Ethernet ports in time-slot increments of 64 kbps each. The number of time slots allocated by the DTE is determined by the user-selected data rate.

WD92xGN is powered by a -36V to -72V local power supply or by line power. The WD92xGL can provide line power.

A WD92xGL has the same form factor as the WD92xGN and may be configured as either an STU-C or STU-R. The difference is that the WD92xGL can generate line power or wetting current. The WD92xGN units are capable of terminating line power and local power.

Features

- Provides framing for fractional G.703/704 E1 interface in HDB3 coding with CRC-4 detection and generation – also provides unframed for G.703
- Provides serial dataport (V.35, V.36, RS-530, or X.21) with an Nx64 kbps rate selectable interface
- Provides an auto MDI/MDI-X 10/100 Mbps Ethernet interface
- Two-wire and four-wire G.SHDSL transmission over various ETSI test loops up to 4608 kbps
- G.991.2 G.SHDSL performance statistics report
- Front panel LEDs for status indication and alarm monitoring
- Loopback operation via craft terminal or front panel
- Built-in BER tester
- RS-232 Management support
- Generates/Accepts line power
- Provides wetting current load
- G.703 Timeslot 16 remapping (see "Note" below)
- G.SHDSL and application interfaces alarm report
- G.821 and G.826 E1 interface performance statistics report
- Software configurable G.703 impedance (75 or 120 Ω)

Note: When signaling is enabled with a configuration of less than 15 DS0's, timeslot 16 will be remapped for more efficient use of bandwidth. Refer to the *WorldDSL G.SHDSL Line Units User Manual* for details (LTPE-UM-3160).

Specifications

Table 1. General Specifications

Category	Item	Value
Power Requirements Note: The power consumptions are measured at -48 V power input point.	DC Input Voltage	-36 V to -130 V for local or line power input
	Line Powering Output	120 V @ 100 mA, Max.
		160 V @ 84 mA, Max.
	Consumption	6.3 W Max. for WD924GL-XX-01
		8.8 W Max. for WD924GL-1B-01
		15.8 W Max. for WD924GL-XX-01 (One remote powering @ 20Kft 26 AWG wires WD924GN-XX-01)
		20.8 W Max. for WD92XGL-1B-01 (One remote powering @ 20Kft 26 AWG wires WD924GN-1B-01)
Environmental	Operating	Temperature: 0° C to + 50° C
		Humidity: Up to 95% non-condensing
	Storage	Temperature: -20° C to + 70° C
		Humidity: 5% to 95% non-condensing
Dimensions	Height (H)	6.875 in. (17.5 cm)
	Width (W)	0.91 in. (2.3 cm)
	Depth (D)	8.75 in. (22.2 cm)
Regulatory Approvals	Safety	EN 60950
	EMC/EMI	EN 300 386-2

Step 1: Line Powering Settings

ATTENTION

Wear an antistatic wrist strap connected to earth ground when installing these units. Avoid contact with board-mounted components.

WD92xGL is equipped with line powering (U23) and WD92xGN is not. WD92xGL can generate/terminate line power by setting jumpers P17 and P18. However, the WD92xGN only terminates line power. In Figure 1, the jumper setup section shows there are three possible line powering selections determined by jumpers P17 and P18. "Local Power" means the unit is powered locally from DC -48V input. "Generating Line Power" means the unit is locally powered and using the equipped Line Power unit (U23) to generate high voltage (200V) and feed it into DSL lines in order to power the remote unit (STU-R). "Terminate Line Power" means the unit takes power from DSL lines to power up the unit. Generate and Terminate works as a pair.

WARNING

For jumpers P5, P17, and P19 (shown in Figure 1) please make sure the jumper is set horizontally. If you place the jumper vertically, it will damage the card.

Horizontal: (Correct) Vertical: (Wrong)

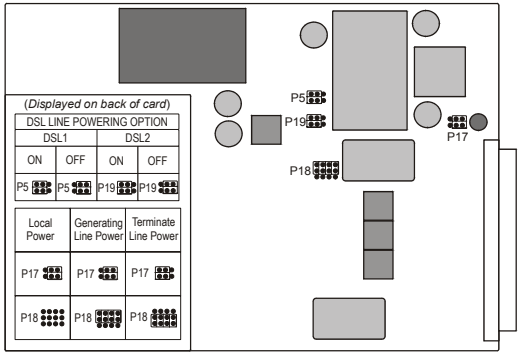

Figure 1. Location of Line Power Jumpers P5, P17, P18, and P19

Table 2. WorldDSL Multi-Range Line Power Settings Reference

Distance to STU-R Line Voltage at STU-C	G.SHDSL Type Single Pair (2-wire) (0.4 mm)	G.SHDSL Type 2 Pair (4-wire) (0.4 mm)
120 V	0 km ~ 1.5 km	0 km ~ 3 km
160 V	0 km ~ 3 km	0 km ~ 6 km

Notes:
1. This table is based on the WD924 power consumption and the power limited condition. The distance is not for DSL rate limited.
2. The higher level distance is sensitive to power consumption; therefore, it will be different for the various WorldDSL models.
3. If you connect DSL pair shorter than the minimum distance, then the protection circuit will be activiated to shut down the power.

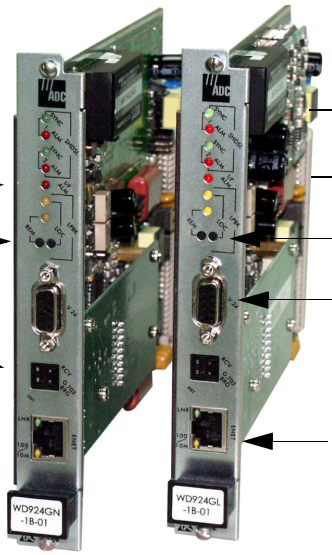

Figure 2. G.SHDSL Front Panels

Table 3. Front Panel LED Functions

LED/Function	Mode		Description
SHDSL SYNC Displays synchronization status for the G.SHDSL loop.		Steady green	G.SHDSL loop is ready to transmit and receive data.
		Slow flashing (1)	G.SHDSL loop acquisition is in progress. SYNC LED flashes 0.5 seconds on, then 0.5 seconds off.
		Slow Flashing (2)	If the system is in 1+1 mode, the SYNC LED of standby flashes 3 seconds on, then 0.5 seconds off to indicate the system is available for protecting the working loop.
SHDSL ALM Displays alarm status for the G.SHDSL loop.		Steady red	• Margin is below set threshold (MAL alarm). • Loop attenuation is above set threshold (LAL alarm). • Errored seconds count is above set threshold (ESAL alarm). • Loss of sync word (LOSW alarm).
		Pulsing red	Pulses for every ES on the span.
		Off	Normal transmit or receive data is in progress.

Table 3: Front Panel LED Functions (continued)

LED/ Function	Mode		Description
I/F ALM Displays alarm status for the G.703 port, Nx64k port.		Steady red	Loss of signal (LOS) alarm. Loss of data port clock (LDC) alarm due to loss of TT clock (Nx64k timing).
		Blinking red	• Loss of external clock (LEC) alarm when using EXT timing. • Loss of frame alignment (LFA) alarm. • Remote alarm indication signal (RAI) alarm. • Received alarm indication signal (AIS) alarm.
		Pulsing red	Pulses for every ES on E1 interface.
		Off	No interface alarm.
LOC and REM LPBK LEDs [a] Displays the local (LOC) and (REM) loopback status	**LOC**	**REM**	
	Off	Off	No loopbacks are active.
	Steady yellow	Off	Local DSL analog loopback is active.
	Off	Steady yellow	Remote loopback is active.
	Blinking yellow	Off	Local interface loopback is active.
	Blinking yellow	Blinking yellow	A loopback away from the local equipment is active.
LNK LED Ethernet connection. Provides LAN transmit/ receive status activity.		Steady green	LAN link is up.
		Blinking green	Active LAN connection has transmit or receive activity.
		Off	LAN link is down.
10/100 Mbps LED		Green	100 Mbps
10 Mbps or 100 Mbps		Off	10 Mbps

a. The LOC and REM loopback LEDs are read in unison.

Step 1: Installation

The STU-C-configured unit holds the configuration settings for both itself and the remote STU-R-configured unit. As the two units synchronize, the STU-C will configure the STU-R.

Step	Action
1	Align the WD92xGN and WD92xGL with the card slot guides.
2	Slide the card into the guides until it touches the backplane connector. Push the unit into the connector.
3	Finger-tighten the two screws on the card front panel to secure the unit in place.
4	Power up the SHDSL unit. If using the WD92xGL as an STU-C, set the Unit Role to STU-C.
5	Confirm the following: • The red ALM LED is on and the green SYNC LED flashes once per second as the units self-configure and establish synchronization. • After a short time, the red ALM LED is off, and the SYNC LED is a steady green. The unit is now ready for configuration using the screens displayed on a maintenance terminal. Other LED functions are described in Table 3 on the previous page.

Step 2: System Configuration

After establishing communication with the remote unit, the SHDSL system can be configured through a maintenance terminal connected to the STU-C console port. The STU-C and STU-R interfaces can be configured from the STU-C console port.

Step	Action
1	Press the **SPACEBAR** several times to display the maintenance terminal Logon Screen (Figure 3), then press **ENTER** to display the console screen menu bar.
2	To change the default setting of any system parameter, press **C** to access the console screen Config menu (Figure 4). See Table 4 for the recommended order of system configuration. Details are provided in the *WorldDSL G.SHDSL Line Units User Manual*, LTPE-UM-3160. **Note:** Copies of the WorldDSL G.SHDSL User Manual and this publication can be downloaded from the ADC website at www.adc.com. To order a hard copy, contact your sales representative.

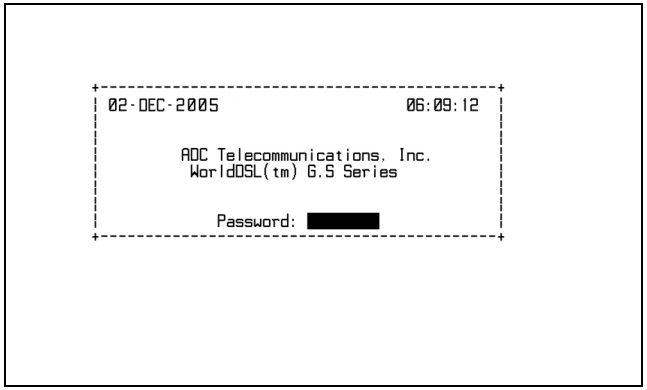

Figure 3. Logon Screen

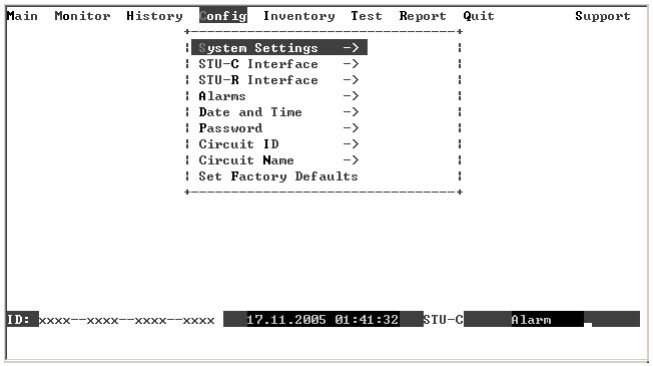

Figure 4. Console Screen Config Menu

Table 4. Config Menu Options and Order of System Configuration

Use this Option	To:
Date and Time	Set the system date and time.
Password	Set or change the system password.
Circuit ID	Assign a circuit ID.
Circuit Name	Assign a circuit name.
System Settings	Select and configure system-wide operating parameters.
STU-C and STU-R Interface	Select and configure STU-C/STU-R-specific operating parameters.
Alarms	Enable or disable alarms and select alarm severity.

Step 4: Loopback/BER Testing

Initiate loopback testing from the console screen Test menu (Figure 5) or use the front-panel local (LOC) and remote (REM) loopback (LPBK) buttons. The Test menu is also used for conducting BER tests.

Press **ENTER** to activate the selected loopback and/or BER test. The Test menu provides a graphical representation of active loopbacks and BER tests.

Details are provided in the *WorldDSL G.SHDSL Line Units User Manual*, LTPE-UM-3160.

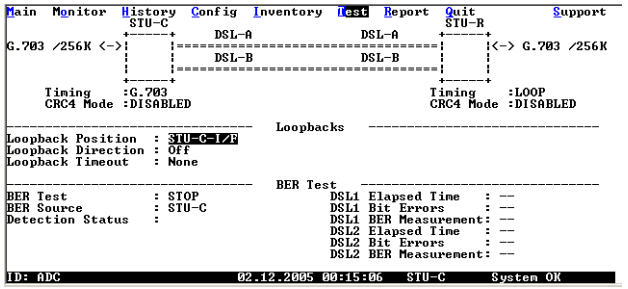

Figure 5. Test Menu

How to Obtain ADC Documentation

Copies of this and other, associated WorldDSL publications can be downloaded from the ADC website at www.adc.com. To order a hard copy, please contact your sales representative.

FCC Class A Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Limited Warranty

Product warranty is determined by your service agreement. Refer to the ADC Warranty/Software Handbook for additional information, or contact your sales representative or Customer Service for details.

Modifications

Any changes or modifications made to this device that are not expressly approved by ADC Telecommunications, Inc. voids the user's warranty. All wiring external to the products should follow the provisions of the current edition of the National Electrical Code.

Standards Compliance

This equipment has been tested and verified to comply with the applicable sections of the following safety standards:

- GR 63-CORE - Network Equipment-Building System (NEBS) Requirements
- GR 1089-CORE - Electromagnetic Compatibility and Electrical Safety
- Binational standard, UL-60950/CSA C22.2 No. 60950-00: Safety of Information Technology Equipment.

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Technical Support

Technical assistance is available 24 hours a day, 7 days a week by contacting the ADC Technical Assistance Center (TAC) at:

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Knowledge Base:	www.adc.com/Knowledge_Base/index.jsp
Web:	www.adc.com

WorldDSL G.SHDSL

Quick Installation Guide

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Revision History

Rev	Date	Revisions
01	9/30/2004	Initial release.
02	3/15/2005	Added information on WorldDSL Timeslot 16 remapping; rebranded with new ADC template.
03	1/25/2006	Feature Update.
04	4/20/2006	Misc. Technical Updates.

Rate Selectable G.SHDSL
WD92xGN Units

WD921GN-XX-01 List 1
WD924GN-XX-01 List 1
WD920GN-1B-01 List 1
WD921GN-1B-01 List 1
WD924GN-1B-01 List 1

Rate Selectable G.SHDSL
WD92xGL Units

WD921GL-XX-01 List 1
WD924GL-XX-01 List 1
WD920GL-1B-01 List 1
WD921GL-1B-01 List 1
WD924GL-1B-01 List 1