ZipWirePlus Family G.shdsl/HDSL1/HDSL2/IDSL/SDSL Transceiver and Framer

M28945/M28946/M28947/M28950
Version 5.3
Release Notes

Date : 01/28/05

This document contains information on a product under development. The parametric information contains target parameters that are subject to change.

Table of Contents

1 Introduction

This document describes the changes found in the ZipWirePlus Version 5.3 software release. The changes are based on the Version 5.0 software released on Sep 09, 2003. This document provides an overview of the changes.

Please note that the ZipWirePlus Family of devices consists of the following products

- M28945 - *ZipWirePlus™ G.shdsl Transceiver with Embedded Microprocessor*
- M28946 - *ZipWirePlus™ G.shdsl Transceiver with Dual-Bearer Technology*
- M28947 - *Advanced ZipWirePlus™ G.shdsl Transceiver with T1/E1 Framer*
- M28950 - *ZipWire$^{VPG™}$ Advanced Voice-PairGain Transceiver with Embedded Microprocessor*

The Table 1-1 summarizes the salient features of the ZipWirePlus family of devices.

Table 1-1- Feature Summary for ZipWirePlus Devices

	M28945	M28946	M28947	M28950
Description	ZipWirePlus™ G.shdsl Transceiver with Embedded Microprocessor	ZipWirePlus™ G.shdsl Transceiver with Dual-Bearer Technology	Advanced ZipWirePlus™ G.shdsl Transceiver with E1 Framer	ZipWire$^{VPG™}$ Advanced Voice-PairGain Transceiver with Embedded Microprocessor
Standards Supported	G.shdsl.bis, HDSL, IDSL, HDSL2, SDSL	G.shdsl.bis, HDSL, HDSL2, SDSL	G.shdsl.bis, HDSL, IDSL, HDSL2, SDSL	G.shdsl, HDSL, SDSL, IDSL
G.shdsl Repeater	Supported	Supported	Supported	Not Supported
G.shdsl 4-wire Operation	Supported	Supported	Supported	Not Supported
G.shdsl Line Probe	Supported	Supported	Supported	Supported
Dual Bearer Operation	Supported	Supported	Supported	Not Supported
Internal E1 Framer	Not Supported	Not Supported	Supported	Not Supported
Enhanced G.shdsl	Supported	Supported	Supported	Not Supported
Proprietary Lower DSL Rates (using 4 TCPAM)	Supported	Supported	Supported	Supported
Application Interfaces	PCM, Narrowband, UTOPIA L1/L2, DSL auxiliary interface, ATM Serial Interface	PCM, Narrowband, UTOPIA L1/L2, DSL auxiliary interface, ATM Serial Interface	PCM, Narrowband, UTOPIA L1/L2, DSL auxiliary interface, ATM Serial Interface	PCM interface

The 5.3 software release includes firmware images for all the devices in the ZipWirePlus family. Figure 1-1 shows the features included in each of the firmware images.

Figure 1-1 Features Matrix for ZipWirePlus firmware Images

M28945/M28946/M28947/M28950 Feature Matrix

NOTE: (x) means Feature Supported

Product	Standards	Build Type	GSHDSL	REPEATER	LINEPROBE	ESHDSL	HDSL2	SDSL	HDSL1	IDSL NT	E1 FRAMER	NARROWBAND	ATM L1L2	MULTI_PAIR
M28945	G.SHDSL	gshdsl_pcm_atm_repeater_B94x	x	x	x								x	x
	G.SHDSL	gshdsl_pcmmb_B94x	x		x							x		x
	E.SHDSL	eshdsl_pcmmb_B94x	x			x						x		x
	HDSL2	optis					x					x		
	SDSL	2b1q						x						
	SDSL	2b1q_atm						x					x	
	IDSL	**idsl**								x				
M28946	G.SHDSL	gshdsl_pcm_atm_repeater_B94x	x	x	x								x	x
	G.SHDSL	gshdsl_pcmmb_B94x	x		x							x		x
	G.SHDSL	gshdsl_pcmmb_repeater_B94x	x	x	x							x		x
	E.SHDSL	eshdsl_pcmmb_B94x	x			x						x		x
	HDSL2	optis					x					x		
	SDSL	2b1q						x						
	SDSL	2b1q_atm						x					x	
M28947	G.SHDSL	gshdsl_pcm_atm_repeater_B94x	x	x	x								x	x
	G.SHDSL	gshdsl_pcmmb_B94x	x		x							x		x
	G.SHDSL	gshdsl_pcmmb_repeater_B94x	x	x	x							x		x
	G.SHDSL	gshdsl_pcmmb_e1pra_B94x	x								x	x		x
	E.SHDSL	eshdsl_pcmmb_B94x	x			x						x		x
	HDSL2	optis					x					x		
	SDSL	2b1q						x						
	SDSL	2b1q_atm						x					x	
	IDSL	**idsl**								x				
M28950	G.SHDSL	gshdsl_pcm_B950	x		x									
	SDSL	2b1q						x						
	SDSL	2b1q_atm						x					x	
	HDSL1	VoicePairgain						x	x					
	IDSL	**idsl**								x				

Refer to the M28945/M28946/M28947/M28950 Data sheets and ZipWirePlus Programmer Reference Manual for detailed description of the features and API commands.

The following are the document numbers for the ZipWirePlus family of products.

- ZipWirePlus Programmer Reference Manual Document 289xx-SWG-001-B Jan 2005
- M28945 Data sheet Document 28945-DSH-001-C Dec 2004
- M28946 Data sheet Document 28946-DSH-001-C Dec 2004
- M28947 Data sheet Document 28947-DSH-001-C Jan 2005
- M28950 Data sheet Document 28950-DSH-001-C Dec 2004

The document is divided into the following sections:

- Firmware Changes: New Features & Enhancements and Bug Fixes
- API Commands
- Non-Conformances

NOTE – Unless mentioned specifically the feature/bug fix is applicable to all the ZipWirePlus devices.

2 New Features and Enhancements

This section provides a list of new features and enhancements.

2.1 Revised Programmers Reference Manual, Datasheet, App Note

- ZipWirePlus Programmer Reference Manual Document 289xx-SWG-001-B Jan 2005
- M28945 Data sheet Document 28945-DSH-001-C Dec 2004
- M28946 Data sheet Document 28946-DSH-001-C Dec 2004
- M28947 Data sheet Document 28947-DSH-001-C Jan 2005
- M28950 Data sheet Document 28950-DSH-001-C Dec 2004
- M289xx Application Note: ZipwirePlus Interoperability 289xx-APP-004-A Jan 2005

2.2 New Features

2.2.1 G.shdsl

- **Enhanced G.shdsl mode** –(Annex F G.991.2 standard) - Supporting payload data rates (192 Kbps to 5696 kbps) in Fixed Rate
- **ATM 4-wire Mode**
- **Support for ATM OAM Counters**
- **Internal E1 Framer Enhancements** – Support for FAS & MFAS generation when the DSL Link is down. (M28947 only)
- **Unframed PCM 4-wire Mode** – ZipWirePlus devices support this mode for both the configurations
  - ZipWirePlus device the Masters of the Clock
  - ZipWirePlus device Slave to the Application Clock
- **G.shdsl operation at Low DSL rates (64 Kbps & 128 Kbps)** - using proprietary 4 TCPAM coding.
- **G.hs Multi-pair Compliance** – Support for the "4-wire' bit mentioned in the G.994.1 specification
- **i-bit access through the Host Interface** – Support for i-bits = 1,2 through the Host Bus Interface.
- **Optional Lower delay mode for lower G.shdsl Rates** – The ZipWirePlus devices can be programmed to function in this mode by the _DSL_DSP_CONFIG (0x5F) API for G.shdsl data rates below 1.5 Mbps.
- **PCM & Narrowband Support** – The Dual Bearer Mode has been enhanced. The ZipWirePlus Firmware supports upto 72 timeslots of PCM and Narrowband combined. The PCM timeslots can vary from 3 to 69 timeslots with the remainder of the 72 timeslots being Narrowband timeslots. Each combination of PCM & Narrowband timeslots needs a unique Water Level Setting for PCM and Narrowband interface (using _DSL_PCM_WATER_LEVEL (0x2C) and _DSL_NB_WATER_LEVEL (0x2D) APIs). These Water level settings are available upon request.
- **Rate List for Fixed Rate Mode** – The ZipWirePlus firmware now supports the rate list for the fixed rate mode when the "LineProbe or Fixed Rate" field in _DSL_PREACT_RATE_LIST (0x15) API is set to 1. As a result the ZipWirePlus modem will send out a single rate in the CL Message during the G.hs transaction. If the "LineProbe or Fixed Rate" is set to zero then the ZipWirePlus Device will send out all the rates in the CL message.

2.2.2 SDSL

- **Autobaud Support**

- **Configurable SyncWord** – Added a new API _DSL_FR_2B1Q_CONFIG (0x65) which will provide a generic mechanism to set the SyncWord in 2B1Q mode and to set the framer interface to switch between SERIAL_SWAP (default) and SERIAL.
- **Scrambling Disable/Enable** – The ZipWirePlus firmware now supports enabling and disabling of the Scambler/Descrambler on a real time basis using the “Scrambler/ Descrambler Disable “ field in the _DSL_FR_HDSL_CONFIG (0x11) API.

2.2.3 HDSL2 (OPTIS)

None

2.2.4 HDSL1

- **Compliance with ETSI Loop Performance**
- **Loop ID support** – The Loop ID can be programmed using the _DSL_CONFIG_PID (0x2B) API.
- **Configurable LOSW Timer** - When LOSW occurs, ZipWirePlus device waits for LOSWT timer to expire. This parameter adds additional time to the default value(2 seconds) of the LOSWT timer.
- **CRC Error Indicator bit** – Added the CRC Error Indicator bit to the HDSL1 Indicator bits.

2.2.5 IDSL

- **IDSL NT support**
- **IDSL Interoperability** - with AT&T, Motorola and Infineon devices

2.3 DSL_API.H Changes

There are no changes to the dsl_api.h file. However some new APIs have been added and some of them modified. Please refer to Section 4.1 for more details.

3 Bug Fixes

This section describes bug fixes resolved since version 5.0.

3.1 Multi-Pair Mode Support

ZipWirePlus firmware supports Multi-pair mode for PCM (Unframed and Framed) and ATM traffic.

3.2 Lineprobe enabled on Near End ZipWirePlus modem but disabled on Far End ZipWirePlus modem Issue

If CO has enabled line probe but it is disabled on RT side, CO will report framer timeout and restart G.hs. If RT had line probe enabled but it is disabled on CO side, then RT would continuously report LOSW error. This issue has been fixed now.

3.3 Near End CRC Errors and Far end Febe errors are inconsistent when Unsolicited Interrupts are enabled

Host API _DSL_WRITE_EOC(0x64) is stomping on the febe bit value written by the ZipWirePlus firmware. This issue has been addressed in this release.

3.4 G.shdsl Noise Margin Performance

Improvements were made for G.shdsl rates 384 Kbps and below.

3.5 Certain G.shdsl rates fail training

G.shdsl rates of 428 Kbps, 4352 Kbps and 4416 Kbps were failing in G.shdsl Training. This issues has been fixed in this release.

3.6 HDSL1 NMR variation

ZipWirePlus devices in HDSL1 Mode are showing run to run NMR variation. This issue has been addressed.

3.7 Support for Configurable Line Probe NMR

The ZipWirePlus device supports configurable Line Probe through the _DSL_THRESHOLDS (0x43) API. This has been implemented in this ZipWirePlus Firmware Release.

3.8 8 Mbps PCM Interface Support

This fix adds the support for 3 to 32 PCM timeslots in the DSL payload, when the PCM interface is operating at 8Mhz. Transporting more than 32 PCM timeslots in the DSL payload has not been validated.

3.9 HDSL1 interoperability

- Supports training with the RS8973 device.
- Supports communication with the RS8953 device using the 0x72 syncword.

3.10 HDSL2 interoperability

- HDSL2 Interoperability with ADTN CO and ADTN RT at T1 rate
- HDSL2 Interoperability with GSPN CO and GSPN RT at T1 rate.

3.11 G.shdsl Interoperability

- G.shdsl Interoperability with MTLK CO and RT.
- ZipWirePlus CO and RT G.shdsl Interoperability with MTLK Regenerator.
- G.shdsl Interoperability with GSPN CO and RT (v 1.7, v2.3.1, v2.5).
- G.shdsl Interoperability with INF CO and RT (v1.4), including INF inability to be configured as Plesiosynchronous clock mode issue.

For more detail, see Reference App Note ZipwirePlus Interoperability 289xx-APP-004-A.pdf

4 API Commands

4.1 Revised Programmer Reference manual(289xx-SWG-001-B)

The Programmer Reference Manual has been updated for 5.3 Release and Enhanced G.shdsl, IDSL NT, ATM 4-wire mode and Unframed 4-wire mode have been added to the document.

The **Figure 4-1** lists the added/modified APIs.

Command	Control Status	Opcode	Description
_DSL_WRITE_IND_BITS	Control	0x60	Indicator bits to be transmitted out the next DSL frame.
_DSL_READ_IND_BITS	Status	0xD0	Indicator bits received from the incoming DSL frame
_DSL_WRITE_ZBITS	Control	0x63	Z-bits to be transmitted out the next DSL frame.
_DSL_READ_ZBITS	Status	0xD1	Z-bits received from the incoming DSL frame
_ DSL_WRITE_EOC	Control	0x64	EOC bits to be transmitted out the next DSL frame.
_EOC_RX_GET_MSG	Status	0xB1	EOC bits received from the incoming DSL frame
_DSL_AUTO_IND	Control	0x62	Enable Auto-Update of Indicator Bits
_DSL_INTR_HOST_MASK	Control	0x50	Enable/Disable Unsolicited Interrupts0x51
_DSL_INTR_API_SUBMASK	Control	0x51	Enable/Disable unsolicited Interrupts for API Commands
_DSL_CONFIG_PID (New)	Control	0x2B	Configures the Pair Identification Functionality
_DPLL_REF_SOURCE (New)	Control	0x61	Configures the source of the PCM DPLL 6ms input
_E1_PRA_CONFIG	Control	0x44	Configure the E1 Framer
_DSL_FR_2B1Q_CONFIG	Control	0x65	Configures the 2B1Q Mode
_DSL_DSP_CONFIG	Control	0x5F	Modifies the DSP Configuration
_DSL_SYSTEM_CONFIG	Control	0x06	Operation Mode
_DSL_MULTI_RATE_CONFIG	Control	0x1B	PCM data rate
_DSL_ACTIVATE	Control	0x0B	Activates the ZipWirePlus port
_DSL_MULTI_PAIR_CONFIG	Control	0x19	Configure Multi-Pair Applications
_DSL_STATUS	Status	0x85	Queries the DSL Status Registers
_ATM_PHY_PERF_ERR_CTRS	Status	0xB9	Read ATM PHY performance counters
_ATM_PHY_CELL_CTTS	Status	0xBA	Read ATM PHY Transmit And Receive Cell Counters
_DSL_TEST_MODE	Control	0x0D	Configures the device into special test modes
_DSL_FR_HDSL_CONFIG	Control	0x11	Configures the DSL framer DSL Block

Figure 4-1 ZipWirePlus APIs Added/Modified

5 Non-Conformances

5.1 Software Non-Conformances

This section describes non-conformances outstanding with the ZipWirePlus Version 5.3 software release.

5.1.1 G.shdsl Framed PCM Multi-pair applications require the PCM Multi Frame Sync pulse to be 6 ms

The ZipWirePlus device does not support Multi-Pair operation when the Multi-Frame Sync Pulse is other than 6 ms.

5.1.2 Pre-Activation Annex Type must be configured the same on both sides

The Annex Type option in the _DSL_PREACTIVATION_CFG (0x0F) must be configured to the same value on both the HTU-C and HTU-R.

5.1.3 ATM PHY Performance and Cell Counters are not available in all Loopbacks

When the ATM is enabled and running the DSL Framer PCM on PCM or ATM PHY Source loopback, the 8 kHz reference signal is not available to the ATM block. Therefore, the _ATM_PHY_PERF_ERR_CTRS (0xB9) and _ATM_PHY_CELL_CTRS (0xBA) are not available during these loopbacks.

5.1.4 TP/RP Frame Offset - only support frame offset and not multi-frame offset

The _DSL_TP_FRM_OFST (0x2E) and _DSL_RP_FRM_OFSET (0x2F) supports a single frame offset and not a multi-frame offset.

5.1.5 ATM Inject HEC Errors

The _ATM_PHY_INJECT_HEC_ERROR (0x1F) API command only injects errors approximately 41% of the time.

5.1.6 Does not support ATM Phy IDLE counters

The device does not support the ATM Phy IDLE counters as defined in the _DSL_PHY_CELL_CTRS (0xBA) API command, bytes 10-17. These counters will always return 0.

5.2 API Commands Errata

None

5.3 Unimplemented Software Features

None

5.4 ZipWirePlus Silicon Non-Conformance

This section lists the non-conformances for the M28945-13/-33, M28946-13/-33, M28947-13/-33 and M28950-13/-33 devices and the earlier devices.

5.4.1 ATM Inject HEC Errors

The _ATM_PHY_INJECT_HEC_ERROR (0x1F) API command only injects errors approximately 41% of the time.

5.4.2 HTU-C Master common sync (System Bus) mode

Previous versions of the M28945 device could not operate in HTU-C master common sync mode. This has been fixed in M28945-13/33 device.

5.4.3 NTR – can't tolerate switching to redundant (back-up) clock

When switching the NTR clock source, the DSL link will not be maintained. A re-train will be required.

5.4.4 Clad work around issue (G.shdsl only)

During G.shdsl mode training, one out of million times the Clock Rate Adapter block (CLAD) may generate a higher frequency clock, which will result in malfunction of the CLAD block or the device itself.

This feature is needed as a work-around solution to the ZipWirePlus M28945 CLAD hardware. DSL_STATUS (0x85) API command STATUS_1 (byte 1, bit 5) convey the CLAD FATAL_ERROR to the host upon request. Upon detecting the bit the host processor should assert the reset pin on the device and download the firmware code

