



MicroGate Serial API for Linux

The MicroGate Serial API provides a High-level Data Link Control (HDLC) communications Application Program Interface (API) for Linux (kernel versions 2.2.5 and later) using the SyncLink *GT*, SyncLink *GT4*, SyncLink PCMCIA cards or SyncLink *GT PC/104+* adapters. HDLC is a bit-synchronous serial communications protocol widely used in Internet, X.25, frame relay and IBM SDLC communications. The MicroGate Serial API is designed for applications of the SyncLink adapters where direct application control of the serial HDLC communications interface or Raw data stream is required. Frame sizes up to 64 Kbytes with both 16 and 32-bit CRCs are supported.



The API provides an interface for application programs to function as HDLC/SDLC stations. System calls are used to gain access to an HDLC port, configure the port, manipulate serial interface signals and send and receive HDLC frames. Support for Monosync, Bisync and Raw data streams increases the flexibility of this API and hardware solution. An asynchronous communications mode is provided for call setup using the "AT" command set. This allows applications to auto-dial and auto-answer switched connections when using modems and other devices with "AT" command sets.



The MicroGate Serial API is **FREE** and may be [downloaded](#) at any time from the MicroGate website. Adapter specific support of each of the API options is also documented on the web site ([click here](#)).

The SyncLink *GT*, SyncLink *GT4*, SyncLink PCMCIA and SyncLink *GT PC/104+* adapters for Linux are high-speed serial communications adapters for X86 computers running the Linux operating system, version 2.2.5 and later. The adapters connect to remote routers or computers using a variety of wide area networking services including DDS, and T1/E1. SyncLink and its device driver are designed to support both single and multi-processor operation, as well as, 64-bits under x86_64 architecture when using Linux.

Designed for use with analog and digital CSU/DSU data communications equipment, the single-port SyncLink *GT*, multiport *GT4* and PC/104+ adapters support data rates up to 10 Mbps. The PCMCIA version supports data rates of up to 128 Kbps and beyond.

Through its serial data interface, which can be configured as V.35, RS-232, or RS-422/485 (RS-530, RS-449, X.21), SyncLink adapters cable directly to data communications equipment or to remote devices using either internal or external clocking features. The SyncLink *GT4* supports these same connections through independently configured serial data interfaces. Available conversion cables are required for each port for V.35, RS-449, RS-530, and X.21 applications.



Plug and Play configuration of adapter resources expands the number of adapters that may be installed to the number of slots available.

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SOFTWARE

The MicroGate Serial API contains programming documentation, sample C programs, SyncLink device driver, and HDLC line discipline. Source is included for all provided software including the device driver and HDLC line discipline.

The sample C programs include:

mgsutil	command line configuration utility
mgsstest	diagnostics program that demonstrates controlling a port and sending/receiving data
primary/secondary	SDLC loop mode samples

SYSTEM CALLS

The MicroGate Serial API consists of system calls used for controlling and monitoring communications. Most operations act on a port (file descriptor) that is opened and closed with the open and close system calls. Data is exchanged with the write and read system calls. Port control and monitoring is accomplished with the ioctl system call using a mix of standard tty ioctl codes (prefix TIOC) and SyncLink specific ioctl codes (prefix MGSL).

Serial API system calls by category:

Function Call	Description
Device Access	
open()	Open port
close()	Close port
Device Configuration	
ioctl(MGSL_IOCSPARAMS)	Set adapter parameters
ioctl(MGSL_IOCSPARAMS)	Get adapter parameters
Device Control and Status	
ioctl(TIOCMSET)	Explicitly set/clear all serial signals
ioctl(TIOCMBS)	Set (assert) individual serial signals
ioctl(TIOCMBS)	Clear (negate) individual serial signals
ioctl(TIOCMGET)	Get serial signals
ioctl(TIOCMWAIT)	Wait for serial signal transition
ioctl(MGSL_IOCWAITEVENT)	Wait for event (serial signal/hunt mode/idlereceived)
ioctl(TIOCGICOUNT)	Get interrupt/event statistics
ioctl(MGSL_IOCSTATS)	Get communication statistics
Data Communications	
write()	Transmit frame
ioctl(MGSL_IOCTXENABLE)	Enable/Disable transmitter
ioctl(MGSL_IOCSTXIDLE)	Set transmit idle mode (flags/ones/zeros/mark/space/etc)
ioctl(MGSL_IOCSTXIDLE)	Get current transmit idle mode
ioctl(MGSL_IOCTXABORT)	Abort currently transmitting frame
read()	Get received frame
ioctl(MGSL_IOCRXENABLE)	Enable/Disable receiver
ioctl(MGSL_IOCLOOPTXDONE)	Indicate transmit done in loop mode

PORT PARAMETERS

The ioctl(MGSL_IOCSPARAMS) call specifies the functional characteristics of a serial port, and whether it is to be configured for asynchronous or HDLC communications. Asynchronous mode is configured for sending "AT" commands to a modem or other device with "AT" command set. Typically, async mode is used to auto-dial switched connections before changing to HDLC mode for data communications. Following are listed the HDLC port parameters.

Parameter	Description
Mode	Async or HDLC
Loopback	Internal loopback mode for diagnostics
Flags	Misc control options loop mode selection
Encoding	Encoding (NRZ NRZB NRZI BIPHASE)
ClockSpeed	Internal clock speed
Addr	HDLC address
CrcType	CCITT CRC16 none
PreambleLength	Preamble length in bits (8 16 32 64)
PreamblePattern	Preamble pattern
DataRate	Async mode data rate
DataBits	Async mode data bits (7 or 8)
StopBits	Async mode stop bits (1 or 2)
Parity	Async mode parity (none even odd)

DEBUG LOGGING

For use in application debugging and for diagnosing communications problems, the SyncLink device driver has a configurable debug level (specified when loading the driver) that output varying levels of debug information to the system log. Debug levels include logging of complete data blocks, informational events, error events, system calls, and interrupt events.

AVAILABLE DOWNLOADS

[linuxwan.tar.gz](#) Complete SyncLink WAN package (all sources/drivers)
[Programming.txt](#) API programming documentation

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PRODUCT CONFIGURATIONS

	Product Code
Single Port Adapters	
SyncLink GT Adapter for Linux/PCI/V.35	191193
SyncLink GT Adapter for Linux/PCI/RS-232	192193
SyncLink GT Adapter for Linux/PCI/RS-422/485/X.21	193193
SyncLink GT Low-Profile Bracket	LPB000
PCMCIA Adapters	
SyncLink Adapter for Linux/PCMCIA	P10193
4-port Adapters	
SyncLink GT4 Adapter for Linux/PCI/V.35/4p	491193
SyncLink GT4 Adapter for Linux/PCI/RS-232/4p	492193
SyncLink GT4 Adapter for Linux/PCI/RS-422/485X.21/4p	493193
PC/104+ Adapters	
SyncLink GT PC/104+ Adapter for Linux/V.35	1P1193
SyncLink GT PC/104+ Adapter for Linux/RS-232	1P2193
SyncLink GT PC/104+ Adapter for Linux/RS-422/485/X.21	1P3193
Cables	
V.35 cable	2534GT
RS-232 cable	CMF000
RS-449 cable	2537FM
RS-530 cable	CMF000
X.21 cable	2515FM

SPECIFICATIONS (SyncLink GT)

Controller: MicroGate FPGA
Serial Ports: One
Serial Interface: Jumper-selectable as V.35, RS-232, RS-422/485 (RS-530 & RS-449, X.21)
Serial Data Format: Bit-synchronous, SDLC, HDLC
Data Rates: Up to 10 Mbps
Clocking: Internal or external
I/O Base Address: Plug and Play configurable
Interrupt Request Level: Plug and Play configurable
Environmental: Temperature 0-60oC; humidity 0 to 95% non-condensing; alt. - 200 to +10,000 ft.
Mechanical: Low-Profile PCI MD1; length 4.7", height 2.5", Weight 2.7 Oz
PCI 3.0 compliant, 32-bit, 33mhz (5v, 3.3v and PCI-X compatible), Low-profile compatible w/optional bracket.
Power usage: 0.2A +5V, 23 mA +12V, 23mA -12V
Certification: Complies with FCC limits for a Class B digital device; conforms with CE requirements
Connector: DB-25 (male)
Cable Options: DB-25 (female) to DB-25 (male); DB-25 (female) to 34-pin V.35 (male); DB-25 (female) to 37-pin RS-449 (male); DB-25 (female) to 15-pin X.21 (male)

SPECIFICATIONS (SyncLink GT4)

Controller(s): MicroGate FPGA
Serial Ports: Two (2) or four (4); custom designs offer more ports-per-adapter
Serial Interface: Jumper-selectable as V.35, RS-232, RS-422/485 (RS-530,RS-449, X.21)
Serial Data Format: bit-synchronous: HDLC, SDLC; asynchronous
Data Rates: Up to 10 Mbps per port synchronous; 921600 bps asynchronous
Interrupt Request Level: Plug and Play configurable
Environmental: Temperature 0-60oC; humidity 0 to 95% non-condensing; alt. - 200 to +10,000 ft.
Mechanical: Standard PCI short card; length 6.875", height 4.2", Weight 5.5 Oz
PCI 3.0 compliant, 32-bit, 33mhz (5v, 3.3v, and PCI-X compatible)
Power usage: 300mA 5V, 80mA +12V, 80mA -12V
Certification: Complies with FCC limits for a Class B digital device; conforms with CE requirements
Connectors: LFH-60
Supplied Adapter Cable: LFH-60 to dual DB-25 (male)
Cable Options: DB-25 (female) to DB-25 (male); DB-25 (female) to 34-pin V.35 (male); DB-25 (female) to 37-pin RS-449 (male); DB-25 (female) to 15-pin X.21 (male)

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SPECIFICATIONS (SyncLink GT PC/104+)

Controller: MicroGate FPGA
Serial Ports: One
Serial Interface: Jumper-selectable as V.35, RS-232, RS-422/485 (RS-530 & RS-449, X.21)
Serial Data Format: Bit-synchronous, SDLC, HDLC, asynchronous
Data Rates: Up to 10 Mbps synchronous; 921600 bps asynchronous
Clocking: Internal or external
I/O Base Address: Plug and Play configurable
Interrupt Request Level: Plug and Play configurable
Rotary switch selects 1 of 4 PC/104+ stack positions
Environmental: Temperature -40C to +85C; humidity 0 to 95% non-condensing; alt. - 200 to +10,000 ft.
Mechanical: Standard PC/104+ dimensions, Stack-through connectors, Weight 3.1 Oz
PCI 3.0 compliant, 32-bit, 33mhz
Power: 200mA +5V, 100mA 3.3V
Connector: 26 Pin Header with Ejector/Latches, 26-pin Header to DB-25 adapter cable
Cable Options: DB-25 (female) to DB-25 (male); DB-25 (female) to 34-pin V.35 (male); DB-25 (female) to 37-pin RS-449 (male); DB-25 (female) to 15-pin X.21 (male)

SPECIFICATIONS (SyncLink PCMCIA)

Controller(s): SAB82532
Serial Ports: One
Serial Interface: Software-selectable as V.35, RS-232, RS-422 (RS-530,RS-449, X.21)
Serial Data Format: bit-synchronous: HDLC, SDLC; BSC; async
Data Rates:128 Kbps and higher
I/O Base Address: Plug and Play configurable (PC Card)
Interrupt Request Level: Plug and Play configurable
Environmental: Temperature 0-60oC; humidity 0 to 95% non- condensing; alt. - 200 to +10,000 ft.
Mechanical: Standard Type II PCMCIA card; length 3.37 inches, width 2.126 inches, weight 1.0 Oz
Power usage: 200 mA +5V
Certification: Complies with FCC limits for a Class B digital device; conforms with CE requirements
Supplied Adapter Cable: PCMCIA I/O connector to DB-25 (male)
Cable Options: DB-25 (female) to DB-25 (male) DB-25 (female) to 34-pin V.35 (male); DB-25 (female) to 37-pin RS-449 (male); DB-25 (female) to 15-pin X.21 (male)