

Data Sheet and Installation

# TinyBridge-100

Miniature Remote Fast  
Ethernet Bridge



data communications  
The Access Company

## Features

- High-performance miniature remote bridge for Fast Ethernet extension
- Wire-speed WAN throughput: 19,700 pps at 10 Mbps
- Synchronous WAN interfaces: V.24, V.35, V.36, RS-530, X.21, or 4-wire modem
- Two priority queues according to 802.1p or IP-ToS bits
- Fault propagation of WAN error conditions to LAN port
- Automatic MDIX support
- Compatible with applicable parts of IEEE 802.3

TinyBridge-100 is a high-performance, remote, self-learning Ethernet/Fast Ethernet bridge. Its small size and low cost make it ideal for sensitive bridging applications, or as a LAN extender over synchronous WAN.

## LAN INTERFACE

TinyBridge-100 is available with a 10/100BaseT interface that operates in full or half duplex Ethernet topologies. The unit supports a packet length of up to 1536 bytes.

Automatic MDIX allows using straight or crossed cables for the LAN connection.

MAC addresses of the LAN to which the unit is connected are automatically learned. Only those frames destined for the remote LAN are forwarded. The LAN table stores up to 2048 addresses and is updated automatically.

MAC address filtering can be disabled, allowing all traffic to flow over the WAN link.

TinyBridge-100 has two queues for handling priority, determined in the following order:

- If the packet received is a tagged Ethernet frame, TinyBridge-100 marks it according to the tag priority (0-7):  
0-3: low-priority queue  
4-7: high-priority queue.
- Otherwise, TinyBridge-100 marks the frame according to IP-ToS priority (0-7):  
0-3: low-priority queue  
4-7: high-priority queue.
- Untagged and non-IP frames enter the low priority queue.

Frames egress from the queues with a 1:2 ratio, two frames with high priority, one frame with low priority.

Flow control for full duplex and backpressure for half duplex are supported. The buffer holds up to 120 frames.

### WAN INTERFACE

The following synchronous WAN interfaces are available:

- V.24/RS-232
- V.35
- V.36/RS-449
- X.21
- RS-530.

A fault on the WAN can be propagated if fault propagation is enabled; TinyBridge-100 shuts down the link and forces router to trace another route.

TinyBridge-100 operates over synchronous links at data rates of up to 10 Mbps. An external clock can be supplied for operation at other bit rates.

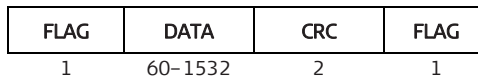


Figure 1. TinyBridge-100 Frame Structure

The TinyBridge-100 WAN interface operates in DTE mode. This means it accepts receive and transmit clocks. The timing is shown in *Figure 2* and *Figure 3*.

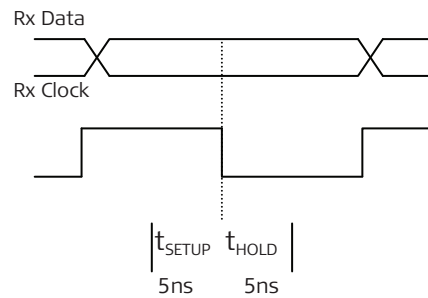


Figure 2. Receive Clock Timing

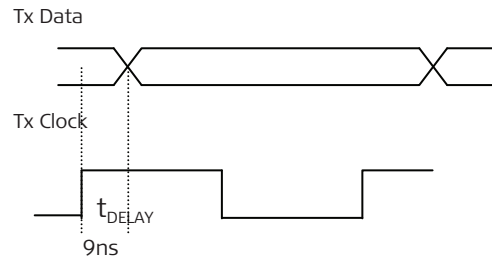


Figure 3. Transmit Clock Timing

## Applications

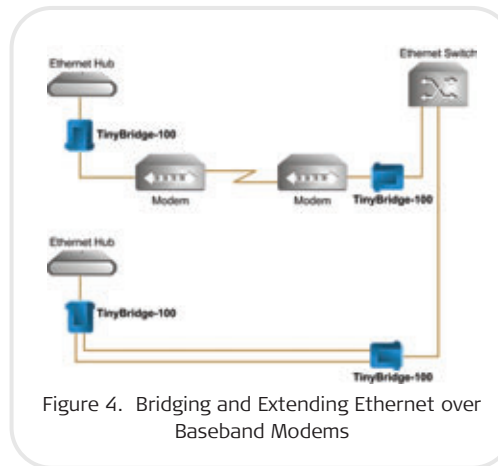


Figure 4. Bridging and Extending Ethernet over Baseband Modems

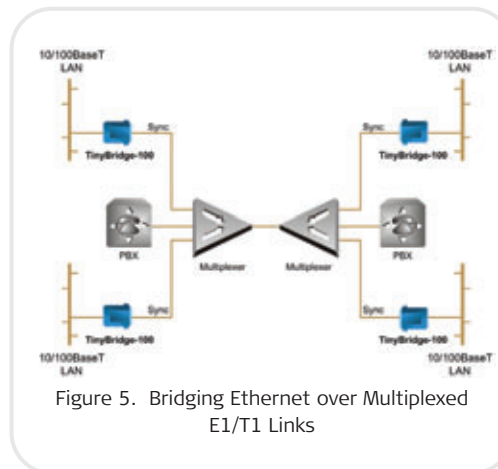


Figure 5. Bridging Ethernet over Multiplexed E1/T1 Links

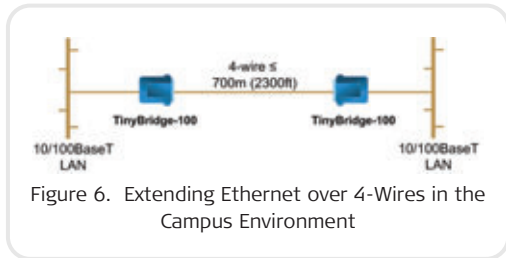


Figure 6. Extending Ethernet over 4-Wires in the Campus Environment

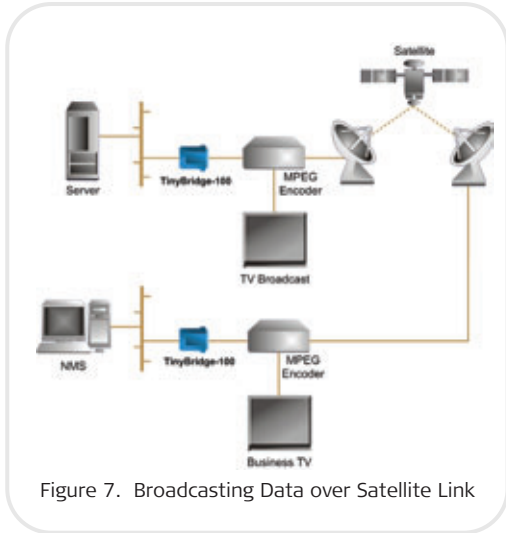


Figure 7. Broadcasting Data over Satellite Link

## SPECIFICATIONS

### ETHERNET

**Frame Size**

1536 bytes (max)

**LAN Table**

2048 MAC addresses with 5-minute automatic aging

**Buffer**

Up to 120 frames for 64-byte frames

**Latency**

100 Mbps LAN rate, 10 Mbps WAN rate:

- 66  $\mu$ s for 64-byte frames
- 1,400  $\mu$ s for 1536-byte frames

**Compliance**

Conforms to IEEE 802.3

**Data Rate**

10 Mbps, 100 Mbps

**Connectors**

Shielded RJ-45

**Cable**

To comply with electromagnetic regulations, it is recommended to use shielded Cat. 5 cable

### WAN

**Protocol**

HDLC

**Data Rate**

Up to 10 Mbps synchronous



### **Throughput**

10 Mbps WAN rate:

- 19,700 pps for 64-byte frames and increment byte data (00, 01, 02, ...)
- 802 pps for 1536-byte frames and increment byte data (00, 01, 02, ...)

### **4-wire Range**

700m (2300 ft)

### **Connectors**

V.24 (RS-232): DB-25 female

V.35: 34-pin female or male via adapter cable

V.36 (RS-422): DB-37 female via adapter cable

RS-530: DB-25 female

X.21: DB-15 female or male via adapter cable

4-wire: 5-pin terminal block

### **Operating Range**

Using Cat. 5 UTP cable:

- 10 Mbps: 500m (1640 ft)
- 5 Mbps: 700m (2300 ft)

## GENERAL

### Physical

Height: 18 mm (0.7 in)

Width: 53 mm (2.1 in)

Length: 69 mm (2.7 in)

Weight: 30 g (1.0 oz)

### Power Supply

External 5 VDC/1.2A regulated adapter

***Note.** While TinyBridge-100 operates with any regulated 5 VDC, 1200 mA power supply, the CE approval for the 4-wire version requires provision of a grounding path through the use of a power supply with a 3-prong plug.*

### Power Consumption

400 mA @ 5 VDC

### Environment

Temperature: 0–50°C (32–122°F)

Humidity: Up to 90%, non-condensing

## Safety



### Safety Instructions

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

#### IMPORTANT

North American Users

TinyBridge-100 is powered by an external power supply. To reduce the risk of electric shock, fire, and injury to persons:

**Use only with a UL-listed and CSA-Certified Class 2 power supply rated 5 VDC, 1200 mA maximum.**



### Instructions de Sécurité

Le point d'exclamation dans le triangle équilatéral alerte l'utilisateur d'importantes instructions concernant le fonctionnement et l'entretien mentionnées dans le livre qui accompagne l'appareil.

#### IMPORTANT

Pour les utilisateurs Nord Américains

Le TinyBridge-100 est renforcé par un transformateur extérieur. Afin de réduire le risque d'électrocution, de feux ou de blessure:

**Utiliser seulement avec le UL listé et le CSA Certifié Classe 2 le transformateur de 5 VDC, 1200 mA maximum.**

**DECLARATION OF CONFORMITY**

**Mfr. Name:** RAD Data Communications Ltd.

**Mfr. Address:** 24 Raoul Wallenberg St.  
Tel Aviv 69719, Israel

**Declares that the product:**

**Product Name:** TinyBridge-100

Conforms to the following standard(s) or other  
normative document(s):

**EMC:** EN 55022:1998 + A1:2000 +  
A2:2003  
EN 55024: 1998 + A1:2001 +  
A2:2003  
EN 61000-3-2:2000 + A2:2005  
EN 61000-3-3:1995 + A1:2001

**Safety:** EN 60950-1:2001

**Supplementary Information:**

The product herewith complies with the  
requirements of the Low Voltage Directive  
2006/96/EC and the R&TTE Directive 99/5/EC for  
wired equipment. The product was tested in a  
typical configuration.

Tel Aviv, 8 November 2007



Haim Karshen

VP Quality

European Contact: RAD Data Communications  
GmbH, Otto-Hahn-Str. 28-30, 85521  
Ottobrunn-Riemerling, Germany

## INSTALLATION

### CONFIGURING TINYBRIDGE-100

1. Identify the DIP switches on the top panel of TinyBridge-100.
2. Set the DIP switches according to *Table 1*.

Table 1. DIP Switch Settings

Switch	Switch ID	Function	Possible Settings	Factory Setting
1	100	LAN rate	<b>ON</b> - 100 Mbps <b>OFF</b> - 10 Mbps	ON
2	FDX	LAN duplex mode	<b>ON</b> - Full duplex <b>OFF</b> - Half duplex	ON
3	AN	Auto-negotiation mode	<b>ON</b> - Autonegotiation is enabled. Maximum LAN port level is advertised at 100 Mbps, full duplex <b>OFF</b> - Autonegotiation is disabled. Speed and duplex mode are determined by the 100 and FDX switches	ON

Switch	Switch ID	Function	Possible Settings	Factory Setting
4	FIL <sup>1</sup>	LAN filtering mode	<p><b>ON</b> - Only frames destined for another LAN are transmitted over the WAN</p> <p><b>OFF</b> - All frames are transmitted over the WAN</p>	ON
5	FP	Fault Propagation	<p><b>ON</b> - If the CTS (RS-530, V.36, V.35, V.24), or Indication (X.21) signal is not received at the WAN side or LOS condition is detected (4-wire), LAN link is shut down</p> <p><b>OFF</b> - LAN link status does not depend on any signal from the WAN side</p>	OFF

Switch	Switch ID	Function	Possible Settings	Factory Setting
6	FLC <sup>2</sup>	Backpressure / Flow control	<b>ON</b> - Backpressure/ flow control are enabled for half duplex/full duplex respectively <b>OFF</b> - Backpressure/ flow control are disabled for half duplex/full duplex respectively	ON
7	LNG	LONG (4-wire version only)	<b>ON</b> - 4-wire link operates at 5 Mbps <b>OFF</b> - 4-wire link operates at 10 Mbps	OFF

**Note 1:** Reset TinyBridge-100 for changes in the filtering mode to take effect.

**Note 2:** Enable autonegotiation for changes in the flow control mode to take effect. When powering up TinyBridge-100 with flow control disabled, enabling flow control requires resetting TinyBridge-100.

## CONNECTING THE INTERFACES

### Connecting the LAN Interface

Connect the user LAN to the RJ-45 connector of TinyBridge-100. Automatic MDIX allows using straight or crossed cables for the LAN connection.

### Connecting the WAN Interface

Connect the 15-pin, 25-pin, 34-pin, or 37-pin connector of the unit to DCE equipment, using the appropriate cable (see *Table 3*, *Table 4*, or *Table 5* for pinout details).

### Connecting the 4-Wire Interface

**Warning:** Do not apply power to TinyBridge-100 until the 4-wire terminal block is connected as described below

1. Remove the protective cover from the terminal block.
2. Unplug the terminal block from TinyBridge-100.
3. Feed the 4 wire cable through the protective cover and connect the Tx and Rx wires to their respective terminals, as illustrated in *Figure 8*. If the cable is shielded, connect the shield to the GND terminal.
4. Check that the wires are secure and reconnect the terminal block to its socket.
5. Place the protective cover in position over the terminal block.

**IMPORTANT:** When two 4-wire TinyBridge-100 units are to be connected directly, the terminal blocks should be wired so that the Rx terminals of each TinyBridge-100 connect to the Tx terminals of the other unit.



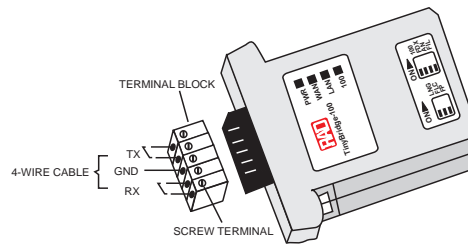


Figure 8. Connecting the 4-wire WAN Interface

#### Connecting Power

1. Connect external power adapter to a mains outlet.
2. Plug in the external power adapter jack to TinyBridge-100.

The PWR LED lights up.

**Note.** While TinyBridge-100 operates with any regulated 5 VDC, 1200 mA power supply, the CE approval requires use of the power supply listed in the Ordering section.

## OPERATION

TinyBridge-100 operation is automatic. *Table 2* shows how to diagnose the status of the TinyBridge-100 unit from the LED indicators.

Table 2. LED Indicators

LED	Color	Description
PWR	Green	<b>ON</b> – Power is connected
		<b>OFF</b> – Power is disconnected
WAN	Yellow	<b>ON</b> – Activity on WAN (includes idle)
		<b>OFF</b> – No activity on WAN
	Red*	<b>ON</b> – Error condition on WAN
		<b>OFF</b> – No error condition on WAN
LAN	Green	<b>OFF</b> – No link integrity
		<b>ON</b> – Link integrity
	Yellow	<b>OFF</b> – No activity on LAN
		<b>Blinking</b> – Activity on LAN
100	Green	<b>ON</b> – 100 Mbps LAN
		<b>OFF</b> – 10 Mbps LAN

\* 4-wire version only

Table 3. DB-25 Pin Allocation (V.24/RS-232)

Pin	Name	Type
1	SHIELD	
2	TxD	Output
3	RxD	Input
4	RTS	Output
5	CTS	Input
6	NC	
7	GND	
8	NC	
9	NU	
10	NU	
11	NU	
12	NU	
13	NU	
14	NU	
15	TCLK	Input
16	NU	
17	RCLK	Input
18	NU	
19	NU	
20	NU	
21	NU	
22	NC	
23	NU	
24	NU	
25	NU	

**Notes:**

- *NC* indicates unused pins that must be left unconnected, as they are internally connected
- *NU* indicates unused pins that are not connected internally.

Table 4. DB-25 Pin Allocation (V. 35)

Pin	Name	Type
1	SHIELD	
2	TxD-A	Output
3	RxD-A	Input
4	RTS-A	Output
5	CTS-A	Input
6	NC	
7	GND	
8	NC	
9	RCLK-B	Input
10	NU	
11	NC	
12	TCLK-B	Input
13	NU	
14	TxD-B	Output
15	TCLK-A	Input
16	RxD-B	Input
17	RCLK-A	Input
18	NU	
19	NU	
20	NU	
21	NU	
22	NC	
23	NU	
24	NC	
25	NU	

**Notes:**

- *NC* indicates unused pins that must be left unconnected, as they are internally connected
- *NU* indicates unused pins that are not connected internally.

Table 5. DB-25 Pin Allocation (V.11)  
(used for RS-530, X.21, V.36)

Pin	Name	Type
1	SHIELD	
2	TxD-A	Output
3	RxD-A	Input
4	RTS-A	Output
5	CTS-A*	Input
6	NC	
7	GND	
8	NC	
9	RCLK-B	Input
10	NU	
11	NC	
12	TCLK-B	Input
13	CTS-B*	Input
14	TxD-B	Output
15	TCLK-A	Input
16	RxD-B	Input
17	RCLK-A	Input
18	NU	
19	RTS-B	Output
20	NU	
21	NU	
22	NC	
23	NU	
24	NC	
25	NU	

**Notes:**

- \* indicates signal for X.21
- **NC** indicates unused pins that must be left unconnected, as they are internally connected
- **NU** indicates unused pins that are not connected internally.

## Ordering

TinyBridge-100/#/\$

### Legend

# WAN interface:

**V24** V.24/RS-232

**V35F** V.35 female

**V35M** V.35 male

**V36** V.36

**530** RS-530

**X21F** X.21 female

**X21M** X.21 male

**4W** 4-wire WAN interface

\$ Power supply type (Default=none):

**AC** 100-240 VAC switching power supply  
with integral AC connector

*Note: This power supply can be ordered  
separately as P/S-AC/5/1200.*

### SUPPLIED ACCESSORIES

#### Adapter cables:

**CBL-530/V35/F:** Supplied with V.35F interface

**CBL-530/V35/M:** Supplied with V.35M interface

**CBL-530/449/F:** Supplied with V.36 interface

**CBL-TINY100/X21/F:** Supplied with X.21F interface

**CBL-TINY100/X21/M:** Supplied with X.21M interface

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