APPENDIX A

AT3-6M Interface Adapter

Introduction

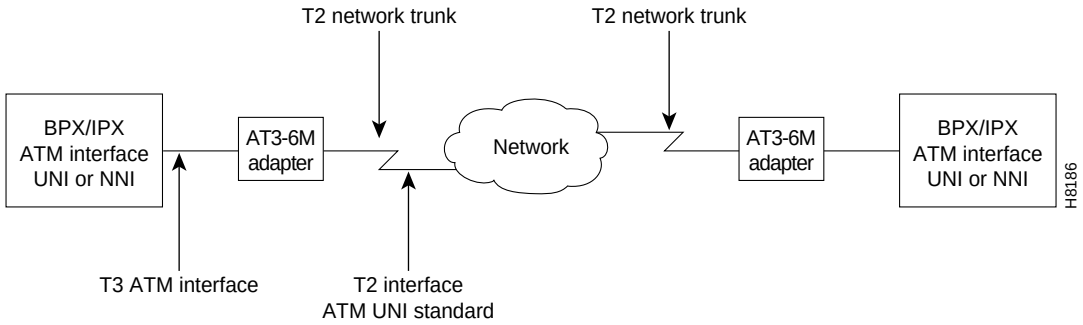
This Appendix describes the StrataCom AT3-6M Interface Adapter, sometimes referred to as the T3-T2 Interface Adapter, used with the BPX to provide a 6 Mbps ATM network interface to T2 transmission facilities.

Application

The StrataCom AT3-6M Interface Adapter is used with the BPX Broadband ATM Switch or the IPX Narrowband Switch in applications where it is required to interface a 6 Mbps T2 digital network facility to the 45 Mbps T3 ATM port on the BPX or IPX node.

Applications include users where T2 transmission facilities are available. And also for users with ATM networks who require somewhat more bandwidth than is provided by the T1 or E1 ATM network connections but do not need the full T3 bandwidth provided by the BPX ATM network ports. See Figure A-1 for a typical application.

Figure A-1 Network Application



General Description

The AT3-6M Interface Adapter is a bi-directional device which provides a conversion between transmission systems of different transmission rates, the North American T3 (44.736 Mbps) and the Japanese 6M (T2). It is used only in ATM networks. The adapter is transparent to the both users and the network.

The T3 interface operates at 44.736 Mbps with the B-ISDN Physical Layer Convergence Protocol (PLCP) and meeting the ATM Forum standards. The T2 interface operates at 6 Mbps according to the Japanese Nippon Telephone & Telegraph (NTT) User-Network Interface (UNI) specifications.

ATM cells from one interface are mapped to the other interface enabling users with ATM node equipment with North American T3 ATM ports to operate in a T2 network. The ATM cell throughput on a T2 digital trunk using this adapter is limited to 14,490 cells per second.

The cell transfer rate for T2 is greatly reduced from the T3 cell rate out of a T3 port on an IPX using the ATMT card or from a BPX port. Therefore it is very important to restrict the cell rate from the node when using a T2 trunk. Cell rate adaptation is done via software trunk configuration at the T3 ATM interface, where the non null cell throughput is limited to the T2 capacity. In the T2 to the T3 direction, the T3 ATM interface has more than enough capacity to accommodate the T2 cell rate.

The Interface Adapter can buffer a 70-cell burst at the T3 rate before the T2 interface will begin to drop cells. Cells will continue to be dropped until the T3 interface returns to a rate that complies with the bandwidth of the T2 interface.

All alarms and line errors are passed through the Interface Adapter unchanged. Any existing network management system has an instant view of the actual network transmission system. Errors at the ATM layer propagate through from one interface to the other, thus the end user has the complete knowledge and statistical information regarding the network status at all times. Therefore a special network management interface is not required.

Since the T3 interface is asynchronous and the T2 is synchronous, the AT3-6M can be configured to carry the synchronization information through from one interface to the other. The synchronization is carried through the T3 interface using the PLCP-embedded 8 KHz. The T2 interface clock may be generated locally or it may be slaved to the public network.

Equipment Description

The AT3-6M is fully contained in a metallic housing designed to be mounted in a 19" equipment rack. It occupies only one rack mounting space and is powered from normal AC line powering. The power supply accommodates an input voltage over the range 90 to 240 VAC, 50 or 60 Hz.

Interface Connectors

The interface connectors are located on the rear panel (Table A-1 and Figure A-2). These connectors include:

- Two T3 BNC connectors, XMT and RCV.
- Two 6M BNC connectors, XMT and RCV.
- A single RS-232 male, subminiature 9-pin control terminal interface.
- AC input connector with integral fuse.

The control terminal is a standard RS-232 interface DTE interface. No hardware handshake is required for the interface. The diagnostic display comes up immediately. It operates at 9.6 Kbps with any ASCII terminal.

Table A-1 Rear Panel Connectors

Connector	Type	Description
T3 RX	BNC	Receive T3 input from BPX or IPX ATM port.
T3 TX	BNC	Transmit T3 output to BPX or IPX ATM port.
T2 RX	BNC	Receive 6 MB input from T2 facility.
T2 TX	BNC	Transmit 6 MB input to T2 facility.
RS-232	DB9	Control terminal connection.
Primary Power	IEC	AC power input with fuse.

Front Panel Indicators

The front panel of the system provides LED indicators for the alarm status of the transmit and the receive T3 and the T2 interfaces (refer to Table A-2 and Figure A-2). Also on the front panel are indications for power and for operating status (Fail/Active).

The Overflow LED indicates that the cell rate coming from the T3 interface exceeds the bandwidth of the T2 facility and that the Interface Adapter buffer has overflowed.

Table A-2 Front Panel Indicators

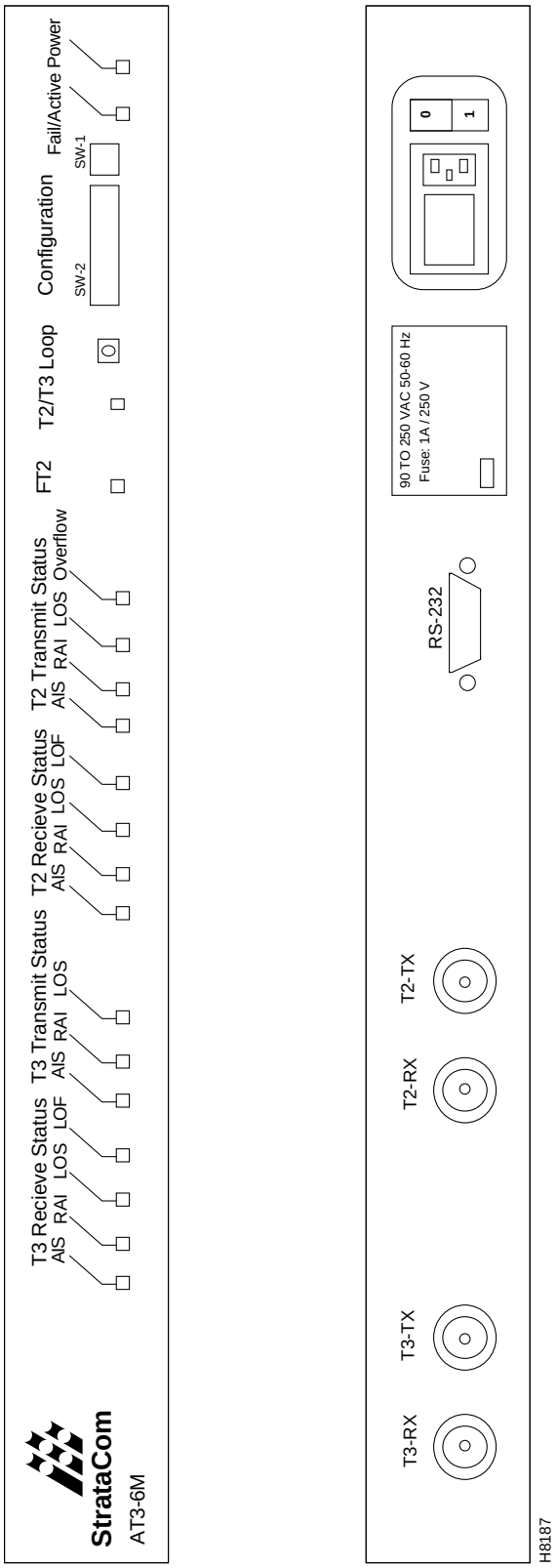
Indicator	Color	Description
T3 Receive Status—AIS	Green	Alarm Indication signal detected on the RCV T3 line.
T3 Receive Status—RAI	Yellow	Remote Alarm Indication signal detected on the receive T3 line.
T3 Receive Status—LOS	Red	Loss of receive T3 signal
T3 Receive—LOF	Red	Loss of frame on receive T3 signal
T3 Transmit Status—AIS	Green	Alarm Indication signal detected on the transmit T3 line.
T3 Transmit Status—RAI	Yellow	Remote Alarm Indication signal detected on the transmit T3 line.
T3 Transmit Status—LOS	Red	Loss of transmit T3 signal
T2 Receive Status—AIS	Green	Alarm Indication signal detected on the RCV T2 line.
T2 Receive Status—RAI	Yellow	Remote Alarm Indication signal detected on the receive T2 line.
T2 Receive Status—LOS	Red	Loss of receive T2 signal
T2 Receive—LOF	Red	Loss of frame on receive T2 signal
T2 Transmit Status—AIS	Green	Remote Alarm Indication signal detected on the transmit T2 line.
T2 Transmit Status—RAI	Yellow	Loss of transmit T2 signal
T2 Transmit Status—LOS	Red	Loss of frame on transmit signal
Overflow	Red	T3 receive cell rate exceeds the T2 line capacity.
FT2	Red	Fractional T2 indication for future use.
T3/T2 loop	Red	Indicates the unit is in loop back mode, external toward the T3 and T2 line interfaces.

Indicator	Color	Description
Active/Fail	Green/Red	Upon power up the system will go through extensive self tests. If self-test passes, the Active /Fail LED will be green; if self-test fails the LED will be RED.
Power	Green	Power ON indication.

DIP Switches

The adapter has two front panel DIP switches, a two-position (SW-1) and a 12-position (SW-2) switch. SW-1 controls the configurations that may interrupt operation and should be done through a two-step operation. SW-2 enables all other configuration parameters.

Figure A-2 Front and Rear Panel Features



Installation

Install the AT3-6M in a rack adjacent to the BPX enclosure (allowing room for any AC Power Supply Assembly that may also need to be mounted) or in the IPX enclosure wherever there is space for the 1 RMS AT3-6M adapter.

System Connections

Two short BNC-BNC cables are required to connect the AT3-6M to the BPX or IPX node.

1. For use with BPX, connect one cable between one of the three TX connectors on a selected BPX LM-3T3 card and the T3-RX connector on the AT3-6M back panel. For IPX applications, connect to the TX connector on the ATMT back card
2. Connect the other cable between the associated RX connector on the BPX LM-3T3 or ATMT card and the T3-TX connector on the AT3-6M back panel.
3. Connect the cable coming from the 6 Mbps facility to the T2-RX connector on the AT3-6M.
4. Connect the cable going to the 6 Mbps facility to the T2-TX connector on the AT3-6M.
5. Connect the AC power cord to the IEC connector on the rear of the AT3-6M.

AT3-6M Configuration

The adapter configuration is done via a set of DIP switches located on the front panel. There are two sets of switches, a 12-position switch and a two position switch. The two position switch enables the configuration change via the terminal and enable/disable the loop push button located in the front panel (to secure against accidental operation). Review both Table A-3 and Table A-4. Set the appropriate DIP switches with the power off.

Table A-3 DIP Switch SW-1 Selection Guide

Switch	Position	Function
1	Down	Enable configuration via the TTY.
1	Up	Disable configuration via the TTY (default).
2	Down	Enable front panel loop push button.
2	Up	Disable front panel loop push button (default).

Table A-4 DIP Switch SW-2 Selection Guide

Switches	Position	Function
1 2	Up Up	Internal synchronization source for the T2 transmitter.
1 2	Up Down	Slave T2 transmitter to T3 line
1 2	Down Down	Slave T2 transmitter to T2 receiver
3 4	Up Up	Long length T3 cable.
3 4	Up Down	Medium length T3 cable.
3 4	Down Down	Short length T3 cable; system is co located to IPX/BPX[1] (default).
5, 6	don't care	Unused
7	Up	ATM converter mode
7	Down	Test Mode
8	Up	Enable BPV relay from T2 to T3
8	Down	Disable PV relay from T2 to T3
9	Up	Long length T2 cable
9	Down	Short length T2 cable (default).[1]
10, 11, 12	don't care	Unused

1. T2 and T3 cable length should be set to "short" upon power-up for self-test.

Upon LOS, defaults to "internal synchronization."

BPX or IPX Port Configuration

The trunk on the BPX or IPX node must be reconfigured from StrataView Plus or a local control terminal.

1. T to the first node equipped with an AT3-6M.
2. Use the Configure Trunk (**cnftrk**) command to select T2 for the Tx Trunk Rate.
3. Set the RCV Trunk Rate to 28980 cps.
4. Repeat steps 1 through 3 for all other nodes using the AT3-6M.

Operation

The following paragraphs describe the various operating modes for the AT3-6M. The unit is basically designed for unattended operation. Any failures in the unit or any line alarms or errors will be propagated.

Power-Up Sequence

During the system power-up, the unit goes through a self test procedure. The Power LED turns green, the Active/ Fail LED stays off until the self test sequence is completed. At the end of the self test the loop LED comes on for about 5 seconds.

Through the self test, all LEDs light up. When the test is completed successfully the Active/Fail LED turns green. If the system fails self test, it will repeat the self-test twice more. If it continues to fail, the Active/Fail LED turns red.

Normal Operation

In standard operation the AT3-6M system relays ATM cells from the T2 6M to the T3 interface. To accommodate for the difference in the transmission rate, the AT3-6M removes all null cells from the T3 interface. The T3 sources connected to the AT3-6M must regulate their ATM Cell rate not to exceed the T2 6M cell rate. The AT3-6M can absorb up to 70 cells in a single burst.

The AT3-6M Interface Adapter can interface to any ATM UNI or NNI line at the T2 or T3 rate. The AT3-6M Relays alarms and errors from one interface to the other. It relays the alarm and error conditions as indicated in Table A-5.

Table A-5 Alarm Handling

Alarms Passed Thru (both directions)	Errors Relayed Thru (both directions)
AIS	HEC Error—both directions.
RAI	BPV (up to 10^{-5} rate)—6M to T3 only.
LOS	
LOF	

Remote Loop Operation

The AT3-6M has the capability of creating a remote loop on both the T3 and the T2 sides for test purposes. The loop can be activated by manually pressing a front-panel switch or through the control terminal. The loopbacks are through looping relays at the two interfaces and they operate simultaneously.

To activate the loop from the front panel, one must first enable the proper DIP switch on SW-1. Then press and hold the front panel push button for one second. This is to prevent accidental operation of the loop. Once the loop is set it can be removed by operating the loop switch a second time or it will automatically remove itself after one hour.

Terminal Operation

The system is designed to operate without a terminal. However there is a terminal interface designed for diagnostics and maintenance purpose only. The terminal interface is always active and continuously displays the user prompt. The terminal interface operating parameters are as follows:

a. Electrical Interface: RS232

b. DTE/DCE: DCE

c. Speed: 9.6 Kbps

d. Handshake: NON

e. Connector: Male DB9

Upon power up, the system goes through power up diagnostics. The terminal displays the diagnostics sequence. Upon successful self test the unit is available for operation. The terminal will display the actual set up of the system represented by the DIP switches (Table A-6). If the configuration was overwritten through the TTY, the terminal will display the actual set up that could be different then the dip switch setting.

Table A-6 DIP Switch Settings

1	2	3	4	5	6	7	8	9	10	11	12	1	2
0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1

Commands

Commands are entered after the user prompt. Commands are available to display the various error counters and alarms associated with the T2 line and the T3 port interface, select the source of timing for the DSU, and to enable and remove the remote loop. Table A-7 lists available commands for use with the AT3-6M terminal interface while Table A-8 indicates the display format.

Table A-7 Command Summary

Command	Parameters	Meaning
?		Help Menu
dspstat		Display status. See Figure A-2 for display.
dspstat clear		Clears the status display
Override dipsw	0 1	Disable TTY configuration entry. Enable TTY configuration entry. Operates only when DIP switch 1-1 is down.
Sync source	0 1 2	System is slaved to the 6M line System is slaved to the T3 line System runs of its internal clock
Remote loop	# of seconds stop	Enable remote loop back operation. Cancel the loop back operation.

Table A-8 Status Display

Status	T3[1]	T2[1]
BPV	NNN	NNN
Parity Errors	NNN	X
Framing Errors	NNN	NNN
PLCP Framing Errors	NNN	X
HEC Errors	NNN	NNN
RX Cells	NNN	NNN
TX Cells	NNN	NNN
AIS	1/0	1/0
1/0	1/0	1/0
LOF	1/0	1/0
Overflow	X	1/0

1. X = not available

Specifications

The following are the specifications for the AT3-6M Interface Adapter for Release 8.2.

T3 interface

Line rate:	44.736 Mbps ±20 ppm.
Framing format:	C-bit parity
Line code:	B3ZS
Physical layer:	PLCP format.
ATM layer:	UNI per the ATM Forum UNI 3.0 specification.
Cell Rate:	Up to 96,000 cells/sec.
Connector:	75 ohm BNC

T2 Interface

Line rate:	6.312 Mbps
Line code:	B8ZS
Synchronization:	Internal 6.312 Mbps ±30 ppm or Slave to the incoming 6 Mbps line or Slave to the T3 PLCP frame.
Framing format:	ITU-T G.703
ATM Layer:	Per NTT UNI specification dated 1993.
Queue:	75 cell FIFO.
Cell Rate:	Up to 14,490 cells/sec.
Connector:	75 ohm BNC.

Power

Input Power:	90 VAC to 250 VAC, 50/60 Hz.
Power consumption:	30 watts
Input Power Connector:	Universal power entry module with fuse.
Fuse size:	1/2A 250 VAC

Mechanical

Rack Mounting Space:	1 rack mount space, 19" rack.
Size:	19" x 1.75" x 8.5"

Terminal Interface

Speed:	9.6 Kbps
Type:	DTE
Handshake:	NONE
Connector:	DB9