TAM1500-12
12-Port T1 Access Multiplexer

> **CAUTION** Net to Net Technologies strongly recommends the use of proper electrostatic discharge (ESD) precautions when handling this equipment.

INSTALLATION

1. **Unpack and inspect the TAM1500-12.**

   If there is visible damage, do not attempt to connect the device; contact Customer Support at 1-877-638-2638 (001-603-427-0600 for international customers) or Support@NetToNet.com.

2. **Install the TAM1500-12 in an IP DSLAM chassis.**

   > **NOTE** There must be a Multiplexer Uplink Module installed in the IP DSLAM chassis in order for Access Modules to operate.

   All Access Multiplexer Modules for Net to Net Technologies' IP DSLAMs are hot swappable; installing or removing an Access Module while the chassis is powered up does not affect the operational status of other Access Modules within the chassis. The IPD12000 is a fourteen slot chassis; slots 1-12 are reserved for Access Modules (such as the TAM1500-12) and slots 13-14 are reserved for Multiplexer Uplink Modules (such as the MUM200-2). Access Modules may be placed in any order in slots 1-12. The IPD4000 is a five slot chassis; slots 1-4 are reserved for Access Modules and slot 5 is reserved for a Multiplexer Uplink Module.

   a. Align the TAM1500-12 with the slot module guides of the chosen slot for installation (slot 1-12 on the IPD12000 or slot 1-4 on the IPD4000).

   b. Slide the TAM1500-12 firmly into the chassis. DO NOT USE EXCESS FORCE.

   c. Secure the TAM1500-12 by tightening the fastening screws on the module faceplate.

   d. Verify that the PWR (Power) LED on the TAM1500-12 faceplate is illuminated.

3. Connect the T1 Line(s).

Plug the T1 cable into the RJ21 connector for the chosen slot on the back of the IP DSLAM. The TAM1500-12 will connect with remote T1 modems at distances up to 6,000 feet before requiring a T1 repeater. For each port being connected to a remote T1 modem, verify that the T1 link has been established; the T1 LK LED for that port will show steady illumination to indicate the connection has been made. Link up should occur within 20 seconds depending on the quality, gauge and distance of the copper cables. Default bandwidth for the TAM1500-12 is 1,536 kbps.

T1 RJ21 Connector Port Pinout

PORT	1	2	3	4	5	6	7	8	9	10	11	12
RX Tip	26	27	28	29	30	31	32	33	34	35	36	37
RX Ring	1	2	3	4	5	6	7	8	9	10	11	12
TX Tip	39	40	41	42	43	44	45	46	47	48	49	50
TX Ring	14	15	16	17	18	19	20	21	22	23	24	25

(Pins 13 and 38 are not used)

> **NOTE** Once the TAM1500-12 has been installed, all settings are software selectable via Net to Net Technologies' Network Management System (NMS). For further information regarding TAM1500-12 configuration and management please refer to the Circuit Configuration section further on in this manual and/or to the Management User Guide for IP and Mini DSLAMs.

OVERVIEW

TAM1500-12 Management

Statistical and configuration data for the TAM1500-12 are maintained in an embedded web server that resides within the firmware of Net to Net Technologies' Multiplexer Uplink Modules (MUMs). This firmware contains Net to Net's Network Management System (NMS) and Simple Network Management Protocol (SNMP).

Accessing TAM1500-12 data in a newly installed IP DSLAM

a. Connect your PC to the Ethernet RJ45 MGMT port located on the faceplate of the MUM installed in your IP DSLAM.

b. Verify the connection; solid illumination of the MGMT LNK LED on the MUM faceplate indicates the connection has been established.

c. Launch a web browser such as Microsoft Internet Explorer (v4.0 or higher) or Netscape Navigator (v4.0 or higher).

d. Type the default IP address into the address field at the top of your browser and press the Enter key.

- 192.168.254.252 if the MUM is in slot 13 (IPD12000) or slot 5 (IPD4000)
- 192.168.254.253 if the MUM is in slot 14 (IPD12000)

e. Log in with a default username and password (both of which are case sensitive). Please note that General Users have "read only" access; for NMS configuration you must log in as a Superuser.

- general / Password
- superuser / Password

> **NOTE** Once accessed initially, the management system within the MUM can be configured such that NMS and SNMP can be reached from any computer on your network. For further instruction please refer to the Management User Guide for IP and Mini DSLAMs.

Accessing TAM1500-12 data in a previously installed IP DSLAM

a. Establish a connection with the MUM either directly (through the Ethernet RJ45 MGMT port on the MUM faceplate) or, if the system has been so configured, from a PC on your network.

b. For direct connections verify that the MGMT LNK LED on the MUM faceplate is illuminated indicating the connection has been established.

c. Launch a web browser such as Microsoft Internet Explorer (v4.0 or higher) or Netscape Navigator (v4.0 or higher).

d. Enter the assigned IP address* into the address field at the top of your browser window. Press the Enter key.

e. Log in with your assigned username and password.* Please note that General Users have "read only" access; for NMS configuration you must log in as a Superuser.

*If the IP address, username or password is unknown, contact your System Administrator or Information Technology Manager.

Default Settings

No configuration is necessary for the TAM1500-12 to operate at default settings. If however, a change is required, default settings can easily be modified within NMS. For information regarding specific parameter configurations, refer to the TAM1500-12 Circuit Configuration section on the following page and/or the Management User Guide for IP and Mini DSLAMs.

Management Password Administration Defaults*

General Username: general   Super Username: superuser

General Password: Password   Super Password: Password

*Usernames and passwords are case sensitive.

Management System Configuration Defaults

IP Addresses:		Subnet Mask:	255.255.255.0
IPD12000 slot 13	192.168.254.252	Default Gateway:	0.0.0.0
IPD12000 slot 14	192.168.254.253	In-band Management:	disabled
IPD4000 slot 5	192.168.254.252	Uplink VLAN ID:	0

TAM1500-12 Circuit Defaults

Circ. ID:	n/a	Pri [Priority]:	0
IP Range 1:	0.0.0.0 - 255.255.255.255	Flood:	Upl [Uplink]
IP Range 2:	0.0.0.0 - 0.0.0.0	Frame Type:	ESF [Extended Super Frame]
Speed:	1,536 kbps	Line Code:	B8ZS [Bipolar with 8 Zero Substitution]
Protocol:	ALL	Tx Buildout:	0dB [decibels]
Backbone-VLAN:	0	Clock Source:	Local
VLAN:	0 - 0		

Data Storage

Configuration backup is inherent in the TAM1500-12. Upon initial power up of the IP DSLAM, the default parameters of the TAM1500-12 will remain in place unless changed through NMS. Once changed, new configurations will automatically be recorded in the Random Access Memory (RAM) of the TAM1500-12 and the Non-Volatile Random Access Memory (NVRAM) of the MUM. While data stored in TAM1500-12 RAM will be erased if the unit loses power, data stored within MUM NVRAM will remain intact (even if the unit loses power) unless deliberately cleared or reconfigured.

TAM1500-12 CIRCUIT CONFIGURATION

Circuit configurations common to all Access Module models are defined in the Management User Guide for IP and Mini DSLAMs. Circuit configurations specific to T1 technology are outlined below. Default settings for any of these may be altered via the Circuit Configuration window of Net to Net's Network Management System (NMS).

Speed

There are eight timeslot/bandwidth options for the T1 link; default is 1,536 kbps across all 24 channels. Remote T1 modems determine line speed through their communication with the TAM1500-12.

TAM1500-12 Timeslot & Bandwidth Options

Timeslots	1-3	1-6	1-9	1-12	1-15	1-18	1-21	**1-24**
Bandwidth (kbps)	192	384	576	768	960	1,152	1,344	**1,536**

Frame Type

Frame type is the T1 data encapsulation method. A frame consists of 193 bits (8-bit samples of each of the 24 T1 channels plus a synchronization bit) transmitted at a rate of 8,000 frames per second (1,544 kbps) across the T1 line.

Super Frame
Super Frame (SF) format assembles data into 12-frame transmission clusters.

Extended Super Frame (Default)
Extended Super Frame (ESF) format, used in Wide Area Networks (WANs), assembles data into 24-frame transmission clusters and integrates the following:

- Facilities Data Link (FDL) - communication support through in-service monitoring and diagnostics
- Cyclic Redundancy Check (CRC) - detects line errors and scrutinizes data integrity

Line Code

Line code is the T1 mode of transmission. The following line code options fall within the International Telecommunication Union - Telecommunication Standardization Sector (ITU-T) G.703 Standards for Transmission Facilities.

Bipolar with 8 Zero Substitution (Default)
Bipolar with 8 Zero Substitution (B8ZS) is used to accomodate the minimum ones density requirement in the North American public network. B8ZS line coding helps prevent loss of synchronization between the TAM1500-12 and remote T1 modems by using bipolar violations to guarantee there will always be pulses in the line.

Alternate Mark Inversion
The Alternate Mark Inversion (AMI) mode of transmission simply alternates positive and negative pulses. It is typical, with AMI, for a link to encounter long strings of zeros which can potentially cause loss of synchronization between remote units. Net to Net Technologies' products however, meet the North American minimum ones density requirement internally such that, even with AMI, loss of synchronization is prevented between the TAM1500-12 and remote T1 modems as it is with B8ZS line coding.

Tx (Transmit) Buildout

Shorter distances between the TAM1500-12 and remote modems require increasing line attenuation in order to prevent the T1 signal from becoming too strong for the repeaters, switches and other T1 transmission equiment that may be encountered along the line. Increased line attenuation translates into decreased transmit amplitude of the T1 signal.

0db (Default)
Receivers on most newer T1 equipment (repeaters, switches, etc.) can automatically adjust for incoming amplitude, allowing them to run at zero attenuation regardless of distance.

-7.5db, -15db or -22db
Some older T1 equipment (repeaters, switches, etc.) cannot automatically adjust for incoming amplitude, in which case, it may be necessary to set attenuation manually (through NMS) from the choices above.

Timing

Local (Default)
The transmit clock source will originate from an oscillator onboard the TAM1500-12.

Loop
The transmit clock source will originate from the remote T1 modem.

ADDITIONAL INFORMATION

LED Indicators

LED	State	Indication	Additional Information
PWR (Power)	solid green	unit is operational	If the Power LED is not illuminated, it is unlikely the TAM1500-12 is receiving power and none of the LEDs will be illuminated.
T1 LK (Link)	solid green	T1 connection is established	A T1 link exists and the port may be transmitting data but it is not receiving any packets from the remote T1 modem.
	pulsing green	T1 connection is established and active	The port is receiving valid data or status packets from the remote T1 modem.
	no illumination	**Red Alarm** The incoming connection to the port has been lost; no data is being received.	If the outgoing connection from the port has also been lost then the remote T1 modem will be in Red Alarm as well.
T1 RX (Receiving)	flashing amber	T1 activity	The port is either receiving data from the remote T1 modem or statistical packets from the IP DSLAM management.
	solid amber	heavy Rx traffic	The port is receiving large amounts of data from the remote T1 modem.
	no illumination	no activity	A link may exist but the port is not receiving any data from the remote T1 modem.

T1 TX (Transmitting)	flashing amber	T1 activity	The port is transmitting data to the remote T1 modem.
	solid amber	heavy Tx traffic	The port is transmitting large amounts of data to the remote T1 modem.
	no illumination	no activity	A link may exist but the port is not transmitting any data to the remote T1 modem.
T1 AL (Alarm)	no illumination	T1 is operational	Note: If the T1 LK LED also remains unlit then the port is in Red Alarm.
	solid amber	**Yellow Alarm** The outgoing connection from the port has been lost; no data is being transmitted.	The remote T1 modem has lost its incoming connection and is in Red Alarm.
	pulsing amber	**Blue Alarm** An indirect connection has been lost; the port may no longer be receiving data from the remote T1 modem.	The remote T1 modem has lost a connection with an intermediate device and is in Red or Yellow Alarm.

(A pulsing LED blinks steadily at a rate of once per second. A flashing LED blinks at a more rapid, less constant rate.)

Regulatory Compliance

FCC Regulatory Compliance Information for Class A Equipment

Note: 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.

Caution: Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

FCC Regulatory Compliance Information for T1 Equipment

Note: This equipment complies with Part 68 of the FCC rules and bears a label that contains the FCC registration number. This information must be provided to the telephone company if requested. This equipment should be connected to the telephone network or premise wiring using compatible modular plugs and cabling in compliance with the requirements of Part 68 of the FCC rules, using the following standard jack types: (1) RJ-48H: TNE1500-P-12-XX, TAM1500-12 or (2) RJ-48C: TNE1500-X, UIM-T1.

In the unlikely event that this equipment harms the telephone network, the telephone company can temporarily disconnect your service. The telephone company will try to warn you in advance of any such disconnection, but if advance notice isn't practical, it may disconnect the service first and notify you as soon as possible thereafter. In the event such a disconnection is deemed necessary, you will be advised of your right to file a complaint with the FCC. Additionally, the telephone company may, from time to time, make changes in its facilities, equipment, or operations that could affect the operation of this equipment. If this occurs, the telephone company is required to provide you with advance notice so you can make the modifications necessary to maintain uninterrupted service.

Caution: This unit does not contain any user serviceable parts. Repair service and/or warranty information may be obtained by contacting Customer Support at Net to Net Technologies, Inc.:

> 112 Corporate Drive, Suite 1, Portsmouth, NH 03801
> (603) 427-0600 / (877) 638-2638, Contact@NetToNet.com / www.nettonet.com

Industry Canada Regulatory Compliance Information for Class A Equipment

This Class A digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la Classe A est conforme à la norme NMB-003 du Canada.

Industry Canada Regulatory Compliance Information for T1 Equipment

Notice: The Industry Canada label identifies certified equipment. This certification means that the equipment meets telecommunications network protective, operational, and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements documents. The department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas. Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.