

# 28 WAN Links

## Introduction

This chapter describes the procedures for configuring a “WAN link” between an already created PPP Entity (see Chapter 27, “Point-to-Point Protocol”) and the physical interface that will be used to carry PPP traffic. The procedures described in this chapter comprise the third and final step in the three-step process for configuring the operation of PPP on your OmniAccess 512 (the complete three-step process was also described in Chapter 27).

Here is a brief review of the PPP configuration process: the first step is to configure the physical interfaces that will carry PPP traffic. The second step is to configure the operation of PPP itself by creating “PPP Entities.” The third step is to configure the “link” between an existing PPP Entity and the physical interface that will be used to carry PPP traffic (hence the name “WAN Links”).

## Configuring WAN Interfaces

Three kinds of physical WAN interfaces can support PPP connections: serial ports, T1/E1 channels, and ISDN lines. The “WAN Links” you create to support PPP connections vary somewhat, depending upon the type of physical interface being used. When the physical interface being used is a Universal Serial Port (USP) or a fractional T1/E1 channel (which are permanent channels), the port is dedicated to the PPP connection and the “WAN Link” simply identifies the physical interface in terms of the slot and port.

### ♦ Important Note ♦

The front panel of an OA-512 switch is divided into several areas labeled **S1, S2, S3**, etc. Conceptually, think of these areas as a division of the switch into several modules, or slots. For more information on slot designation, see Chapter 1 titled “OmniAccess 512 Switches.”

When the physical interface being used is an ISDN interface (which provides dynamic, switched connections), the “WAN Link” identifies the numbering information that is to be used to establish the serial connection and the slot/port if necessary.

### Related Hardware Chapters

The configuration of an ISDN interface is described in Chapter 29, “Managing ISDN Ports.” The configuration of a T1/E1 interface is described in Chapter 30, “Managing T1 and E1 Ports.” The configuration of a universal serial port (USP) on a WSM-S board is described in Chapter 25, “Managing WAN Switching Submodules.” The ISDN WSM board (WSM-BRI) also contains a USP; this port on the WSM-BRI board may be configured in a similar manner to the USP ports on the WSM-S board.

# The Link Submenu

The WAN menu contains a submenu named **link** which contains commands for creating the WAN Links needed to support the Point-to-Point Protocol (PPP) over various hardware interfaces. WAN links can either be “fixed” (i.e., configured for a serial port or T1/E1 port), or dial-based (i.e., configured for an ISDN port). The link UI commands also provide a means of modifying and viewing existing WAN Links and displaying their operational status.

To switch to, and to display, the **link** menu, enter the following commands:

```
link
?
```

A screen similar to the following displays:

Command	Link Menu
linkadd	Add a Link configuration entry
linkmodify	Modify an existing Link configuration entry
linkdelete	Delete an existing Link configuration entry
linkview	View configuration of WAN Link(s)
linkstatus	Status of WAN Link(s)
Main	File
Interface	Security
	Summary
	System
	VLAN
	Services
	Networking
	Help

Each of the commands on this menu is described in the following sections.

## Adding a WAN Link

The **linkadd** command is used to add link configuration records, or “WAN Links” to the switch. This command defaults to a WSM physical port (serial or Fractional T1/E1). When the **linkadd** command is used to create links over WSM ports, all of the parameters needed to create the link are contained on one screen. However, when you select to create a link over an ISDN port, a second screen will be displayed after you enter and save the initial parameters on the first screen.

The first subheading (*Adding WSM Port Links*) below shows the sequence of screens when creating a link over a WSM port. The second subheading below (*Adding ISDN Call Links* on page 28-4) shows the sequence of screens when creating a link over an ISDN port.

### Adding WSM Port Links

1. To add a link over a WSM port, you must enter a Peer ID number (associated with a “PPP Entity”) with the command. See Chapter 27, “Point-to-Point Protocol,” for details on creating Peer IDs.

For example, to create a link for Peer ID 1, enter the following command (where **p1** is the Peer ID number):

```
linkadd p1
```

A screen similar to the following displays:

**Adding Link for Peer ID 1, Link Index 1:**

```

1)  Description : Link Entry: 2, Peer ID: 1
    {Enter text up to 31 characters}
2)  Administrative Status ..... = Enabled
    {(E)nabled, (D)isabled}
3)  Link Type ..... = WSM Port
    {(W)SM Port, (I)SDN call}
4)  Link Slot ..... = 0
    {Slot number or 0 if not tied to a slot}
5)  Link Port ..... = 0
    {Port number or 0 if not tied to a port}

(save/quit/cancel)
:
```

To alter a parameter, enter the line number for the parameter, followed by an equal sign (=), then the new value. For example, to change the **Link Type** (line 3) from WSM Port to ISDN call, you would enter:

```
3=I
```

When you have completed configuring parameters, enter **save**. Your new values will be saved and you will exit this menu. If you want to exit this menu without saving changes, simply enter **quit** or **cancel**.

The fields on this screen have the following meanings:

#### Description

A textual description used to identify this WAN Link. The default text indicates the link entry number and the Peer ID number.

### Administrative Status

Sets the Administrative Status of this WAN Link. The options are “**Enabled**,” which will enable this link and “**Disabled**,” which will disable the link but not delete it.

### Link Type

Specifies the type of physical connection that will carry the link. The options are “**WSM Port**,” which means a serial or Fractional T1/E1 connection and “**ISDN**,” which means an ISDN call will be used to make the connection.

### Link Slot

Specifies the switch slot number to be used by this WAN Link. For the OmniAccess 512, this is always slot 3.

### Link Port

Specifies the switch port number to be used by this WAN Link.

2. To make a change to the values for any of the fields on this screen, enter the field's line number followed by the desired value.
3. To add the link for a WSM port, you must specify which switch port and slot is to be used. To do so, you must make changes to the values for items 4 and 5. For example, if your WSM port is in slot 3, port 2, you would enter the following three commands:

```
: 4=3
: 5=2
: save
```

After entering the **save** command, you will be returned to the system prompt.

## Adding ISDN Call Links

1. To create a link over ISDN, you must enter a Peer ID number (associated with a “PPP Entity”) with the command. See Chapter 27, “Point-to-Point Protocol,” for details on creating Peer IDs.

For example, to create a link for Peer ID 1, you would enter the following command (where **p1** is the Peer ID number):

```
linkadd p1
```

A screen similar to the following displays:

```
Adding Link for Peer ID 1, Link Index 1:
```

- ```
1) Description : Link Entry: 2, Peer ID: 1
   {Enter text up to 31 characters}
2) Administrative Status ..... = Enabled
   {(E)nabled, (D)isabled}
3) Link Type ..... = WSM Port
   {(W)SM Port, (I)SDN call}
4) Link Slot ..... = 0
   {Slot number or 0 if not tied to a slot}
5) Link Port ..... = 0
   {Port number or 0 if not tied to a port}
```

```
(save/quit/cancel)
:
```

2. You must now change the Link Type to ISDN. To do so, enter the following commands:

```
: 3=I
: ?
```

A screen similar to the following displays:

```
1)  Link Description :
    {Enter text up to 31 characters}
2)  Link Administrative Status ..... = Enabled
    {(E)nabled, (D)isabled}
3)  Link Type ..... = ISDN Call
    {(W)SM Port, (I)SDN call}
4)  Link Slot. .... =
    {Slot number or 0 if not tied to a slot}
5)  Link Port ..... =
    {Port number or 0 if not tied to a port}

(save/quit/cancel)
:
```

3. You must now enter the ISDN slot and port numbers that will be used by this WAN Link. For example, to use slot 3, port 2, you would enter the following commands:

```
: 4=3
: 5=2
```

#### Note

Incoming and backup ISDN calls may dynamically select and use any available slot and port. However, you *must* specify an ISDN slot and port for the link when you first create its WAN Link.

A screen similar to the following displays:

```
Modify ISDN call record configuration. Peer ID: 1 Link Index: 1
Type: ISDN Call Slot: 3 Port: 2

1) Link Description : Link Entry: 1, Peer ID: 1
   {Enter text up to 30 characters}
2) Link Administrative Status ..... = Enabled
   {(E)nabled, (D)isabled}
3) Inactivity Timer ..... = 0
   {1-9999 seconds or 0 if disabled}
4) Minimum call duration ..... = 0
   {1-9999 seconds or 0 if disabled}
5) Maximum call duration ..... = 0
   {1-9999 seconds or 0 if disabled}
6) Outgoing Calls ..... = Enabled
   {Enable, Disable}
   60) Call Originate Mode ..... = On-Demand
      {(O)n-Demand or (B)ackup}
   61) Carrier Delay Timeout ..... = 0
      {Call completion timeout 1-999 seconds}
   62) Maximum Call Retries ..... = 1
      {Retry call count, 0 if infinite}
   63) Retry Delay ..... = 0
      {Seconds between retry attempts, 0 = retry immediately}
   64) Failure Delay ..... = 0
      {Secs after max calls failed to retry,
       0 = don't retry after max calls failed}
   65) Remote Phone Number ..... =
      {digits 0 through 9}
   66) Desired Calling Speed ..... = 64000
      {56000, 64000}
7) Incoming calls ..... = Enabled
   {Enabled, Disabled}

(save/quit/cancel)
:
```

The fields on this screen have the following meanings:

### Link Description

A textual description used to identify this WAN Link.

### Link Administrative Status

Sets the Administrative Status of this WAN Link. The options are “**Enabled**,” which will allow the link to operate and “**Disabled**,” which will disable the link without deleting it.

### Inactivity Timer

Sets the time period (in seconds) after which the connection will be terminated if it is not carrying useful data. “Useful data” refers to forwarding packets (routing information), but not to encapsulator maintenance frames. An entry of zero (**0**) specifies no disconnection due to inactivity. The Inactivity Timer is disabled for outgoing backup calls, and should be disabled by the user for incoming calls that are used to backup.

**Minimum Call Duration**

The minimum duration of a call, in seconds, starting from the time the call is connected until the call is disconnected. If you enable this field by entering a nonzero value, the Inactivity Timer will be disabled until the time set in the Minimum Call Duration field has passed.

**Maximum Call Duration**

The maximum call duration in seconds. An entry of zero (0) means “unlimited.”

**Outgoing Calls**

Sets whether outgoing calls can be made by this WAN Link. The option “**Enabled**” will allow the link to make outgoing calls while “**Disabled**” will not allow the link to make outgoing calls. These suboptions further specify the details of the outgoing calls:

***Call Originate Mode***

Specifies whether the call is to be initiated on demand or only when operating as a backup to another link.

***Carrier Delay Timeout***

The amount of time, in seconds, allowed for a call to be completed.

***Maximum Call Retries***

The number of calls to a non-responding address that may be made. An entry of zero (0) means there is no limit to the number of retries. The intent of this parameter is to limit the number of successive calls to an address which is inaccessible or which refuses those calls. Some countries regulate the number of call retries to a given peer that can be made.

***Retry Delay***

The time, in seconds, between call retries if a peer cannot be reached. An entry of zero (0) means that call retries may be done without any delay.

***Failure Delay***

The time, in seconds, after which call attempts are to be made again after a peer has been noticed to be unreachable (i.e., after the limit set in **Maximum Call Retries** has been reached). An entry of zero (0) means that a peer will not be called again after the maximum number of unsuccessful call attempts has been made.

***Remote Phone Number***

The phone number that is to be dialed in order to make the connection. Only one phone number can be associated with a single WAN Link. You can add other WAN Links if you want to use multiple phone numbers.

***Desired Calling Speed***

The desired calling speed. The options are 56000 and 64000 bits/second. You should set this parameter to the maximum speed supported by the telephone switch to which you will be connecting.

**Incoming Calls**

Sets whether incoming calls are to be accepted by this WAN Link. “**Enabled**” will allow the link to accept calls. “**Disabled**” will not allow the link to accept calls.

4. You must now enter a value in at least the **Remote Phone Number** field under **Outgoing Calls**. If you do not make an entry in this field, an error will be returned by the system when you attempt to save and exit the screen.

You can also make changes to any of the other fields on this screen if they are needed to provide ISDN call information this WAN Link. The default settings should suit many situations; however, you will need to determine what information will be needed to support your ISDN calls and make the appropriate entries in the fields on this screen.

5. Enter the **save** command when you are ready to create the WAN Link.

The system prompt will then reappear.

## Modifying a WAN Link

The **linkmodify** command is used to modify the parameters of an existing WAN Link. Different parameters will be displayed by the command based on the type of link. The first subheading (*Modifying ISDN Links*) below shows the sequence of screens when modifying a link over a WSM port. The second subheading below (*Modifying WSM Links* on page 28-10) shows the sequence of screens when modifying a link over an ISDN port.

### Note

The Slot and Port fields in an existing WAN Link record cannot be modified. To change them, you must delete the record then create a new record.

## Modifying ISDN Links

1. To modify a WAN Link, you must enter its Link Index with the command. For example, to modify Link Index 1 which uses ISDN, you would enter the following command:

```
linkmodify L1
```

A screen similar to the following displays:

```
Modify ISDN call record configuration. Peer ID: 1 Link Index: 1
Type: ISDN Call Slot: 3 Port: 1

1) Link Description : Link Entry: 1, Peer ID: 1
   {Enter text up to 30 characters}
2) Link Administrative Status ..... = Enabled
   {(E)nabled, (D)isabled}
3) Inactivity Timer ..... = 30
   {1-9999 seconds or 0 if disabled}
4) Minimum call duration ..... = 0
   {1-9999 seconds or 0 if disabled}
5) Maximum call duration ..... = 0
   {1-9999 seconds}
6) Outgoing Calls ..... = Enabled
   {Enable, Disable}
60) Call Originate Mode ..... = On-Demand
    {On-Demand or (B)ackup}
61) Carrier Delay Timeout ..... = 0
    {Call completion timeout 1-999 seconds}
62) Maximum Call Retries ..... = 0
    {Retry call count, 0 if infinite}
63) Retry Delay ..... = 0
    {Seconds between retry attempts, 0 = retry immediately}
64) Failure Delay ..... = 0
    {Secs after max calls failed to retry,
     0 = don't retry after max calls failed}
65) Remote Phone Number ..... =
    {digits 0 through 9}
66) Desired Calling Speed ..... = 64000
    {56000, 64000}
7) Incoming calls ..... = Enabled
   {Enabled, Disabled}

(save/quit/cancel)
:
```

The fields on this screen are the same as those produced by the **linkadd** command. See *Adding a WAN Link* on page 28-3 for descriptions of each of these fields.

2. Make the desired changes to each of the fields on this screen, then enter the **save** command to implement your changes.

The system prompt will then reappear.

## Modifying WSM Links

1. To modify a WAN Link, you must enter its Link Index with the command. For example, to modify Link Index 2 which uses a WSM physical port (serial or Fractional T1/E1), you would enter the following command:

**linkmodify L2**

A screen similar to the following displays:

**Modify Serial Port Link configuration. Peer ID: 2 Link Index: 2**  
**Type: WSM port Slot: 3 Port: 1**

- 1) **Link Description : Link Entry: 2, Peer ID: 2**  
**{Enter text up to 30 characters}**
- 2) **Link Administrative Status ..... = Enabled**  
**{(E)nabled, (D)isabled}**

**(save/quit/cancel)**  
**:**

The fields on this screen are the same as those produced by the **linkadd** command. See *Adding a WAN Link* on page 28-3 for descriptions of each of these fields.

2. Make the desired changes to the fields on this screen, then enter the **save** command to implement the changes.

The system prompt will then reappear.

## Deleting WAN Links

The **linkdelete** command is used to delete one or more existing WAN Link records.

### Note

Before you can delete a PPP Entity, you must first delete all WAN Links that have been associated with it. See *Deleting a PPP Entity* in Chapter 27 for complete information.

1. To delete an existing WAN Link, for example, Link Index 2, you would enter the following command:

**linkdelete L2**

A screen similar to the following displays:

**This will delete the configuration for Link Peer ID: 3 Link Index: 2**  
**Continue ? {(Y)es, (N)o} : N**

2. If you wish to delete this link, enter **y** and press **Enter**. If you wish to abort the deletion, just press **Enter** to accept the default answer of “No.”

The system prompt will then reappear.

## Viewing WAN Links

The **linkview** command is used to view information on existing WAN Link records.

### Displaying All Existing WAN Links

To view information on all existing WAN Links, enter the following command:

```
linkview
```

A screen similar to the following displays:

```
List of ISDN Port Type:
Peer Link  Link  Link  Link  Outgoing  Incoming  Peer  Inac.  Min/Max  Call
Id   Index Mode  Slot Port  Called Num. Caller Id. Speed Timer  Dur.    Retry
=====
   1    1  DEM   3    2    7145555555 8015551212 56000    0    0/0     0
   2    2  BKP   3    2    7145551212 8015555555 64000    0    0/0     0

List of WSM Port Type:
Peer Link  Link  Link
Id   Index Slot  Port
=====
   1    1    3    1
```

The fields on this screen have the following meanings:

#### Peer ID

The number assigned to the PPP Entity that is related to this WAN Link. You assign this number when you create the PPP Entity (see Chapter 27, “Point-to-Point Protocol,” for more information on creating PPP Entities).

#### Link Index

The number assigned by the system to this WAN Link; used to identify the link in the table.

#### Link Mode

Indicates whether this WAN Link is on-demand (“DEM”) or back-up (“BKP”). On-demand links are brought up only when data is ready to be sent. Backup links are brought up when a primary link fails.

#### Link Slot

The number of the physical switch slot that is to be used for this connection. For the Omni-Access 512, this is always slot 3.

#### Link Port

The number of the physical switch port that is to be used for this connection.

#### Outgoing Called Number

The phone number that is to be dialed in order to establish the connection.

**Incoming Caller ID**

The phone number reported by the Caller ID service, if available.

**Peer Speed**

The specified calling speed for this link. The options are 56000 and 64000 bits/second.

**Inactivity Timer**

Specifies the time period (in seconds) after which the connection will be terminated if it is not carrying useful data. "Useful data" refers to forwarding packets (routing information) but not encapsulator maintenance frames. Zero (0) specifies no disconnection due to inactivity.

**Min/Max Duration**

The minimum and maximum duration of a call, in seconds, starting from the time the call is connected until the call is disconnected. Zero (0) means "unlimited."

**Call Retry**

The number of calls that may be made to a non-responding address. A count of zero (0) means there is no limit to the number of call retries.

**Displaying Information for a Specific WAN Link**

To view detailed information on a *specific* WAN Link, you must enter its Link Index with the command. Different parameters will be displayed based on the type of link being used.

**Example of an ISDN Link**

To examine an ISDN link, for example, Link 1, you would enter following command:

```
linkview L1
```

A screen similar to the following displays:

```
View ISDN call record configuration. Peer ID: 1 Link Index: 1
Type: ISDN Call Slot: 3 Port: 2

1) Link Description :
2) Link Administrative Status ..... = Enabled
3) Inactivity Timer ..... = 30
4) Minimum call duration ..... = 0
5) Maximum call duration ..... = 0
6) Outgoing Calls ..... = Enabled
60) Call Originate Mode ..... = On-Demand
61) Carrier Delay Timeout ..... = 0
62) Maximum Call Retries ..... = 1
63) Retry Delay ..... = 0
64) Failure Delay ..... = 0
65) Remote Phone Number ..... = 7145551212
66) Desired Calling Speed ..... = 64000
7) Incoming calls ..... = Enabled
```

The fields on this screen provide the same information as those on the **linkadd** screen. See *Adding a WAN Link* on page 28-3 for descriptions of each of these fields.

### Example of WSM Serial or T1/E1 Link

An example of a link over a WSM serial or Fractional T1/E1 port would look like this:

**View ISDN Link configuration. Index: 2 Link Peer ID: 3**  
**Type: WSM port Slot: 3 Port: 2**

- 1) **Link Description : Link Entry: 1, Peer ID: 1**  
**{Enter text up to 31 characters}**
- 2) **Link Administrative Status ..... = Enabled**  
**{(E)nabled, (D)isabled}**

The fields on this screen provide the same information as those on the **linkadd** screen. See *Adding a WAN Link* on page 28-3 for descriptions of each of these fields.

## Displaying Link Status

The **linkstatus** command is used to display the operational status of WAN Links.

### Displaying Status for All WAN Links

To view information on all WAN Links, enter the following command:

```
linkstatus
```

A screen similar to the following displays:

| Link<br>Idx | Peer<br>Id | Slot/Port | Last Setup Time |
|-------------|------------|-----------|-----------------|
| ====        | =====      | =====     | =====           |
| 1           | 1          | 3/2       | 00:00:00 03/97  |
| 2           | 2          | 3/2       | 00:00:00 03/97  |

  

| Active Session: |               |            |                    |               |             |              |
|-----------------|---------------|------------|--------------------|---------------|-------------|--------------|
| Setup<br>Time   | Link<br>Index | Peer<br>Id | Peer<br>Call Addr. | Conn.<br>Time | Call<br>St. | Call<br>Org. |
| ====            | =====         | =====      | =====              | =====         | =====       | =====        |
| 00:00           | 1             | 1          | 8188783500         | 00:00         | CON         | ANS          |
| 00:00           | 2             | 1          | 8188783500         | 00:00         | CON         | ANS          |

The fields on this screen have the following meanings:

#### Link Index

The number assigned to identify this WAN Link.

#### Peer ID

The number assigned to the PPP Entity that is related to a WAN Link (indicated by Link Index).

#### Slot/Port

The slot and port numbers associated with a given Link Index and Peer ID.

#### Last Setup Time

The value of “sysUpTime” (the time of day recorded by the switch) when the last call to this peer was started. For ISDN, this will be the time when the setup message was received from or sent to the network. This field will be updated whenever a call is started or answered.

#### Active Session

The following information is available for the active ISDN session, if one is in progress:

##### **Setup Time**

The value of “sysUpTime” (the time of day) when the call to this peer was started.

##### **Peer Id**

The Peer ID that is related to this active ISDN session.

### **Peer Call Address**

The number to which this call is connected. Zero (0) means the number is not available.

### **Connection Time**

The value of “sysUpTime” (the time of day) when the call was connected. Zero (0) means the call is not currently connected.

### **Call State**

The current call state. The possible entries are **IDLE** (meaning there is no active call), **CONT** (meaning the call is in the process of connecting), **CONN** (meaning the call is connected), **ACTX** (meaning the call is active), **DISC** (meaning the call has been disconnected), and **UNKN** (meaning that the state is unknown).

### **Call Origination**

The call origin. Possible entries are **OUTG** (meaning the call was outgoing) and **INCM** (meaning the call was incoming).

## **Displaying Status for a Specific WAN Link**

To view detailed status information on a *specific* WAN Link, you must enter its Link Index with the command.

For example, to examine Link 1 (an ISDN link), you would enter following command:

```
linkstatus L1
```

A screen similar to the following displays:

#### **Status for Link Index: 1**

```
Connect Time ..... 0
Success Calls ..... 0
Failed Calls ..... 0
Accepted Calls ..... 0
Refused Calls ..... 0
Last Setup Time ..... 12:56:00 3/96
```

The fields on this screen have the following meanings:

### **Connect Time**

Accumulated connect time to the peer since system start-up. This is the total connect time, i.e., the connect time for outgoing calls plus the time for incoming calls.

### **Success Calls**

The number of completed calls to the Peer ID related to this WAN Link.

### **Failed Calls**

The number of failed call attempts, or any reason, to the Peer ID related to this WAN Link since system start-up.

### **Accepted Calls**

The number of calls from the Peer ID related to this WAN Link accepted since system start-up.

**Refused Calls**

The number of calls from the Peer ID that were refused, or any reason, since system start-up.

**Last Setup Time**

The value of “sysUpTime” (the time of day) when the last call to this peer was started. For ISDN, this will be the time when the setup message was received from or sent to the network. This field will be updated whenever a call is started or accepted.

