

ATxTel ShieldProAtten Attenuator

ATX-4C-9501-80 / ATX-8C-9501-80

4-Channel and 8-Channel Bidirectional USB/Ethernet Programmable Attenuator
200-8000MHz, 95dB, 0.1dB Step Size



Rev 2

contact us: sales@atxtel.com

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Introduction

ATX-4C-9501-80 and **ATX-8C-9501-80** are ATxTel's newest additions to its series of programmable RF attenuators. With a completely custom-machined aluminum enclosure, **ShieldProAtten** offers excellent RF isolation, making it ideal for Wi-Fi, cellular, and other RF-sensitive testing applications. **ShieldProAtten** provides both USB and Power over Ethernet (PoE) interfaces for easy testbed integration and network control.

ATxTel RF attenuators come pre-calibrated through careful and precise manual fine-tuning and require no further adjustments or calibration.

For any technical questions or concerns, please reach out to us at support@atxtel.com.

Quick Start

Requirements

- **Power:** USB Port or Power over Ethernet (PoE)
- **Communication:** USB type B or Ethernet
- **Web Browser:** Chrome, Edge or Safari

Physical Setup

Ethernet (PoE):

Connect ShieldProAtten with an RJ45 Ethernet cable to a PoE switch (Figure 1). Connect the control PC to the switch. Refer to the PC configuration section.

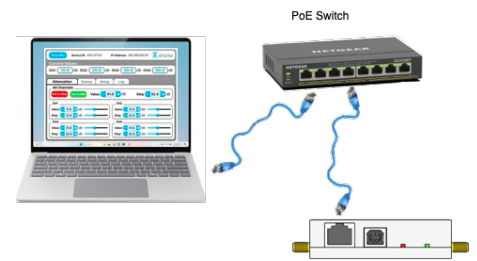


Figure 1: PoE Setup

Ethernet (non PoE):

Connect ShieldProAtten and the control PC with an RJ45 Ethernet cable and the included USB cable (USB-B connector) to power on the attenuator (Figure 2). Refer to the PC configuration section.

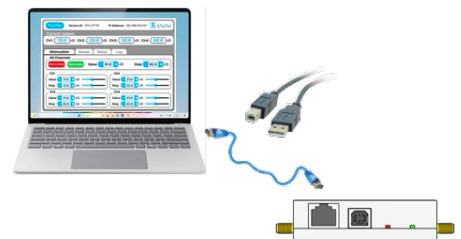
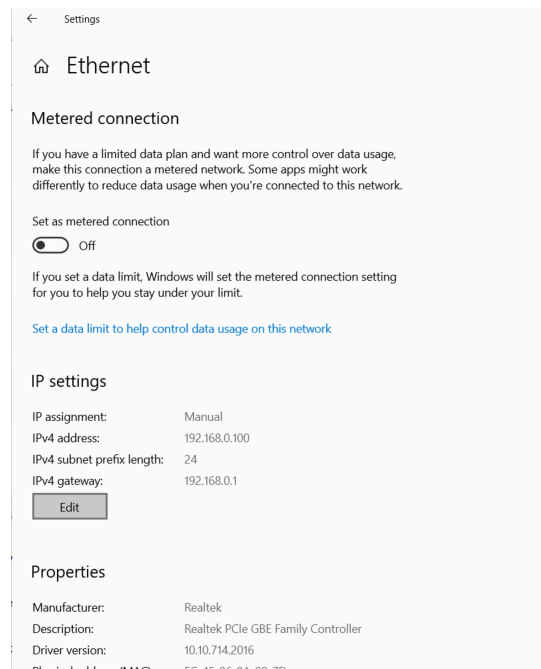
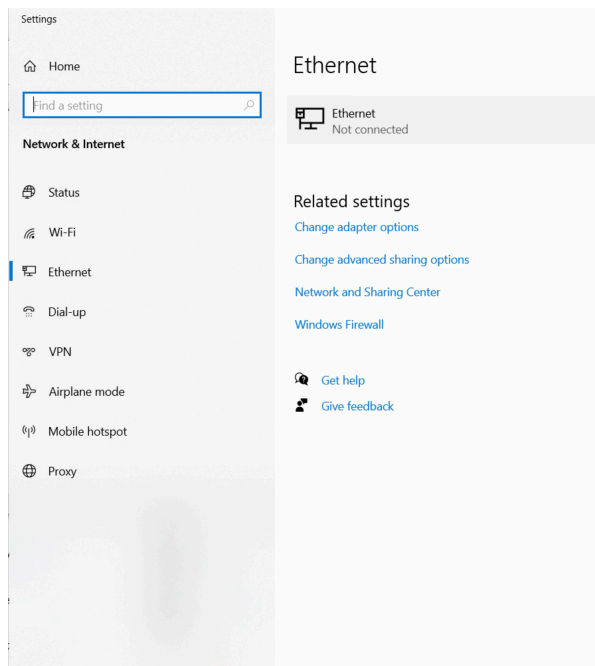
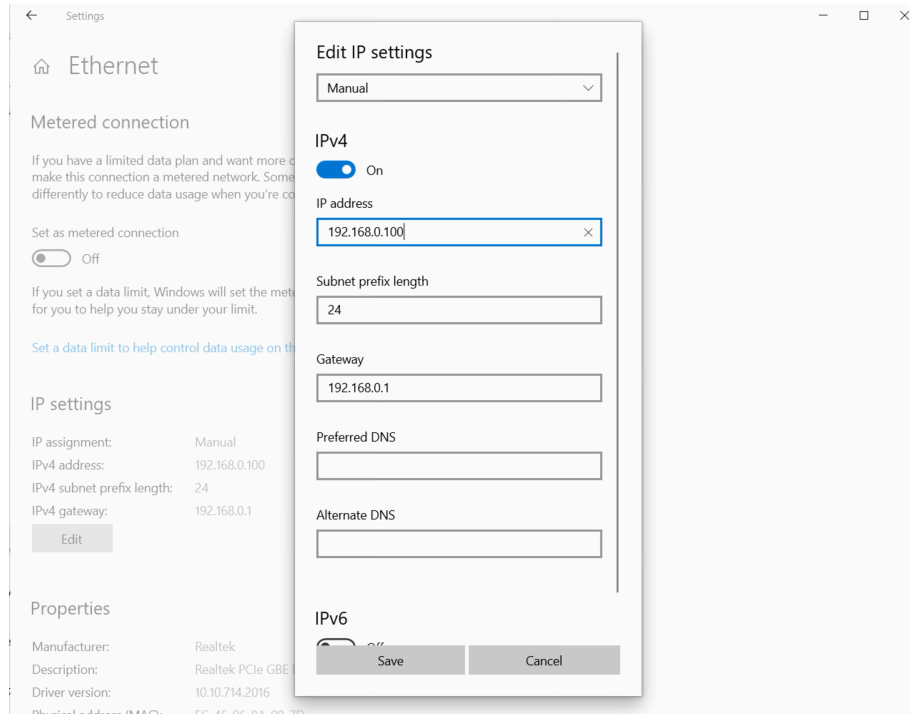


Figure 2: Non PoE Setup

PC Configuration

- **Configure the IP address in the Network Adapter settings**
- Goto Network Setting -> Ethernet -> IP settings [Edit]
- Change IP address to 192.168.0.xxx (except 86)





PC Configuration

- **Configure the IP address in the Network Adapter settings**
- Goto Network Setting -> Ethernet -> IP settings [Edit]
- Change the IP address to 192.168.0.xxx (except 86)
- Open the web browser and enter the address to **192.168.0.86**

Attenuator Monitoring Logging

To monitor the attenuator's set values in real-time, please Telnet to the set IP address of the attenuator (ie. 192.168.0.86) using the default **Telnet port 23**. This is for logging purposes only; no commands are accepted.

API Communication

Supported communication options are "Serial USB Control" and "Telnet Control".

Serial USB control is supported via a USB port with auto-negotiation.

Telnet control is supported via a Telnet connection. Create a Telnet session with the set IP address of the attenuator using **port # 8686**;

1.0 Communications

1.1 Communications supported

Supported communication options are “GUI Controller”, “Serial USB Control”, “Telnet Control”, and “Telnet Logging”.

1.1.1 GUI Controller

To connect to the attenuator using the user interface, please follow these steps:

1. Make sure that the controller laptop is connected to the attenuator via an Ethernet cable.
2. Set up the controller's laptop network to manual settings with the following parameters:
 - o IP address: 192.168.0.XXX (where XXX is any number between 2 and 255, excluding 86)
 - o Subnet mask: 255.255.255.0
 - o Gateway: 192.168.0.1
3. To ensure that the network settings are properly configured, check if the user can successfully ping 192.168.0.86.
4. If the ping is successful, open your browser and navigate to 192.168.0.86 on the controller. ShieldProAtten only supports non-secure HTTP connections.

1.1.2 Serial Control

Serial USB control is supported via a USB port with auto-negotiation.

1.1.3 Telnet Control

Telnet control is supported via a Telnet connection. Create a Telnet session using the attenuator's set IP address **with port 8686**.

1.1.4 Telnet Logging

This interface provides access to a logging resource. No commands are accepted. Create a Telnet session with the IP address with **port # 23**;

1.2 Ethernet Commands

1.2.1 COMMunicate[:ETHernet]:IP

Format:

Communicate:ethernet:ip (Address)

Description:

This command allows for the IP address to be changed. When this command is issued, the potential new IP will be held in memory until the COMM:ETH:SAVE command is received to trigger acceptance of the new value. **The default IP is currently 192.168.0.86.**

Parameter	Description	Range	Res	Default	Units
Address	IP address	Standard legitimate IP address range.	n/a	192.168.0.91	n/a

Examples:

Command	Action
COMM:IP 10.16.0.91	
	Prime a change of IP to 10.16.0.91

1.2.2 COMMunicate[:ETHernet]:GW

Format:

Communicate:ethernet:gw (Address)

Description:

This command allows for the gateway address to be changed. When this command is issued the potential new GW will be held in memory until the COMM:ETH:SAVE command is received to trigger acceptance of the new value. **The default GW is currently 192.168.0.1.**

Parameter	Description	Range	Res	Default	Units
Address	Gateway address	Standard legitimate GW address range.	n/a	192.168.0.1	n/a

Examples:

Command	Action
COMM:GW 10.16.0.1	
	Prime a change of GW to 10.16.0.1

1.2.3 COMMunicate[:ETHernet]:SN

Format:

Communicate:ethernet:SN (mask)

Description:

This command allows for the subnet mask to be changed. When this command is issued, the potential new subnet mask will be held in memory until the COMM:ETH:SAVE command is received to trigger acceptance of the new value. **The default subnet mask is currently 255.255.255.0.**

Parameter	Description	Range	Res	Default	Units
Mask	Subnet Mask	Standard legitimate subnet mask range.	n/a	255.255.255.0	n/a

Examples:

Command	Action
COMM:SN 255.255.0.0	
	Prime a change of SN to 255.255.0.0

1.2.4 COMMunicate[:ETHerNet]:SAVE

Format:

Communicate:ethernet:save

Description:

This command allows for the ethernet parameters primed by the above commands to be formally saved to non-volatile memory. There are no parameters.

Examples:

Command	Action
COMM:SAVE	
	Formally save the primed ethernet parameter changes.

2.0 Commands introduction

The ATxTel command set uses the SCPI standard command formatting and syntax. It can be viewed as SCPI-informed rather than strictly SCPI-compliant.

NOTE: Some formatting is non-standard, so it does not support the full mandatory common command set, nor some of the register support, for example.

3.0 Attenuation Controls

Conventions:

- When the channel ID parameter is used, the channels are identified from Channel 1 through to the maximum number of channels of the unit (N). If a value of '0' (zero) is used, the subsequent parameters are applied to all channels.
- Individual, multiple, or all channels can be configured with a single command.

3.1 Attenuation static control

3.1.1 ATTenuation[:SET]

Format:

ATTENUATION:SET (Ch# Attenuation) ... (ChN Attenuation)

Description:

This command configures channel attenuation.

Parameter	Description	Range	Res	Default	Units
Ch#	Channel number.	0 (ALL),1,2...N	1	n/a	n/a
Attenuation	Attenuation set point.	0.0 – 95.0	0.1	0.0	dB

Examples:

Command	Action
Attenuation:set 0 10.5	
	Set all channels to 10.5 dB of attenuation.
ATT 3 20	
	Set channel 3 to 20 dB of attenuation.
ATT 2 20 4 60	
	Set channel 2 to 20 dB and channel 4 to 60 dB of attenuation.

Query	Action	Response example (4C-9501-80)	Response example (8C-9501-80)
Attenuation:set? 0		11.1 22.2 33.3 44.4	11.1 22.2 33.3 44.4 55.5 66.6 77.7 88.8
	Query all channels for attenuation set values.		
ATT? 3		33.3	
	Query a single channel 3 for attenuation set value.		
ATT? 2 4		22.2 44.4	
	Query channels 2 and 4 for attenuation set values.		

3.1.2 ATTenuation:DEfault

Format:

ATTENUATION:DEfault (Ch# Attenuation) ... (ChN Attenuation)

Description:

This command saves the attenuation value(s) provided in non-volatile memory to be used as the default attenuation values upon power-up of the unit.

Parameter	Description	Range	Res	Default	Units
Ch#	Channel number.	0 (ALL),1,2...N	1	n/a	n/a
Attenuation	Attenuation set point.	0.0 – 95.0	0.1	0.0	dB

Examples:

Command	Action
Attenuation:default 0 33.5	
	Save 33.5 dB as the default power-on attenuation for all channels.
ATT:DEF 1 11.1 4 44.4	
	Save 11.1dB for channel 1 as power-on attenuation. Save 44.4dB for channel 4 as power-on attenuation.

Query	Action	Response example (4C-9501-80)	Response example (8C-9501-80)
Attenuation:default? 0		11.1 22.2 33.3 44.4	11.1 22.2 33.3 44.4 55.5 66.6 77.7 88.8
	Query all channels for default attenuation set values.		
ATT:DEF? 3		33.3	
	Query a single channel 3 for default attenuation set value.		
ATT? 2 4		22.2 44.4	
	Query channels 2 and 4 for default attenuation set values.		

3.2 Attenuation dynamic control

3.2.1 ATTenuation:SWEep:MODE

Format:

ATTENUATION:SWEEP:MODE (Mode)

Description:

This command configures the sweeping mode for all channels. The options are for Continuous Sweeping until the STOP command is issued or to sweep until the number of RUNS is reached.

Parameter	Description	Range	Res	Default	Units
Mode	Sweeping mode configuration.	CONTinuous RUNS	n/a	CONT	n/a

Examples:

Command	Action
Attenuation:sweep:mode continuous	
	Enable continuous sweeping mode for all channels.
ATT:SWE:MODE RUNS	
	Enable all channels to sweep for the number of runs set by the ATT:SWE:RUNS command.

3.2.2 ATTenuation:SWEep:RUNS

Format:

ATTENUATION:SWEEP:RUNS (# of runs)

Description:

This command configures the number of runs that enabled channels will sweep when the sweep mode is RUNS. A RUN is considered a single sweep from the initial setpoint to the final setpoint, i.e. using a swimming metaphor a 'length' of a pool rather than a 'lap'.

Parameter	Description	Range	Res	Default	Units
# of runs	Number of runs applied to ALL channels.	1 – 9999	1	1	n/a

Examples:

Command	Action
Attenuation:sweep:runs 50	
	Set run count to 50 for all channels when the sweep mode is RUNS.
ATT:SWE:RUNS 100	
	Set run count to 100 for all channels when the sweep mode is RUNS.

3.2.3 ATTenuation:SWEep:START

Format:

ATTENUATION:SWEEP:START

Description:

This command starts the sweeping for any included channel. If no channel is enabled, no sweeping will occur.

Examples:

Command	Action
Attenuation:sweep:start	
	Start sweeping for any included channel.
ATT:SWE:STAR	
	Start sweeping for any included channel.

3.2.4 ATTenuation:SWEep:STOP

Format:

ATTENUATION:SWEEP:STOP

Description:

This command stops sweeping on any and all sweeping channel. If no channel is enabled or all channels have already ended in RUNS mode, then this command has no impact.

Examples:

Command	Action
Attenuation:sweep:stop	
	Stop sweeping for any and all sweeping channels.
ATT:SWE:STOP	
	Stop sweeping for any and all sweeping channels.

3.2.5 ATTenuation:SWEep[:SET]

Format:

ATTENUATION:SWEEP:SET (Ch# State Start Stop Step Delay) ... (ChN State Start Stop Step Delay)

Description:

This command configures channels for sweeping attenuation ranges. The direction of the sweeping is determined by the start and stop values, i.e. start can be lower or higher than stop.

NOTE: Delay has 100ms resolution.

Parameter	Description	Range	Res	Default	Units
Ch#	Channel number.	0 (ALL),1,2...N	1	n/a	n/a
State	En/Disable sweeping on Channel.	0 (OFF)/ 1 (ON)	1	0 (OFF)	n/a
Start	Initial attenuation set point.	0.0 – 95.0	0.1	0.0	dB
Stop	Sweep attenuation end point.	0.0 – 95.0	0.1	95.0	dB
Step	Attenuation adjustment per step.	0.0 – 95.0	0.1	5.0	dB
Delay	Inter-step delay time.	100 – 3600000	100	1000	mSec

Examples:

Command	Action
Attenuation:sweep:set 0 1 10.5 60.5 5.0 2500	
	Enable all channels to sweep between 10.5 dB and 60.5 dB attenuation stepping 5 dB every 2.5 seconds.
ATT:SWE 3 1 20 60 2 500	
	Enable channel 3 to sweep between 20 dB to 60 dB attenuation stepping 2 dB every 0.5 seconds.
ATT:SWE 3 0 20 60 2 500	
	Remove channel 3 from the sweeping action.
ATT:SWE 4 1 60 20 2 500 2 1 10.5 50 0.5 750	
	Enable channel 4 to sweep between 60 dB to 20 dB attenuation stepping 2 dB every 0.5 seconds and channel 2 sweeping between 10.5 dB and 50 dB stepping 0.5 dB every 0.75 seconds.

3.2.6 ATTenuation:SWEep:WRAP

Format:

ATTENUATION:SWEEP:WRAP (Mode)

Description:

This command configures the wrap mode of sweeping for all channels when in continuous mode or when run count is greater than 1 in RUNS mode. The options are for REPEAT mode or WRAP mode:

REPEAT => RUN 1 = initial setpoint to final setpoint; RUN 2 = initial setpoint to final setpoint; RUN 3 = initial setpoint to final setpoint; etc...

WRAP => RUN 1 = initial setpoint to final setpoint; RUN 2 = final setpoint to initial setpoint; RUN 3 = initial setpoint to final setpoint; etc...

Parameter	Description	Range	Res	Default	Units
Mode	Sweeping mode for multi-run context.	REPeat WRAP	n/a	WRAP	n/a

Examples:

Command	Action
Attenuation:sweep:wrap wrap	
	Enable WRAP sweeping mode for all channels.
ATT:SWE:WRAP REP	
	Enable REPEAT sweeping mode for all channels.

3.2.7 ATTenuation:SWEep:PAUSE

Format:

ATTENUATION:SWEEP:PAUSE

Description:

This command pauses sweeping on any and all sweeping channel. If no channel is enabled or all channels have already ended in RUNS mode, then this command has no impact. The sweeping can be restarted from the point of pausing using the [ATTenuation:SWEep:START](#) command or just stopped to end the sweeping using the [ATTenuation:SWEep:STOP](#) command.

Examples:

Command	Action
Attenuation:sweep:pause	
	Pause sweeping for any and all sweeping channels.
ATT:SWE:PAUS	
	Pause sweeping for any and all sweeping channels.

4.0 Miscellaneous Commands

4.1 HELP

Format:

HELP?

Description:

Provide the sample command and usage and where to find more information

4.2 *IDN?

Format:

***IDN?**

Description:

Manufacturer, Model AttenRange, SerialNumber Device-ID IPAddress, FWVersion

Example:

**ATxTel, 4 Channel Attenuator 0-95.0dB, ATX4C20231018R0 ATX-ATT01 IP:192.168.0.86,
v0.23.00**

4.3 *RST (also RESET)

Format:

***RST**

Description:

This is the Reset common command expected for all SCPI instruments. It will trigger a reboot of the unit.

4.4 *CLS

Format:

***CLS**

Description:

This is the Clear Status error/event queue. This command clears the queue without providing any response. There are no parameters.

4.5 IDENTify

Format:

IDENTIFY (State)

Description:

When State is set to 1 this command triggers LED(s) to blink to allow identification of the hardware being addressed.

Parameter	Description	Range	Res	Default	Units
State	LED blink	0 (Disabled/OFF), 1 (Enabled/ON)	1	0 (Disabled/OFF)	n/a

Examples:

Command	Action
IDENTIFY 1	
	Trigger HW LED(s) to blink
IDENTIFY 0	
	Switch to normal mode of operation

4.6 DID

Format:

DID (DeviceID)

Description:

Allow the user to set a device ID for a given unit. This can be queried with "DID?" and also shows up in the "*IDN?" query. It is saved in Flash and survives power cycling.

NOTE: "Space" is not accepted

Parameter	Description	Range	Res	Default	Units
DeviceID	User-defined Device ID.	Aphanumeric	n/a	ATX-ATT01	n/a

Examples:

Command	Action
DID LabUnit-05	
	Name a unit "LabUnit-05"

4.7 INFOrmation

Format:

INFOrmation

Description:

Provide the device information

Device info:

ID: ATxTel-ATTN

Current Attenuation: 11.1 22.2 33.3 44.4 (for 4C-9501-80) or 11.1 22.2 33.3 44.4 55.5
66.6 77.7 88.8 (for 8C-9501-80)

Power On Attenuation: 22.0 22.0 22.0 22.0

Serial Echo: ON

```

Ethernet info:
  MAC: 8C:1F:64:41:80:1F
  Telnet Port: 8686
  IP: 192.168.0.86
  SN : 255.255.255.0
  Gw: 192.168.0.1
OK

```

4.8 Error/Event queue

4.8.1 ERROR[:NEXT]?

Format:

ERROR:NEXT?

Description:

This queries the error/event queue and returns a single response. The queue is first in, first out so when queried the oldest error/event will be provided first. When the queue overflows the last error/event in the queue is replaced with the event:

-350, "Queue overflow"

When the queue is empty or has been cleared by *CLS, the response will be:

0, "No error"

Examples:

Command	Response
ERROR?	
Sample:	-110, "Command header error"
Err?	
	-222, "Data out of range"

Commentary:

SCPI has a suite of error codes and text predefined. Number categories are identified for command errors, execution errors, query errors and device-specific errors (both predefined and proprietary). A subset of these errors will be used by the unit to save code space. First draft subset:

```

-0, "No error"
-100, "Command error"
-109, "Missing parameter"
-110, "Command header error"

```

-115, *"Unexpected number of parameters"*
-120, *"Numeric data error"*
-200, *"Generic execution error"*
-222, *"Data out of range"*
-400, *"Query error"*
-300, *"Generic device error"*
-350, *"Queue overflow"*

4.8.2 ERROR:ALL?

Format:

ERROR:ALL?

Description:

This queries the error/event queue and returns all errors separated by carriage return and new line. The queue is first in, first out so when queried the oldest error/event will be provided first.

4.8.3 ERROR:COUNT?

Format:

ERROR:COUNT?

Description:

This queries the number of errors currently in the queue.