ACENet User Guide

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Advanced Simulation Technology inc.
500A Huntmar Park Drive • Herndon, Virginia 20170 USA
(703) 471-2104 • asti-usa.com

Product Name: ACENet

ACENet User Guide

ASTi
500A Huntmar Park Drive
Herndon, Virginia 20170 USA

Revision history

Date	Revision	Version	Comments
9/11/2019	J	0	Converted content to XML. Updated content for grammar, accuracy, and style.
4/20/2020	J	1	Fixed minor display error in "ACENet fiber option."
7/9/2025	K	0	Updated manual title page and styling throughout document. Updated deprecated "Target," "ACE," and "Remote Management System" terminology throughout document. Added FAQ about ACENet network isolation requirements in "Networking FAQs." Clarified that Eth1 interface must be on dedicated network segment with no other traffic in "Network requirements."

Contents

1.0 Introduction

The Audio Communications Environment Network (ACENet) is a low-latency network for remote audio and I/O distribution. ASTi's ACENet devices (i.e., ACE-RIU, ACU2, Ashly Power Amplifier, Crown Power Amplifier) distribute audio to a variety of user interfaces:

- Military headsets
- Press-to-talk (PTT) devices
- Handheld terminals (HHTs)
- Speakers
- Live radios

Figure 1, "Example ACENet configuration" below shows an example of the ACENet system architecture:

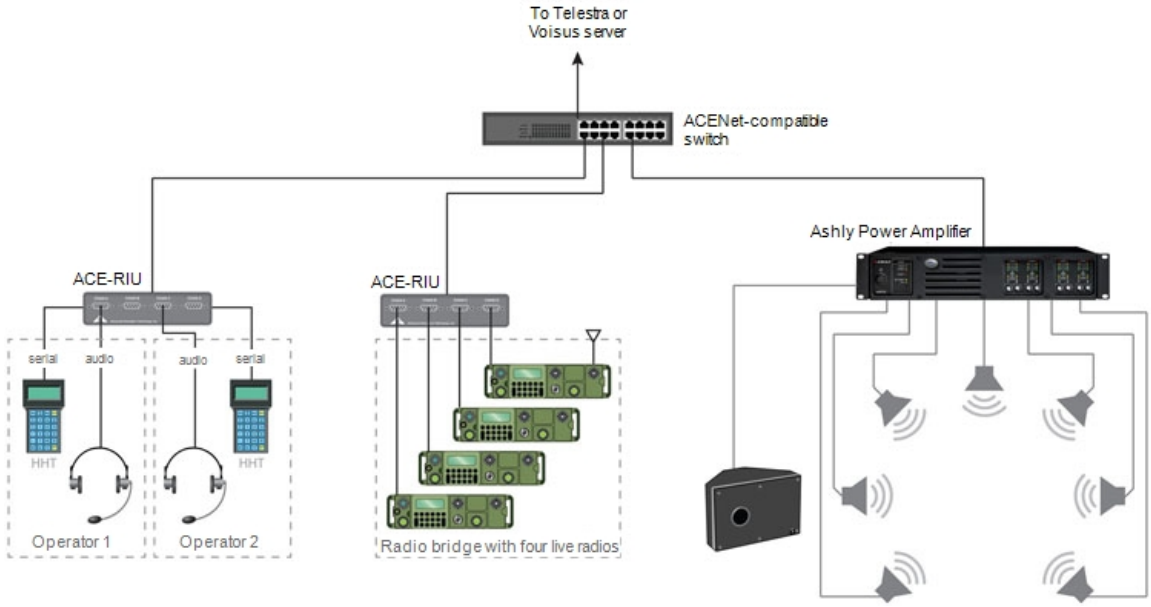

Figure 1: Example ACENet configuration

This guide provides an overview of ACENet architecture. For information about specific ACENet devices, go to the following:

- *ACE-RIU Technical User Guide*
- *ACU2 Technical User Guide*
- *Ashly Power Amplifier User Guide*
- *ASTi Crown Power Amplifier User Guide*

2.0 ACENet features

ACENet architecture offers the following features:

- *Remote distribution:* ACENet's network-based, hub-and-spoke architecture provides digital audio and I/O distribution across a wide area, hundreds of feet from ASTi systems.
- *Ethernet-based architecture:* ACENet uses ASTi-qualified, commercial off-the-shelf (COTS) network cabling and network switches (ASTi-qualified) for easy connectivity and wide, extensible distribution.
- *Scalable architecture:* ACENet supports applications ranging from a single operator to large, multioperator installations. ACENet-compatible switches extend the distance from the ASTi system to ACENet devices and increase the number of operators.
- *Flexible audio and I/O:* ACU2s and ACE-RIUs provide configurable audio, serial, analog, and discrete I/O interfaces to accommodate a wide range of peripherals:
  - Military and commercial headsets
  - Audio amps
  - Powered speakers
  - Microphones
  - Recording equipment
  - Press-to-talk (PTT) units
  - Simulated communications panels
  - Hand-held terminals
  - Other peripheral devices
- *High-fidelity audio:* ACENet supports synchronized, 48-kHz digital audio distribution for high-fidelity, realistic sound and communications simulation.
- *Low latency:* ACENet's closed network architecture and customized real-time distribution software means extremely low transport latency, which is essential for realistic simulation and elimination of delay-related audio issues.

2.1 Network requirements

To preserve low latency, ACENet requires a closed network that consists of the following:

- ASTi servers

***Note**: For restrictions on multiple servers in ACENet, go to Section 3.0, "ACENet FAQs" on page 5.*

- ACE-RIUs, ACU2s, Ashly Power Amplifiers, or Crown Power Amplifiers with their associated peripherals
- *(Optional)* ACENet-compatible Ethernet switches

***Important**: ACENet requires a dedicated network segment accessible only through the Eth1 interface. No other network traffic or devices are permitted on this segment to maintain the ultra-low latency required for realistic audio simulation. Configure Eth1 with a subnet mask that prevents routing to other network segments.*

2.2 ACENet switch requirements

Appendix A, "Deployed ACENet switches" on page 10 provides a list of recommended switches. All ACENet-compatible switches must adhere to the following core requirements.

Specifications:

- Gigabit-capable (1000 Mbps)
- OSI Layer 2 switching device
- LAN switch (not a router or hub)

Settings:

- Autonegotiate speed and duplex type
- Disable advanced Layer 2 protocols, which include 802.1p/q, spanning tree, and quality of service (QoS).

2.3 ACENet cabling requirement

Homemade cables are the primary reason for product performance issues. For best results, only use commercially manufactured, premium-grade cable:

- CAT5e cable or better
- 100 meters (328 feet) maximum length per cable
- Wired according to 1000BASE-T specifications

3.0 ACENet FAQs

This chapter discusses the following ACENet frequently asked questions (FAQs):

- Networking FAQs
- Ethernet switch FAQs
- Additional FAQs for Telestra 4.17 and later

3.1 Networking FAQs

The following FAQs pertain to networking ACENet devices:

1. **Q: Can I connect ACENet to the same network as other systems or share the Eth1 interface with other network traffic?**

   A: No. ACENet requires a dedicated network segment accessible only through the Eth1 interface. No other network traffic or devices are permitted on this segment to maintain the ultra-low latency required for realistic audio simulation. Configure Eth1 with a subnet mask that prevents routing to other network segments.

   ACENet's closed network architecture and customized real-time distribution software deliver extremely low transport latency, which is essential for realistic simulation and elimination of delay-related audio issues. Any additional network traffic or shared infrastructure can introduce latency that compromises simulation fidelity and causes audio timing problems.

   The only exception is using port-based VLANs that completely isolate ACENet traffic from other network traffic, as described in Section 3.2, "Ethernet switch FAQs" on page 7. However, VLAN-tagging is not supported.

2. **Q: Can I connect my ASTi system directly to an ACU2 or ACE-RIU?**

   A: Yes. The ASTi system can directly connect to an ACU2 or ACE-RIU with a crossover CAT5e cable between the device and ASTi system. Alternatively, adding ACENet-compatible switches extends the distance from the ASTi system to ACENet audio devices and increases the number of operators.

Figure 2, "ACENet with/without Ethernet switch" below shows both configurations:

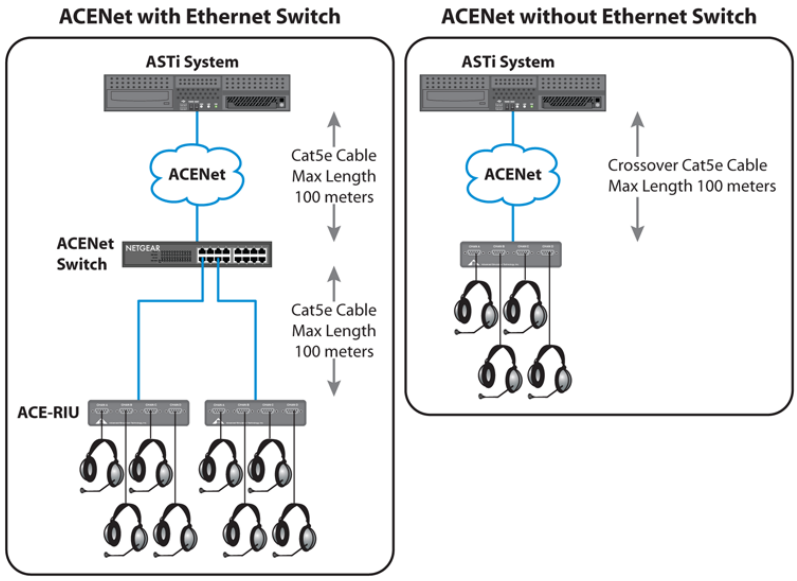

Figure 2: ACENet with/without Ethernet switch

3. **Q: Can I use a hub instead of an Ethernet switch?**

   A: No. Hubs are not supported.

4. **Q: Can I connect a router between my ASTi system and the ACENet audio device and route ACENet packets over a wide area network (WAN)?**

   A: No. Routers are not supported.

5. **Q: Can I daisy-chain switches together to extend the distance from the ASTi system to ACENet audio devices (e.g., ACE-RIUs, ACU2s)?**

   A: Yes. ACENet supports multiple hops (i.e., links between two nodes). ASTi has tested ACENet with up to six hops (i.e., five switches) between an ACENet audio device and an ASTi system.

Figure 3, "Daisy-chained ACENet configuration" below shows a configuration that daisy-chains switches together:

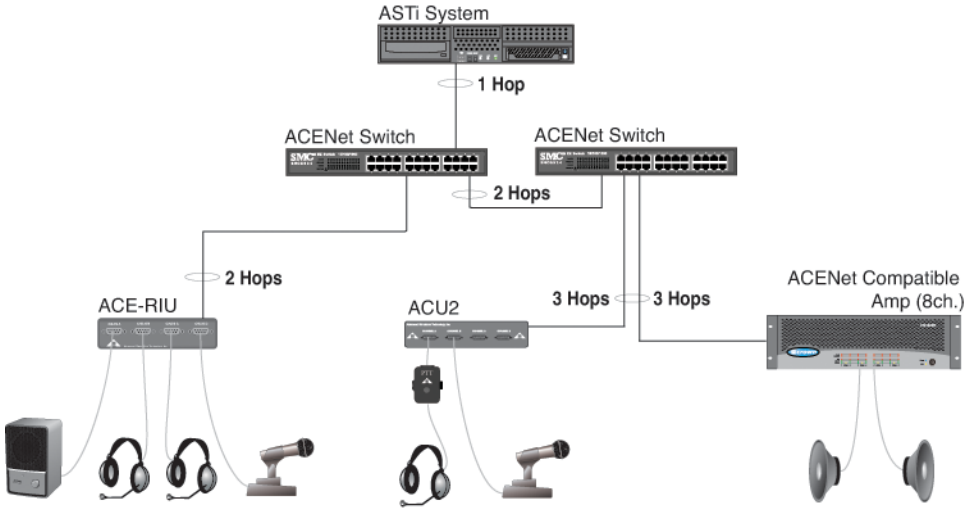

Figure 3: Daisy-chained ACENet configuration

6. **Q: Does ACENet support multiple ASTi systems?**

   A: ACENet cannot support multiple Voisus servers. However, ACENet can accommodate multiple Telestra servers in most cases, except when a Crown Power Amplifier or Ashly Power Amplifier exists on the network. Then it will only support one Telestra.

7. **Q: If an amplifier is present on ACENet, will it support more than one Telestra server?**

   A: No. If a Crown Power Amplifier is present on ACENet, it will only support one Telestra server. Any other configuration is unreliable and not supported.

3.2 Ethernet switch FAQs

The following FAQs pertain to Ethernet switches for ACENet devices:

1. **Q: Do you have a list of approved switches that ASTi has tested?**

   A: Yes. For a list of approved switches, go to Appendix A, "Deployed ACENet switches" on page 10.

2. **Q: Can I connect my ACU2 and ACE-RIU to the same ACENet switch?**

   A: Yes. The ACENet supports mixing ACU2s and ACE-RIUs on the same switch. All ASTi ACENet devices can interact on the same ACENet. Each device must have a unique device name and device number.

3. **Q: Can my Ethernet switch run at 10 or 100 Mbps?**

   A: No, it must run at 1000 Mbps. Attaching 10 Mbps devices to the ACENet may disable the network.

4. **Q: I have a large switch (e.g., 48 ports) and would like to use part of that switch for ACENet. Is this feasible?**

   A: Yes. This configuration is acceptable as long as you are able to logically dedicate *N* ports for ACENet, and those ports do not see traffic from other ports. This is sometimes referred to as a port-based virtual local area network (VLAN).

5. **Q: Can I use VLAN-tagging within ACENet?**

   A: No. VLAN-tagging is not supported. However, port-based VLANs are supported, as described above.

6. **Q: My switch can run various advanced protocols (e.g., 802.1p, 802.1q, port priority, spanning tree). Can I use these protocols? Are they required?**

   A: No. Advanced Layer 2 protocols are not supported. In almost all cases, the switch should run with its default settings. Possible exceptions exist if the above or similar were set by default.

3.3 Additional FAQs for Telestra 4.17 and later

The following FAQs apply to Telestra 4.17 and later. Telestra software versions 4.17 and later work exclusively with ACENet devices with firmware version 2.*X*. Telestra 4.16 and earlier require firmware version 1.*X*. All devices sharing a local ACENet must have the same firmware version.

1. **Q: Can multiple Telestra servers coexist on an ACENet?**

   A: Yes, as long as they communicate with different sets of ACENet devices.

2. **Q: Can multiple Telestra servers share channels on an ACENet device?**

   A: No. Each ACENet device (e.g., ACE-RIU, ACU2, Ashly Power Amplifier) can only communicate with one Telestra server at a time. A secondary Telestra server trying to access the channels on that device will report a “Channel Reservation Error” in the Telestra web interface.

3. **Q: Why does my ACENet device have a “Channel Reservation Error?”**

   A: This error occurs when two separate Telestra servers are trying to reserve or use the same channel on the ACENet device. As a rule, the first Telestra server to install a project that contains that ACENet channel component exclusively reserves the channel and blocks other Telestra servers from using it. Uninstall or stop the project on the first Telestra server, allowing another Telestra server to access the channel.

4. **Q: How can I determine the maximum number of ACENet devices I can connect to the Telestra server?**

   A: The total number of ACENet devices that the Telestra server supports relies on a number of factors:

   - The age and type of hardware components in the Telestra server
   - The model's complexity and CPU loading
   - The number of ACENet devices on the network

5. **Q: My ACENet device channels have valid digital or analog I/O, but there is no audio I/O. What is wrong?**

   A: This symptom is seen when a Telestra server using Telestra 4.16 or earlier tries to use ACENet devices with firmware version 2.*X*. Two solutions exist: upgrade to Telestra 4.17 or later, or downgrade the ACENet firmware to 1.*X*. ASTi strongly recommends upgrading to Telestra 4.17 or later.

6. **Q: Why did I receive an error while upgrading my ACENet firmware?**

   A: Occasionally, errors may occur when upgrading several ACENet devices at one time. Try upgrading the devices a second time or upgrading devices individually. If the device is still booting, you do not need to reboot it before repeating the upgrade attempt.

7. **Q: What is a Device Number?**

   A: The **Device Number** is a configurable parameter that determines the address space that a device uses for ACENet network communications. By default, each device receives a value between 1 and 4096, and every device on a given ACENet segment must have a unique **Device Number** derived from the device's MAC address.

8. **Q: Why does my ACENet device have a “Duplicate Device Number” error?**

   A: A duplicate device number error occurs when two or more ACENet devices on the network have the same device number. This condition hampers audio communications between the Telestra server and the ACENet devices that exhibit the error. To fix this condition, use the Telestra web interface to assign a new, unique number between 1 and 4096 to the devices in question.

Appendix A: Deployed ACENet switches

Table 1, "ACENet-compatible switches" below shows compatible switches that ASTi has deployed to customers:

Switch	Part Number
Cisco Catalyst	2000 series
Cisco Catalyst	3000 series
Cisco Catalyst	4000 series
Cisco Catalyst	6000 series
Hawking	HGS5T
HP ProCurve	2800 series
Linksys	EG005W
Netgear**	GS105
Netgear**	GS108
Netgear**	GS605
Netgear**	GSM7200 series
Netgear**	JGS516
Netgear**	JGS524
SMC*	SMCGS24
SMC*	SMC 8508T
SMC*	SMCGS16
SMC*	SMCGS8

Table 1: ACENet-compatible switches

***Note**: *SMC switches are not supported if manufactured in 2012 or later due to functionality changes.*

***Important**: **Turn on all ACENet devices before turning on the network switch.*

This list is not comprehensive; other switches are likely compatible with ASTi equipment as long as they meet the core requirements in Section 2.2, "ACENet switch requirements" on page 3. For questions about switch compatibility, contact ASTi at support@asti-usa.com.

Appendix B: Incompatible switches

Table 2, "Incompatible Switches" below shows switches that are incompatible with ACENet:

Switch	Part Number
3COM	3C16478*

Table 2: Incompatible Switches

***Note**: *Packet dropouts, possibly due to 802.1 prioritization.*

Appendix C: ACENet fiber option

ACENet runs over an Ethernet-based (i.e., 1000 BASE-T) connection that the ASTi system (i.e., 1000 BASE-T) and ACE-RIU/ACU2 (i.e., 100 BASE-T) interfaces and an ACENet-compatible switch (i.e., 1000 BASE-T) provide. However, ACENet-compatible switches with fiber connections may successfully extend ACENet's reach.

***Important**: ASTi has not fully tested ACENet fiber network connections because they are not a product. Each ACENet configuration forms a set of complex variables that you must test together in their functional environment under operational conditions. From experience, each program has a unique set of issues dependent on the equipment, software, and simulation deployed. Therefore, ASTi cannot guarantee success when using fiber within ACENet.*

C-1 ACENet fiber example

The following scenario is an example of how fiber networking may be used in an ACENet configuration.

- *Server Room:* the Server Room has four ASTi systems. There is one Cisco 6500-series switch that has various blades for different ports and connections, including gigabit, Ethernet, 48-port blades; multimode-fiber blades; and a 100 M Ethernet blade. The Cisco 6500-series switch connects via multimode fiber (i.e., gigabit link) to a Cisco 3500-series switch in an OPs Room. The Cisco 3500-series switches support the OPs rooms in this building or other buildings nearby.
- *OPs Rooms:* each room has a single Cisco 3500-series switch. Fiber connects the switch to the main Cisco 6500-series switch and ASTi system. The Cisco 3500 switch also has 100 M Ethernet ports for the ACE-RIUs within that room. In terms of data flow, it creates a port-based virtual local area network (VLAN) that contains the following:
  - The system's Ethernet port
  - Cisco 6500 1000 M Ethernet port
  - Cisco 6500 fiber port
  - Cisco 3500 fiber port
  - A Cisco 3500 100 M Ethernet port for each ACE-RIU the system controls

***Note**: The VLAN must be transparent to the system and the ACE-RIU.*

Figure 4, "ACENet fiber configuration" below shows an example:

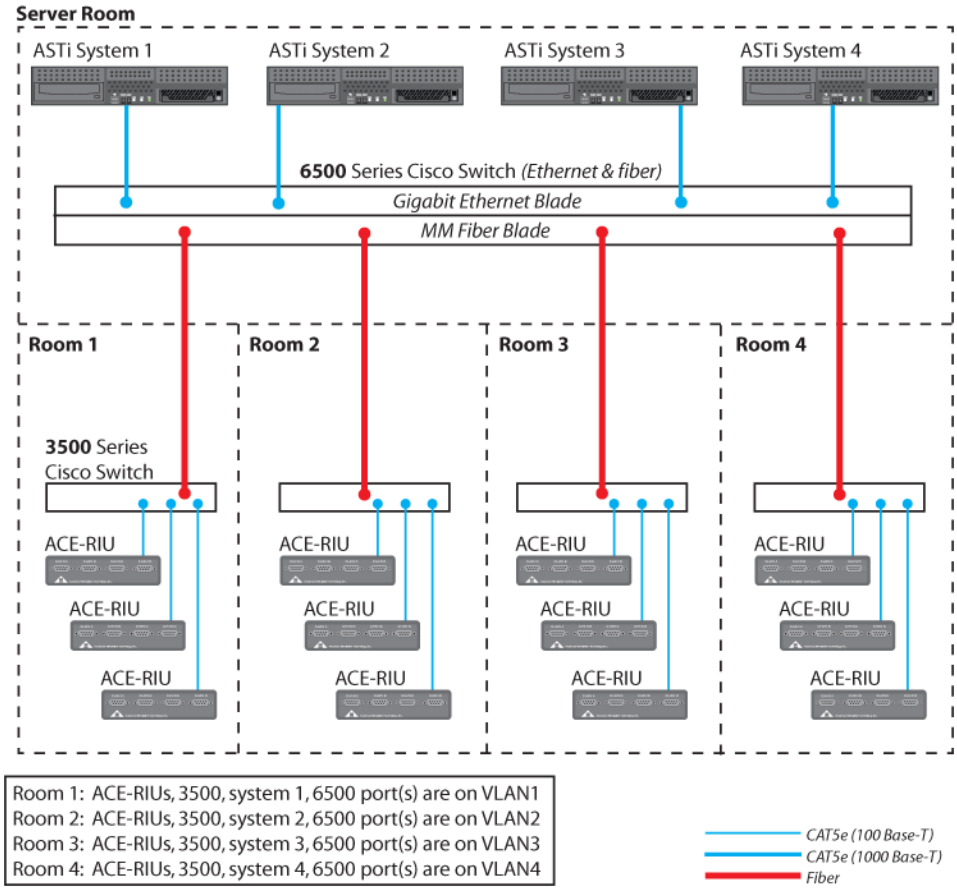

Figure 4: ACENet fiber configuration