



# Model 381 On-Air Beltpack Featuring Dante® Technology

## Key Features

- Dante audio-over-Ethernet technology
- Creates complete “stand-up” on-air position
- One main and one talkback output channel
- Highly-flexible 2-channel headphone output
- Integrated sidetone function
- Excellent audio quality
- Uses STcontroller for configuration
- Power-over-Ethernet (PoE) powered

## Introduction

The Model 381 On-Air Beltpack offers a unique combination of audio resources to directly support a complete broadcast “stand-up” on-air position. Using Dante® audio-over-Ethernet technology, the unit provides main and talkback output channels, talent cue (IFB) input, and sidetone capabilities, as well as essential user controls in a compact, portable package. The Model 381 is compatible with the Dante Domain Manager™ (DDM) software application and is AES67-compliant for direct integration into many contemporary networked audio applications.

Optimized for broadcast sports and live entertainment events, eSports, news-gathering, and streaming broadcast applications, the Model 381 allows incredibly simple deployment while maintaining “pro” audio quality and an intuitive user experience. With just a Power-over-Ethernet (PoE) connection, a dynamic or phantom-powered microphone, and a pair of headphones or an earpiece, the unit will be ready for “on-air” deployment. The STcontroller software application is used for configuring operating parameters including microphone preamplifier gain, P48 phantom power, headphone signal routing, sidetone

operation, and talkback button action. The Model 381’s audio quality is excellent, with low distortion, low noise, and high headroom. Careful circuit design and rugged components ensure long, reliable operation.

## Applications

The Model 381 provides an “all-Dante” solution for one on-air talent location. Two Dante audio input channels supply the user with their talent cue (IFB) signals. Should the cue signal be “mix-minus” an integrated sidetone function can provide the user with a microphone confidence signal. Two Dante audio output channels, one designated as main (for “on-air” use) and the other talkback, are routed via the associated local-area network (LAN) to inputs on Dante-compatible devices. A pushbutton switch, located on the Model 381’s top panel, provides a combination talkback and “cough” function. Five configuration choices allow the exact action of the talkback button and associated function to be selected. Choices include whether or not the Dante main output channel is muted when talkback is active as well as offering the ability to disable the button. The audio switching is performed in the digital domain and is virtually “click-free.”

## Setup and Operation

Set up and operation of the Model 381 is simple. An etherCON® RJ45 jack is used to interconnect with a standard twisted-pair Ethernet port associated with a PoE-enabled network switch. This connection provides both power and bidirectional digital audio. A broadcast headset or handheld (“stick”) microphone can be directly connected to the unit’s 3-pin XLR microphone input connector. This input is compatible with dynamic or condenser microphones. An integrated P48 phantom power source can be enabled if desired. Stereo headphones, the headphone



connections from a stereo or monaural headset, or even a monaural earpiece are connected to the headphone output jack. Two “push-in/push-out” rotary controls (potentiometers or “pots”) make it easy to set the level of the talent cue signals level being sent to the 2-channel headphone output.

The STcontroller software application is used to configure the wide range of Model 381 operating parameters. This allows the unit’s performance to be optimized to meet the needs of specific applications. The Model 381’s ultra-compact enclosure is made from an aluminum alloy which offers both light weight and ruggedness. A stainless steel “belt clip,” located on the back of the unit, allows direct attachment to a user’s clothing. The top surface is curved to minimize the chance of the unit interfering with clothing or being readily observable “on camera.”

## **Ethernet Data and PoE**

The Model 381 connects to a local area network (LAN) by way of a standard 100 Mb/s twisted-pair Ethernet interface. The physical 100BASE-TX interconnection is made by way of a Neutrik® etherCON RJ45 connector. While compatible with standard RJ45 plugs, etherCON allows a ruggedized and locking interconnection for harsh or high-reliability environments. The Model 381’s operating power is provided by way of the Ethernet interface using the 802.3af Power-over-Ethernet (PoE) standard. This allows fast and efficient interconnection with the associated data network. To support PoE power management, the Model 381’s PoE interface enumerates (reports) to the power sourcing equipment (PSE) that it’s a class 2 (low power) device.

## **Dante Audio-over-Ethernet**

Audio data is sent to and received from the Model 381 using the Dante audio-over-Ethernet media networking technology. The Model 381’s two Dante transmitter (output) and two Dante receiver (input) audio channels can be assigned to other devices (routed) using the Dante Controller software application. The Dante transmitter (output) and receiver (input) channels are limited to supporting four Dante flows, two in each direction. The digital audio’s bit depth is up to 24 with a sampling rate of 44.1, 48, 88.2, or 96 kHz. Two bi-color LEDs provide an indication of the Dante connection status.

The Model 381 is compatible with the AES67 interoperability standard. In this mode the two transmitter (output) channels will function in multicast; unicast is not supported. In addition, the unit is compatible with the Dante Domain Manager (DDM) software application.

## **Audio Quality**

The Model 381’s performance is completely “pro,” making it appropriate for use in a wide-range of applications. A low-noise, wide dynamic-range microphone preamplifier and associated voltage-controlled-amplifier (VCA) dynamics controller (“compressor”) circuit ensures that mic input audio quality is preserved while minimizing the chance of signal overload. A configuration choice allows selection of the signal source for the Dante main output channel. The choices are either the output of the microphone preamp or the output of the compressor circuit. These choices are referred to as “pre-compressor” or “post-compressor.” The ADC section utilizes a high-performance integrated circuit that supports sampling rates of 44.1, 48, 88.2, and 96 kHz with a bit depth of up to 24. The audio signal, now in the digital domain, routes through a 32-bit microprocessor and on to the Dante interface section where it is packetized and prepared for transport over Ethernet.

Audio signals arrive via the Dante receiver (input) channels and pass into the Model 381’s microprocessor. As with the Dante transmitter (output) audio channels, the sampling rate can be 44.1, 48, 88.2, or 96 kHz with a bit depth of up to 24. Channel routing, headphone level control, and sidetone creation are performed in the digital domain. This provides flexibility, allows precise control, and keeps the two controls from having to directly handle analog audio signals. The audio channels destined for the headphone output channels are sent to a high-performance digital-to-analog converter and then on to robust driver circuitry. High signal levels can be provided to a variety of headsets, headphones, and earpieces.

## **Configuration Flexibility**

The Model 381 can be configured to meet the needs of specific applications and user preferences. All configuration tasks are performed using the STcontroller personal computer software application, which is available free of charge on the Studio Technologies website. There are no mechanical switch settings or button-press sequences required to configure how the unit functions. Selectable parameters include microphone preamplifier gain, P48 phantom power on/off, headphone output performance, sidetone operation, talkback button operation, and main output audio source.

The gain of the microphone preamplifier can be selected from among five choices. This allows the Model 381 to match the output sensitivity of a range of handheld and headset-associated microphones. A low-noise source of P48 phantom power can be enabled if required to support condenser (capacitor) microphones. The two Dante input audio sources

and the way in which they are assigned to the headphone output channels can be configured. In addition, the operation of the two rotary controls can be selected. These unique choices allow almost any required headphone monitoring situation to be implemented. Whether for use in on-air sports, in an eSports broadcast, or as a production support tool, the Model 381 should be able to achieve the desired configuration.

The integrated sidetone function can be configured to operate from among three choices. This allows audio associated with the output of the microphone preamplifier to be returned to the headphone output as required. Sidetone can be important as some applications may provide a “mix-minus” talent cue signal that doesn’t include the user’s own voice content. A configuration selection allows the talkback button and associated function to be selected from among five choices, including having

the ability to be disabled. The Dante main output channel can be selected to have its audio source be pre (before) or post (after) the dynamics control circuitry.

## Future Capabilities and Firmware Updating

The Model 381 was designed so that its capabilities and performance can be enhanced in the future. A USB connector, located on the unit’s main circuit board (underneath the unit’s cover), allows the application firmware (embedded software) to be updated using a USB flash drive.

The Model 381 uses Audinate’s Ultimo™ integrated circuit to implement the Dante interface. The firmware in this integrated circuit can be updated via the Ethernet connection, helping to ensure that its capabilities remain up to date.

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## Model 381 Specifications

### Power Source:

Power-over-Ethernet (PoE): class 2 (low power, ≤6.49 watts) per IEEE® 802.3af

### Network Audio Technology:

Type: Dante audio-over-Ethernet

AES67-2018 Support: yes

Dante Domain Manager (DDM) Support: yes

Bit Depth: up to 24

Sample Rate: 44.1, 48, 88.2, and 96 kHz

Number of Transmitter (Output) Channels: 2

Description of Transmitter Channels: main (pre- or post-compressor, selectable), talkback (post-compressor)

Number of Receiver (Input) Channels: 2

Description of Receiver Channels: headphone channel 1 and headphone channel 2

Dante Audio Flows: 4; 2 transmitter, 2 receiver

### Network Interface:

Type: 100BASE-TX, twisted-pair Ethernet, Power-over-Ethernet (PoE) supported

Data Rate: 100 Mb/s (10 Mb/s and 1000 Mb/s GigE Ethernet not supported)

### Microphone Input:

Compatibility: dynamic or phantom-powered microphones

Type: balanced, capacitive coupled

Impedance: 2.8 k ohms, nominal

Gain: 36, 42, 48, 54, and 60 dB, selectable

Frequency Response: 30 Hz to 20 kHz, –3 dB at 30 Hz, –0.6 dB at 20 kHz

Distortion (THD+N): <0.020%, 1 kHz, 36 dB gain, –32 dBu input level

Dynamic Range: 96 dB, A-weighted

Phantom Power: P48 per IEC 61938 standard, on/off selectable with status LED

### Compressor:

Application: always used for Dante talkback audio output channel, can be used for Dante main output channel

Threshold: 1 dB above nominal level (–19 dBFS)

Slope: 2:1

Status LED: compressor active

### Headphone Output:

Type: 2-channel

Compatibility: intended for connection to stereo (dual-channel) or mono (single-channel) headphones, headsets or earpieces with nominal impedance of 50 ohms or greater

Maximum Output Voltage: 3.1 Vrms, 1 kHz, 150-ohm load

Frequency Response: 20 Hz to 20 kHz, +0/–1 dB

Distortion (THD+N): 0.001%, +10 dBu output, 150 ohm load

Dynamic Range: >102 dB

### Connectors:

Microphone Input: 3-pin female XLR

Headphone Output: ¼-inch 3-conductor jack

Ethernet: Neutrik etherCON RJ45

USB: type A receptacle (located inside Model 381’s enclosure and used only for updating firmware)

**Configuration:** uses Studio Technologies’ STcontroller personal computer application

### Environmental:

Operating Temperature: 0 to 50 degrees C (32 to 122 degrees F)

Storage Temperature: –40 to 70 degrees C (–40 to 158 degrees F)

Humidity: 5 to 95%, non-condensing

Altitude: not characterized

### Dimensions (Overall):

3.1 inches wide (7.9 cm)

1.5 inches high (4.0 cm) w/out belt clip; 1.8 inches (4.6 cm) with belt clip

4.9 inches deep (12.5 cm)

**Deployment:** intended for portable applications; contains integral belt clip

**Weight:** 0.5 pounds (0.23 kg)

Specifications subject to change without notice.

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## Studio Technologies, Inc.

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