

COMREX



**A simple and versatile
studio codec...**

for delivering
**broadcast quality,
real-time audio**
over the public Internet.

◁ACCESS▷ Really. It works.

About ACCESS

ACCESS delivers mono or stereo audio over POTS, DSL, Cable, Wi-Fi, 3G cellular, satellite — plus some services you may not have even heard of. Given the challenges of the public Internet, it's no small boast to say that ACCESS will perform in real time over many available IP connections including challenging ones. BRIC (Broadcast Reliable Internet Codec) technology allows ACCESS to achieve unprecedented flexibility and reliability in the IP environment.



ACCESS will work on a wide variety of wired and wireless data circuits, including:

- Cable, DSL and POTS
- Wireless Network-802.11x (Wi-Fi) WiMax
- 3G Data Networks, 1x EV-DO, UMTS
- Satellite terminals
- Public Internet—Uses Revolutionary BRIC Technology, designed to overcome the innate unreliability of the public Internet

ACCESS is also a full-featured POTS codec

- Use ACCESS to make a POTS-to-POTS connection. Dial up a Comrex POTS codec (including Matrix, Vector or BlueBox).
- You can deliver 15 kHz Stereo on a single POTS line when connecting to another ACCESS.

Wireless

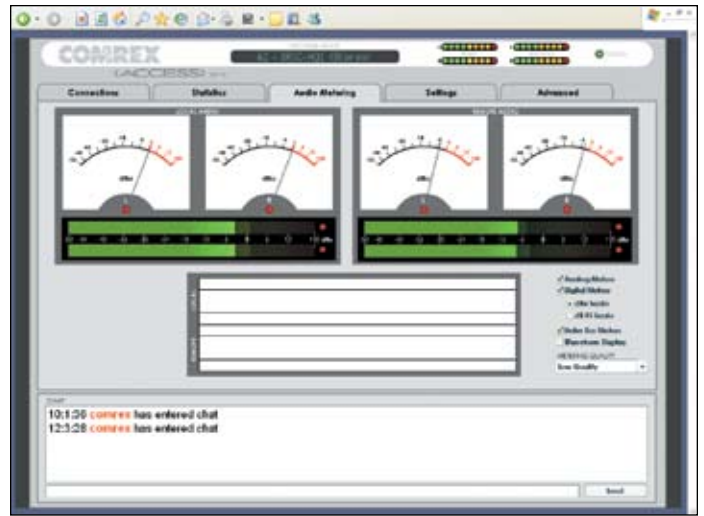
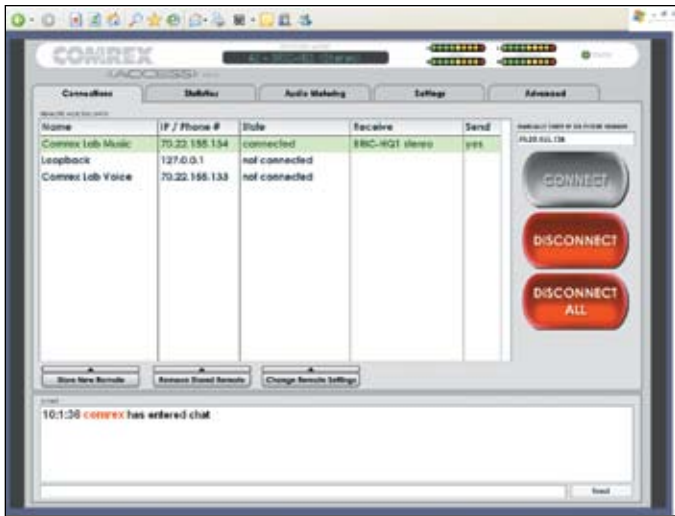
BRIC technology can also deliver wideband audio over 3G cellular data networks like EV-DO and UMTS, as well as the increasing number of publicly available Wi-Fi hotspots. The forthcoming Portable ACCESS has a built-in slot for easy connection to data cards supporting these services. Studio ACCESS Rackmount can also be adapted to work over these services by using a special external adaptor. Contact Comrex for more information on this.

Features and Benefits

No IT Guy Needed

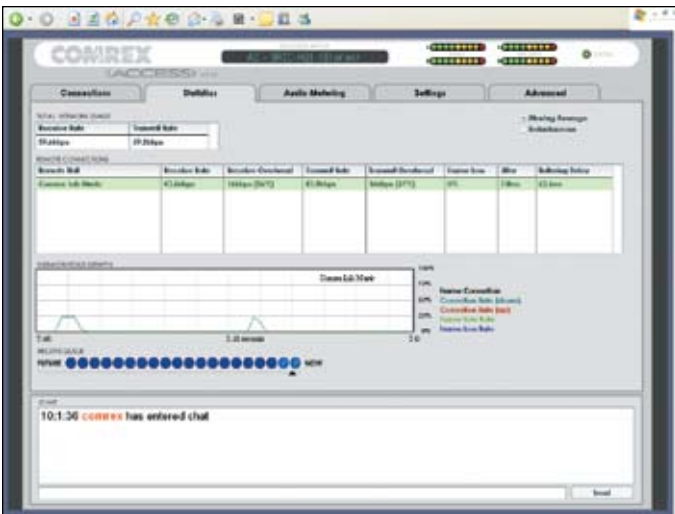
OK, that may be overstating the case a little bit, but there has never been an IP codec as easy to use as ACCESS. ACCESS Rack is designed as the “set and forget” end of the IP link. It has no user controls. Connection and management are done over a LAN using the intuitive web page served from the unit. This way, ACCESS may be controlled from any computer using a normal web browser.

ACCESS Rack GUI:



- One click connection. Really. It’s that easy. Just highlight the address of the codec you want to connect to and click the connect button

- Large, easy-to-read level display



- Clear monitoring capability of connection quality, including jitter and delay



- Encoders may be set up separately for each direction
- Decoder requires no set-up
- ACCESS will automatically set up to decode incoming stream

ACCESS—The Smart Codec

Using BRIC technology means you won't have to mess with ACCESS advanced settings. The sophisticated engine of ACCESS is clever enough to assess circuit conditions and adapt on the fly *without* user intervention. ACCESS is constantly working to compensate for deficits in the quality of service, so no one has to hear how bad the public Internet can be.

For the technically advanced, the menus are there. So, if you are a power user, you can configure ACCESS to be whatever you need. You can increase the delay cushion or twiddle the "frames per packet" to your heart's content. But isn't it great to know that you probably will never need to?

ACCESS—The Powerful Codec

Whatever the audio transmission job, whatever the circuit, ACCESS has a mode for you. From linear mono or stereo audio to an ultra-low bitrate algorithm, there is a wide range of audio choices to fit virtually any programming need.

In addition to the ability to do linear uncompressed mono or stereo, the basic ACCESS codec includes three BRIC algorithms:

- 1- BRIC-HQ1 (High Quality 1) This algorithm keeps delay low (around 1/10 second) but allows for full fidelity (15 kHz) audio transmission. It delivers music or voice audio equally well and runs at a data rate of 28 kb/s. This mode also allows dual mono transmission, so that two independent audio signals (using twice the network bandwidth) can be sent to the same location. HQ1 settings offer choice of mono, dual mono or stereo.
- 2- BRIC-HQ2 (High Quality 2) This mode minimizes artifacts and encodes speech and music equally well, providing a 12 or 15 kHz fidelity signal over 24 kb/s of network bandwidth. BRIC-HQ2 also allows for stereo operation at the lowest data rate of 24-30 kb/s, making stereo over a single modem connection possible. BRIC-HQ2 has moderate delay of about 1/3 second, which is in the range of many ISDN codecs. HQ2 settings offer choice of mono 12K, mono 15K, stereo 12K or stereo 15K. Selecting 12K further reduces artifacts.
- 3- BRIC-ULB (Ultra Low Bitrate) This mode is designed for speech transfer only but has a remarkable compression ratio of around 25:1, allowing it to deliver 7 kHz at an astonishingly low bitrate (around 10 kb/s). The voice quality of BRIC-ULB is comparable to the old codec standard G.722 (7 kHz), but uses less than 1/6th the amount of data.

MPEG-4 AAC algorithms, licensed by Fraunhofer IIS, are available as an optional upgrade.



"Problematic" Internet Office D-mark in Dharamsala, India was no problem for ACCESS.

"We recently took an ACCESS unit Comrex loaned us to Bangkok Thailand for testing. The link with our headquarters in Washington DC worked great. ACCESS provided ISDN quality without the dialup cost. The same demo unit was then carried to Dharamsala, India where it was not only tested but worked so well we used the Access link for a series of live shows. ACCESS sound quality was better than any other Telco or Internet solutions we have tried to date. The results were especially reliable considering that Dharamsala has one of most "problematic" Internet infrastructures that we have come across. Dharamsala is a mountainous fifteen hour drive from Delhi straight up the Himalayans' and is hard to get equipment into. ACCESS worked so well there we bought the demo unit and kept it there."

—David Baden,
Chief Technology Officer Radio Free Asia

ACCESS ALGORITHMS AND SETTINGS

Required Bitrate	Coding Delay	Audio Bandwidth	
			BRIC HQ1 sends good quality audio over narrow digital channels with low delay
28 kb/s	80 ms	15 kHz	1A Mono
42 kb/s	80 ms	15 kHz	1B Stereo
56 kb/s	80 ms	15 kHz	1C Dual Mono allows independent programming to be sent on L&R channels
			BRIC HQ2 sends excellent quality audio over narrow digital channels with moderate delay
24 kb/s	320 ms	15 kHz	2A Mono
24 kb/s	340 ms	12 kHz	2B Mono reduced bandwidth with fewer coding artifacts
30 kb/s	320 ms	15 kHz	2C Stereo
30 kb/s	340 ms	12 kHz	2D Stereo reduced bandwidth with fewer coding artifacts
			BRIC ULB for “worst case” networks—delivers 7 kHz voice at ultra low bitrates with low delay (not recommended for music)
12 kb/s	80 ms	7 kHz	3A Default lowest bitrate of any BRIC algorithm
			HE-AAC provides near transparent audio at low data rates—for situations where latency is not important
32 kb/s	600 ms	20 kHz	4A Mono
48 kb/s	600 ms	20 kHz	4B Stereo
64 kb/s	600 ms	20 kHz	4C Dual Mono allows independent programming to be sent on L&R channels
			AAC-LD requires higher data rates but provides near transparent voice or music with low delay
64 kb/s	80 ms	20 kHz	5A Mono
96 kb/s	80 ms	20 kHz	5B Stereo
128 kb/s	80 ms	20 kHz	5C Dual Mono allows independent programming to be sent on L&R channels
			Linear delivers transparent audio with no compression and very low delay—for use on high throughput networks
788 kb/s	40 ms	20 kHz	6A Mono
1536 kb/s	40 ms	20 kHz	6B Stereo

BRIC and HE-AAC are suitable for the Public Internet.
 AAC-LD requires reasonably good QOS (Quality of Service).
 Linear requires managed networks with extremely high throughput.



Audio Connections and Other Features

- Stereo analog line level inputs/outputs on balanced XLRs—adjustable level
- AES3 digital audio input/output on XLRs
- Front-panel LED indicators
 - Stereo input and output level meters on front panel
 - Power LED illuminates when power is applied
- Audio level meters also available via web page interface
- Connections via Ethernet and RJ11 modem jacks
- Connections for serial ancillary data and four contact closures
- Connections for keyboard and monitor to allow initial configuration
- Contact closures (4)

Options Available:

- Optional AAC package includes:
- MPEG-4 HE-AAC codec—ideal for your lowest bitrate applications
 - MPEG-4 AAC-LD technology—optimized for applications where it is critical to minimize delay

These standard algorithms are licensed by Fraunhofer IIS.

ACCESS System

As a perfect field unit to complement the Rack, ACCESS Portable (coming soon) has been designed as a remote broadcasters dream. About the size of a camcorder, the hand-held unit may be powered for seven hours by its rechargeable battery.

For broadcasts that require larger mixing and headphone capabilities, the handheld unit may be “docked” into the mixer/headphone management section to provide a full featured, table-top, 5-channel stereo mixer/codec.

Some features of the ACCESS Portable are:

- Uses BRIC technology to deliver broadcast audio over the public Internet
- User interface via integrated LCD/touchscreen display menus
- Web browser included for connection to Wi-Fi access points that require log-in
- Built-in Ethernet port
- Built-in rechargeable battery supplies 7 hours of talk-time
- Connection to a range of other networks via integral Cardbus slot including:
 - Modem Connections
 - 3G Cellular Links
 - Wi-Fi or Wi-Max Access cards
- Ethernet port acts as Internet sharing device, allowing use of laptops on circuits utilizing Cardbus cards
- HE-AAC (comparable to AAC+) and AAC-LD modes available as options
- Backward compatibility to Comrex POTS codecs

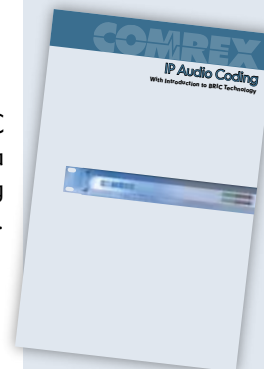
About BRIC Technology

Because telephone networks are migrating to packet-based technology, the use of traditional POTS and ISDN codecs will become increasingly difficult. BRIC technology provides a natural evolution for broadcasters to utilize the ever-increasing availability of broadband Internet access, while maintaining the high quality and low delay required for their application.

BRIC innovations:

- The first broadcast codec to work reliably over most Internet connections
- 7 kHz bi-directional low-delay audio over challenging IP networks using BRIC-ULB algorithm
- Less than 100 mS coding delay using BRIC-ULB or BRIC HQ1
- 15 kHz bi-directional stereo or mono audio over typical networks (or a single dial-up phone line) using BRIC-HQ1 algorithm
- Usable on networks with high packet loss and packet jitter such as the public Internet
- Utilizes BRIC Transversal Server (maintained by Comrex) to allow easy connections from behind firewalls and routers. Use is optional

To learn more about BRIC Technology, contact Comrex for a free booklet— “IP Audio Coding with Introduction to BRIC Technology.



ACCESS Rack

Audio connections

- Balanced stereo XLR line-level audio input—0 dBu
- Balanced XLR line-level audio output—0 dBu
- AES3 XLR Digital audio input
- AES3 XLR Digital audio output

Other connections

- Telephone line: RJ-11 6-pin modular jack
- Ethernet Port: 10/100 baseT
- Contact closures: DB-9 male
- Serial Port: DB-9 female
- VGA Monitor port: DB-15 female
- Keyboard Connector—PS/2
- Mouse Connector—PS/2
- Power: 3 conductor IEC

Audio levels

- Audio input level: 0 dBu
- Audio output level: 0 dBu

Power and physical

- Internal supply: 120/240 VAC 60/50 Hz 50 watts
- Size: 1U Rack 19" W x 9" D x 1.75" H
(48.25 cm x 22.86 cm x 4.5 cm)
- Weight: 9 lbs (4 kg)

About Comrex

Comrex, an innovator in communications and telephony technologies for more than 40 years, provides reliable solutions to meet the demands of live broadcast. Thousands of radio and TV stations trust the quality of our products every day for news, sports and entertainment audio. The company is headquartered near Boston, Massachusetts, and Comrex products are offered and supported by a worldwide network of dealers.

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Put Comrex On The Line.

Toll Free: 800-237-1776 • www.comrex.com • e-mail: info@comrex.com
19 Pine Road, Devens, MA 01434 USA • Tel: +1-978-784-1776 • Fax: +1-978-784-1717

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