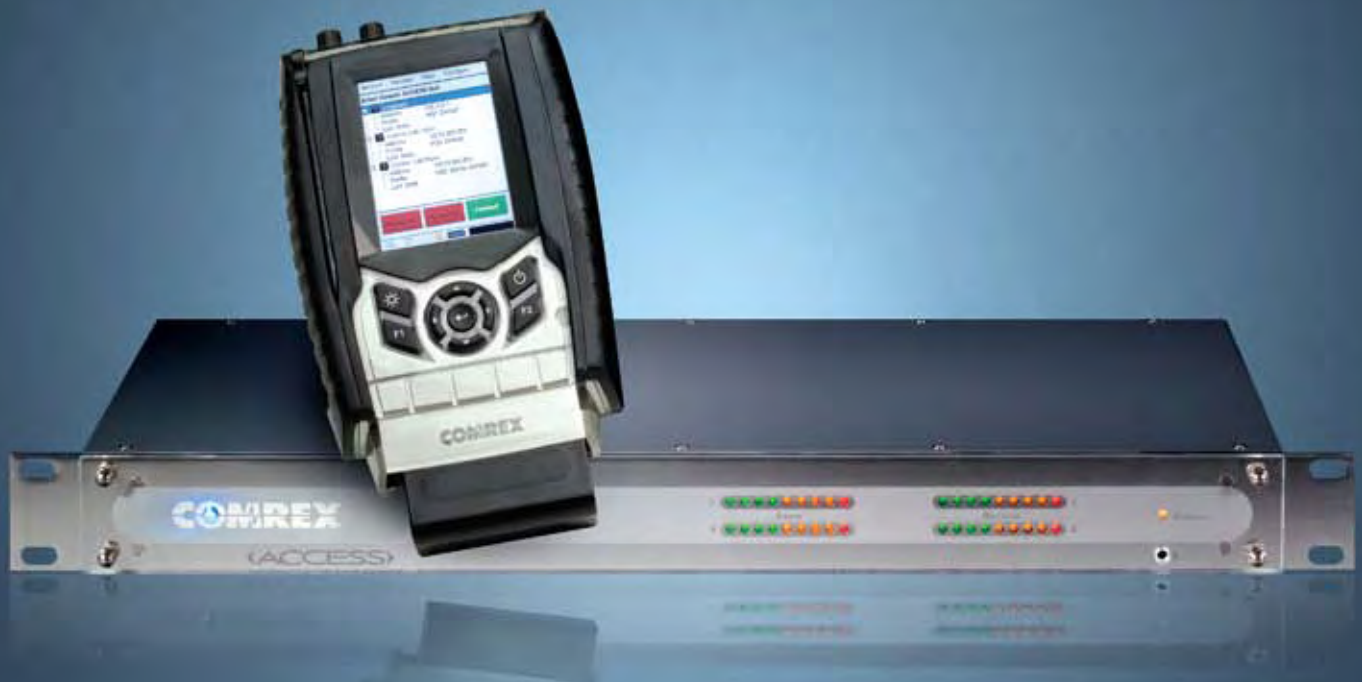
COMREX

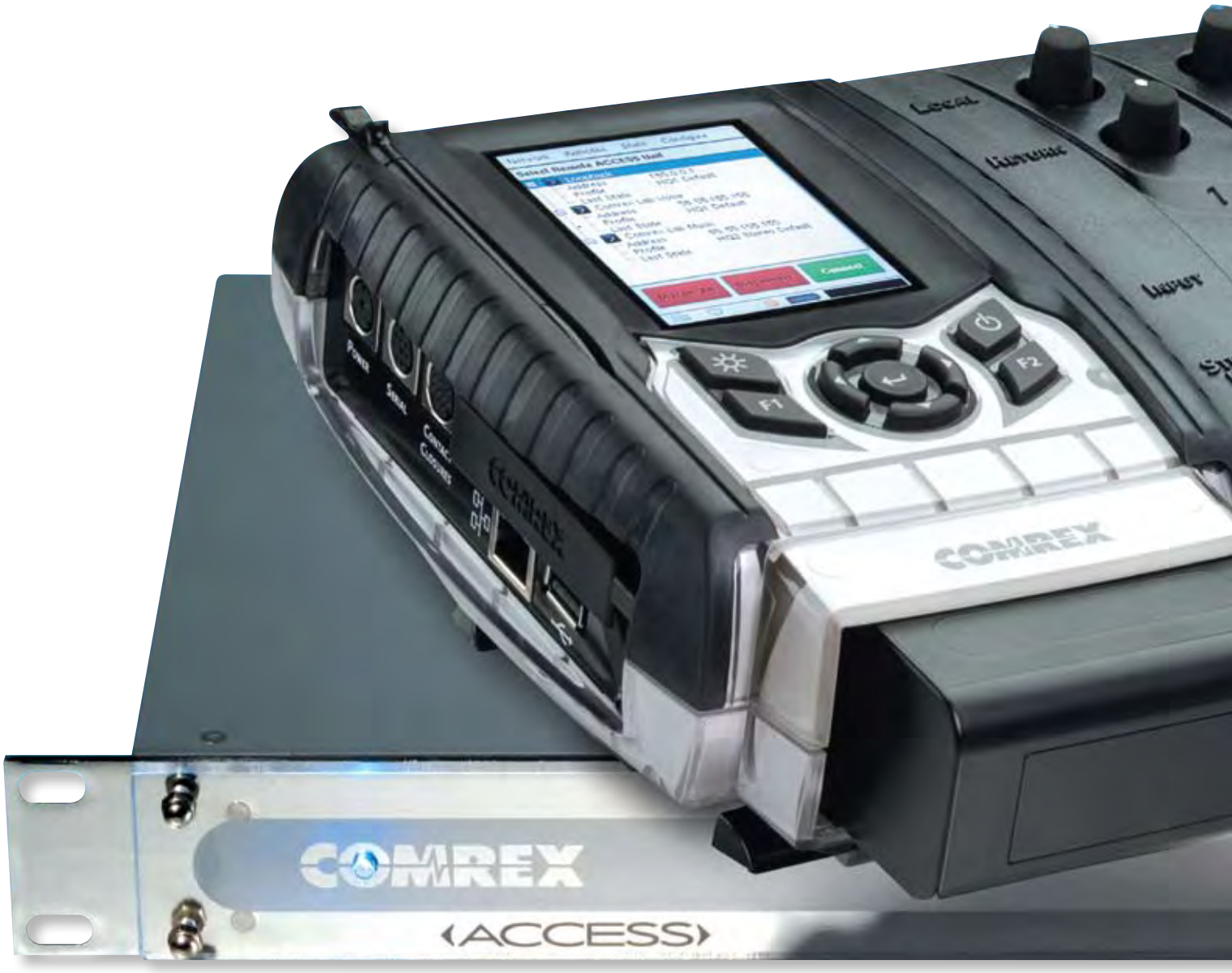
ACCESS Rack & Portable



Small, compact and powerful IP audio codec...

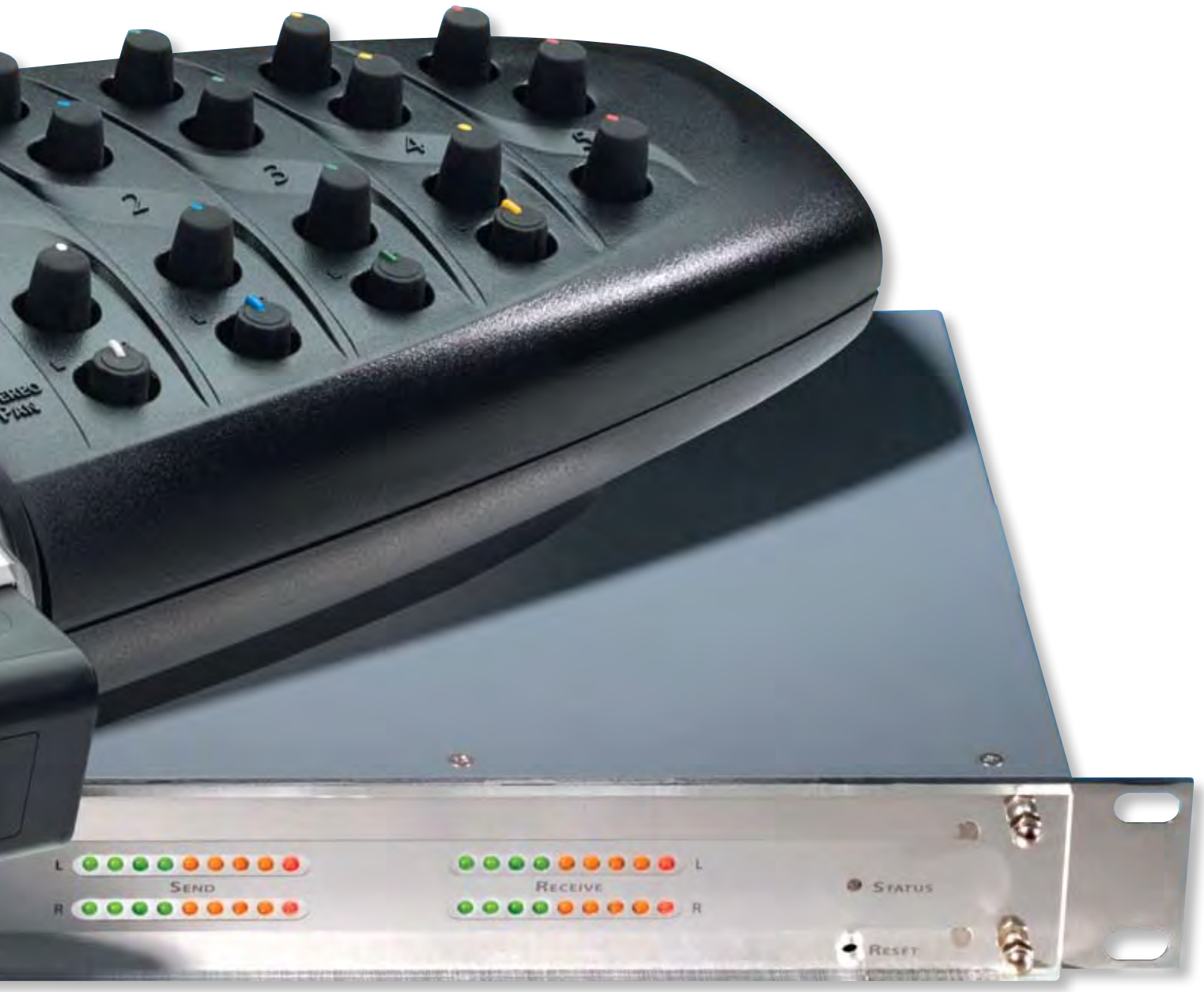
ACCESS

… for delivering broadcast quality, real-time audio over the public Internet. ACCESS. Really. It works.



"The Access worked so well in the Himalayas we bought the demo unit and kept it there."

David Baden, Chief Technology Officer Radio Free Asia



ACCESS —The Smart Codec

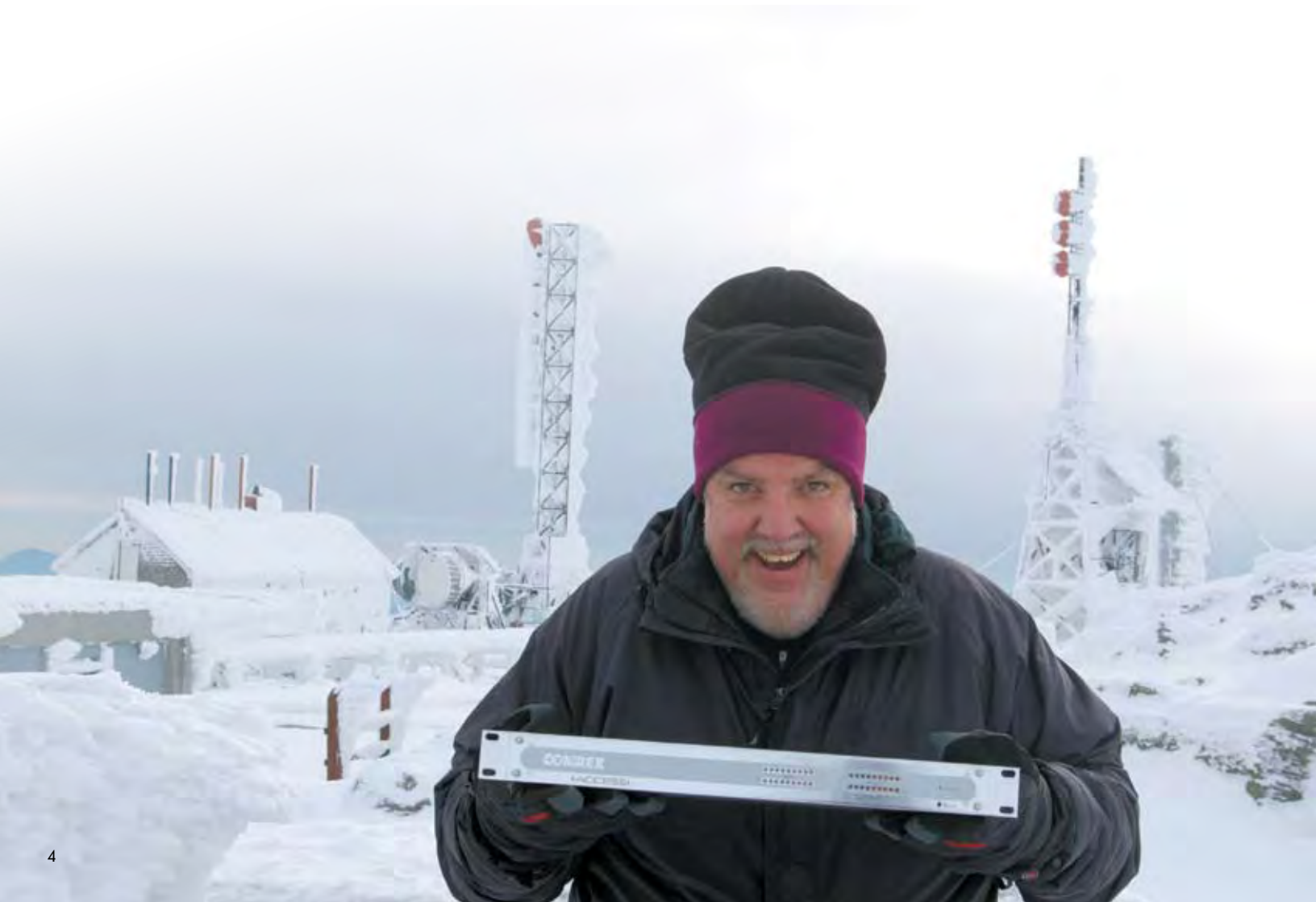
Using BRIC technology means you won't have to mess with ACCESS advanced settings. The sophisticated engine of ACCESS is clever enough to assess circuit conditions and adapt on the fly without user intervention. ACCESS is constantly working to compensate for deficits in the quality of service, so no one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

Wireless

BRIC technology can also deliver wideband audio over 3G Cellular Data Networks like EVDO and UMTS/HSDPA, as well as the increasing number of publicly available of Wi-Fi hotspots. ACCESS Portable has a built-in CardBus slot for easy connection to data cards supporting these services.

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 —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 bit rate algorithm, there is a wide range of audio choices to fit virtually any programming need.

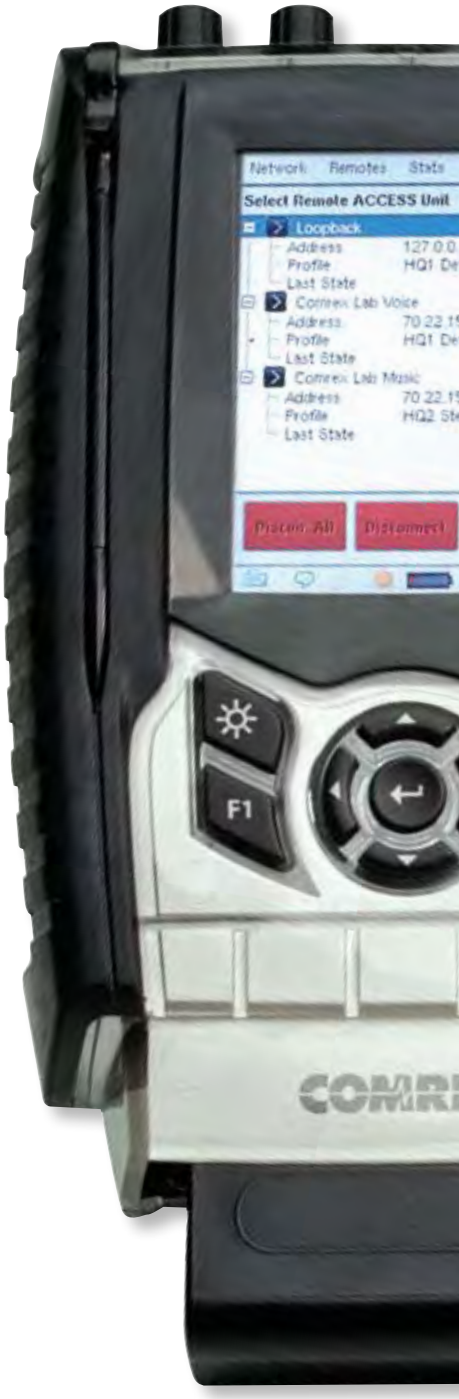
In addition to the ability to do linear uncompressed mono or stereo, the basic ACCESS codec includes three BRIC algorithms:

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 14 kb/s). The voice quality of BRIC-ULB is comparable to the old codec standard G.722 (7 kHz), but uses less than 1/4th the amount of data.

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



Real world super-heroes

Everyday, Comrex ACCESS is conquering the impossible remote and making ordinary broadcasters into real world super heroes! From the highest mountaintops to the open seas, airplanes to bicycles, ACCESS opens up a whole new realm of possibilities by giving broadcasters the tools to do more creative and unique broadcasts from previously impossible locations. Many of our customers have even employed ACCESS to provide dependable STL connections. You can read their stories at: http://remotebroadcasts.blogspot.com/

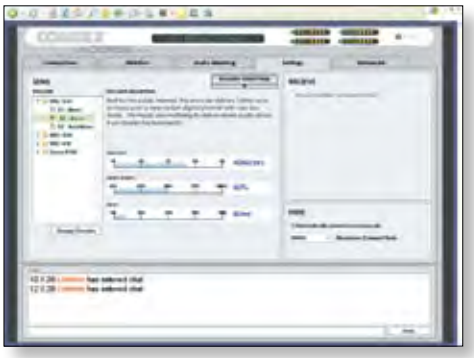
ACCESS Rack

The first Comrex codec to feature revolutionary BRIC technology, the ACCESS Rack was designed and optimized for use in a studio or rack room, although it's perfectly at home in a traveling rack. Control of the unit is managed by using a standard web browser and can be accessed from virtually anywhere —your office, home or even the beach! A very easy to navigate user interface provides connections and monitoring capabilities. Exceptionally versatile, the ACCESS Rack can communicate via just about anything-Cable, DSL and POTS, Wireless Networks-802.11b (Wi-Fi), 3G Cellular Data Networks (EVDO, UMTS/HSDPA). For your studio, look no further than the ACCESS Rack.

- 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.
- Real-time chat messaging window.

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



- Encoders may be set up separately for each direction.
- ACCESS will automatically set up to decode incoming stream.

Features and Benefits

- Uses BRIC technology to deliver broadcast audio over the public Internet
- User interface via standard web browser enables control from any location there's Internet access
- Backward compatibility to Comrex POTS codecs (including Matrix, Vector or BlueBox)
- Optional MPEG 4-AAC algorithms available for extremely high quality audio

Audio, Data and Phone Connections

- Stereo analog line level inputs/outputs on balanced XLRs
- AES3 digital audio input/output on XLRs
- Front-panel LED indicators
  - –Stereo input and output level meters
  - –Power LED illuminates when power is applied
  - –Status LED illuminates when connected
- Audio level meters also available via web page interface
- Connections via 10/100 baseT Ethernet and RJ11 modem jacks
- Connection for serial ancillary data (DB-9 female)
- Connections for keyboard and mouse (PS/2) and monitor (DB-15 female) to allow initial configuration
- Four contact closures (DB-9 male)

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

- Cable, DSL and POTS
- Wireless Networks —802.11b (Wi-Fi)
- 3G Cellular Data Networks —EVDO, UMTS/HSDPA
- Satellite terminals (Inmarsat BGAN, Fleet, VSAT)
- Public Internet —Uses revolutionary BRIC technology, designed to overcome the innate unreliability of the public Internet

ACCESS Rack is also a full-featured POTS codec

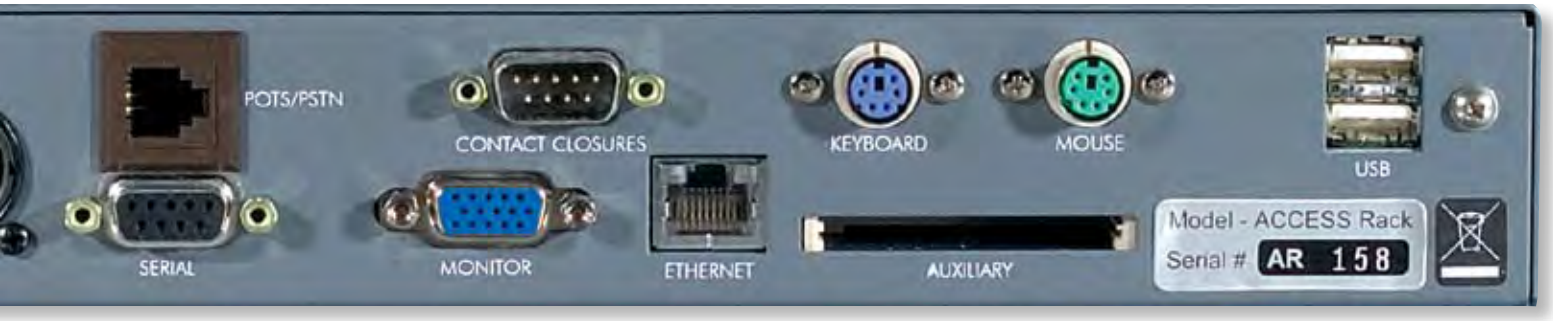
- Use ACCESS to make a POTS-to-POTS connection. Dial up a Comrex POTS codec (including Matrix, Vector or BlueBox)
- You can deliver 15 kHz Stereo on a single POTS line when connecting to another ACCESS

Options Available:

Optional AAC package includes:

- MPEG-4 AAC —Near transparent audio for robust IP networks
- MPEG-4 HE-AAC —Uses Spectral Band Replication to further reduce network bandwidth
- MPEG-4 HE-AACv2 —Aggressive compression for constrained networks
- MPEG-4 AAC-LD —For applications where it is critical to minimize delay

These algorithms are licensed by Fraunhofer IIS.



ACCESS Portable

Broadcasters have long dreamed of complete flexibility and ultimate mobility for remote broadcasts without having to lug around unwieldy racks of gear or clumsy setups too difficult to configure in the field. ACCESS Portable delivers in a sleek, compact, handheld unit capable of sending mono, stereo or dual mono audio over POTS, DSL, Cable, Wi-Fi, 3G Cellular (EVDO/UMTS/HSDPA), satellite —plus some services you may not have even heard of.

ACCESS Portable was designed for fast and easy connections via a wide variety of data circuits regardless of whether in the hands of "non-technical" personnel or seasoned remote "road warriors." Complete with a 7-hour Lithium-Ion battery with built-in charger and combined with an integrated CardBus slot for wireless IP cards and modems, ACCESS Portable will allow you connect from virtually anywhere! Your remotes will never be the same.

For remotes requiring multiple inputs, just add the optional ACCESS Portable Mixer. It just plugs into a multi-pin connector on the side of the ACCESS Portable and suddenly you've increased your inputs and mixing capabilities by five!

ACCESS Portable sits securely in the palm of your hand for easy interaction and configuration.

An integrated stand makes ACCESS Portable a table-top codec with conveniently located audio connections.

- It's a snap to select your network. Simply select it in the interface. You're done.

- Remotes window allows for easy, "select and connect" connections to user configured locations.

- Monitor the performance of your ACCESS over time to compare different configurations.

Data connections on the Access Portable are easy to access.

- Configure security as well as every other function from a handy, well-thought-out interface.

- Easy to configure contact closure settings makes ACCESS an incredibly flexible tool.

- Chat is a great way to manage off-mic communications during setup and the event.

The optional mixer for the ACCESS Portable means you have to lug a LOT less gear to get a LOT more accomplished.

Features and Benefits

- Uses BRIC technology to deliver broadcast audio over the public Internet
- User interface via integrated LCD/touch screen for display menus and audio metering
- Web browser included for connection to Wi-Fi access points that require log-in
- Built-in Ethernet port
- Built-in charger with removable battery supplies 7 hours of talk-time (5 hours with mixer)
- Connection to a wide range of data networks via integral Cardbus slot including:
  - — Modem Connections
  - — 3G Cellular Links
  - — Wi-Fi networks
- ACCESS Portable includes a CardBus-style 802.11b Wi-Fi Card and 56k POTS modem card
- Ethernet port acts as Internet sharing device, allowing use of laptops on circuits utilizing Cardbus cards
- Backward compatibility to Comrex POTS codecs (including Matrix, Vector or BlueBox)
- Optional MPEG 4-AAC algorithms available for extremely high quality audio
- Optional Mixer provides up to 6 Mono inputs/headphone outputs as wells as stereo inputs when connected to ACCESS Portable
- Optional custom cases are available to protect your ACCESS Portable from the rigors of the road

Audio, Data and Phone Connections

- Mic/Line switchable mono input on balanced XLR with adjustable volume control
- Mic input offers switchable 12v phantom power
- Stereo headphone output on 1/8" (3mm) mini jack with adjustable volume control
- Stereo analog line level inputs/outputs on unbalanced 1/8" (3mm) mini jacks
- "Hands free" cellular connection on 1/8" (3mm) mini jack
- Type II CardBus slot for use with modem and wireless cards
- RJ45 Ethernet connector
- USB connector
- DIN connector for serial ancillary data
- DIN connector for contact closures (4)
- Multi-pin connector for optional mixer

Broadcasting a live radio program from the middle of the Pacific Ocean back to Phoenix, Arizona would have been impossible if not for the ACCESS Portable, says world traveler and radio talk show host Keith DeGreen.

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

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Optional Mixer Audio Connections and Features

- Five Mic/Line level switchable mono inputs on balanced XLR
- Mic inputs offer software selectable 12v phantom power
- Five 1/4" TRS headphone jacks
- Audio level adjustments for input, headphone local and return audio
- Stereo pan pots for channel 1 through 4 to accommodate 2 stereo inputs
- Input five can be configured as a producer cue channel
- Powered by ACCESS Portable (AC or battery)

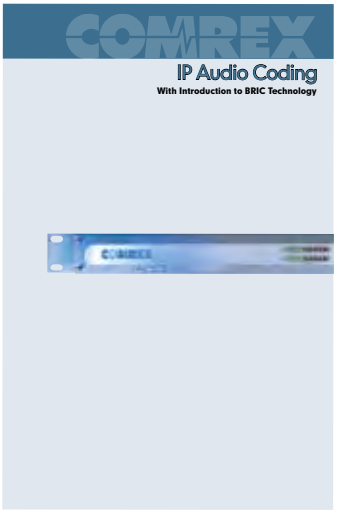
About BRIC Technology

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.

Cox Radio Richmond's WDYL-FM, "Y 101 New Rock!", loves the ability to move freely though the crowd with their ACCESS Portable.

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
- Intelligent jitter buffer management tool dynamically adjusts buffering delay to accommodate for network congestion
- Utilizes BRIC Traversal 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 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
24 kb/s	**80 ms**	**15 kHz**	**A4 Mono 24Kb** restricted to 24 kbps coding rate
			BRIC-HQ2 sends excellent quality audio over narrow digital channels with moderate delay.
24 kb/s	**360 ms**	**15 kHz**	**B1 Mono**
24 kb/s	**380 ms**	**12 kHz**	**B2 Mono 12K** reduced bandwidth with fewer coding artifacts
30 kb/s	**360 ms**	**15 kHz**	**B3 Stereo**
30 kb/s	**380 ms**	**12 kHz**	**B4 Stereo 12K** reduced bandwidth with fewer coding artifacts
24 kb/s	**360 ms**	**15 kHz**	**B5 Stereo 24Kb**
			BRIC-ULB for "worst case" networks —delivers 7 kHz voice at ultra low bitrates with low delay (not recommended for music).
14 kb/s	**80 ms**	**7 kHz**	**C1 Mono (Default**)lowest bitrate of any BRIC algorithm
			Linear PCM delivers transparent audio with no compression and very low delay —for use on high throughput networks.
768 kb/s	**40 ms**	**20 kHz**	**F1 Mono**
1536 kb/s	**40 ms**	**20 kHz**	**F2 Stereo**
Optional AAC Encoders			AAC provides near transparent audio at relatively high data rates. Best used on non-constrained data networks —for situations where latency is not important.
64 kb/s	**300 ms**	**20 kHz**	**D1 Mono**
96 kb/s	**300 ms**	**20 kHz**	**D2 Stereo**
128 kb/s	**300 ms**	**20 kHz**	**D3 Dual Mono** allows independent programming to be sent on L&R channels
128 kb/s	**300 ms**	**20 kHz**	**D4 Stereo 128Kb**
256 kb/s	**300 ms**	**20 kHz**	**D5 Dual Mono 256Kb** allows independent programming to be sent on L&R channels
			HE-AAC provides near transparent audio at low data rate s —for situations where latency is not important.
48 kb/s	**300 ms**	**20 kHz**	**E1 Mono**
64 kb/s	**300 ms**	**20 kHz**	**E2 Stereo**
96 kb/s	**300 ms**	**20 kHz**	**E3 Dual Mono** allows independent programming to be sent on L&R channels
			HE-AAC V2 provides medium quality HE-AAC implementation using Spectral Band Replication.
18 kb/s	**300 ms**	**20 kHz**	**G1 Mono 18Kb/s**
24 kb/s	**300 ms**	**20 kHz**	**G2 Stereo 24Kb/s** adds Parametric Stereo to SBR for higher quality audio at low data rate
48 kb/s	**300 ms**	**20 kHz**	**G3 Stereo 48Kb/s** adds Parametric Stereo to SBR for higher quality audio at low data rate
			AAC-LD requires higher data rates but provides near transparent voice or music with low delay.
96 kb/s	**80 ms**	**15 kHz**	**H1 Mono**
128 kb/s	**80 ms**	**15 kHz**	**H2 Stereo**
192 kb/s	**80 ms**	**15 kHz**	**H3 Dual Mono** allows independent programming to be sent on L&R channels

How do I choose?

ACCESS offers a wide array of encoder modes, and the choice can be daunting. In general:

BRIC-HQ1 is the most popular for wired IP networks, combining good quality and low delay.

BRIC-HQ2 is often better for wireless networks, as it has superior error concealment and high quality.

BRIC-ULB is the best choice for the worst networks, providing "G.722-grade" (7 kHz) transmission of voice audio.

For AAC-based encoders (optional):

HE-AAC is a good choice for delivering near-AAC quality while conserving network bandwidth.

HE-AACv2 is the best choice for constrained networks.

AAC-LD is the highest quality low-delay.

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.

Put Comrex On The Line.

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