What is MaGIC?

MaGIC is an acronym for Media-accelerated Global Information Carrier.  It is a high-bandwidth multi-channel media protocol developed by Gibson for professional and consumer applications. MaGIC can be used to route and send audio, video, MIDI, control information or other data over long distances using standard Cat-5 Ethernet cable.

MaGIC can be used for professional or consumer applications wherever high-bandwidth, low-latency media delivery and/or control is required.  See the following links for more information:

See the video: http://magic.gibson.com/video.html
The Specification: http://magic.gibson.com/specification.html
This is MaGIC: http://magic.gibson.com/thisismagic.html

Why is Gibson in this business?

It has always been the vision of Gibson's President and CEO Henry Juszkiewicz to create a multi-media standard that provides simple, easy-to-use interoperability for everything from the electric guitar to the home security system.

MaGIC provides Gibson (and other companies) with a method to send high-bandwidth media and/or commands to a wide variety of products using simple Cat-5 Ethernet cable.

Since Gibson is creating MaGIC-enabled musical instruments, promoting the standard will provide us with much greater connectivity whether on stage, in the studio or in the home.  If we solve these problems taking care of our own needs on a global scale, musicians and consumers world-wide can benefit from this technology.  Imagine being able to plug your Les Paul into the DVD-R player in your home to "put down" a song idea quickly – or replace the nest of wires behind your home entertainment system with one cable.

What are your objectives towards the marketing and distribution of the MaGIC related products ?

We will be installing a MaGIC ASIC and an RJ45 connector on a wide variety of Gibson guitars near the end of 2002.  If this is the only environment that adopts this standard, we will have achieved our goal of evolving the instrument to a new level of capability, and inspiring significant growth in sales of MaGIC-enabled musical instruments.

The move to a digital signal (192 kHz, 32-bit capable), with bi-directional control information (100 times the bandwidth of MIDI) and phantom power for powering instruments (i.e. no batteries) opens up many new opportunities for manufacturers.

New MaGIC instruments and related equipment (amps, speakers, mixers, etc.) will fuel expanded growth in the musical instrument market *and* provide powerful new features and solutions far beyond the capabilities of today's products.

Can you tell me more about the Gibson digital guitar?

We will be putting MaGIC technology inside thousands of Gibson guitars.  We will install a ruggedized RJ-45 receptacle (utilizing a secure latching system) that provides digital output of both the standard pickups and a six-channel digital stream.  Of course the standard ¼ connector will still provide the classis Gibson sound of the traditional pickups.

Ruggedized RJ-45 connector:  http://www.neutrikusa.com/products/EtherCon/Ethercon.pdf

Do you currently have MaGIC-enabled products?

Yes.  See: http://labs.gibson.com for more information.

Is there a license fee for developers?

No.  We are providing a ten year royalty free license on MaGIC.

My company is doing fine without MaGIC – Why should I care?

Consumer Products

There is a big push now in the CE markets to provide standard connectivity and real-time media delivery.  MaGIC provides high bandwidth delivery of video, audio and control data with extremely low latency.  Providing MaGIC-enabled consumer products gives your product line differentiation that end-users can easily relate too.  See the section *What is MaGIC* for links to specific information.

Professional Audio/Video and Musical Instrument Products

MaGIC can be used wherever multi-channel media needs to be delivered *right now* in a cost-effective easy-to-install cabling solution.  One Ethernet cable can provide 64 channels of bi-directional 48kHz, 24-bit audio with less than 3 ms of delay, analog-to-analog.  Most of this delay is in the analog conversion process.  Our digital-to-digital delay is 250 microseconds. This makes a great digital snake solution for live or studio applications complete with remote routing and gain control.

Check out the Studio MaGIC and Stage Magic Audio Distribution Systems at http://labs.gibson.com/audiodistribution.html.

Since MaGIC allows devices to be daisy chained, a keyboard could be plugged into a guitar amplifier, the guitar amp plugged into a bass amp, then this signal can be sent to the mixer or recording device.  Devices can be identified instantly when plugged in.  No more noisy analog cable runs or bulky analog snakes.

Since Gibson will be providing MaGIC enabled guitars, there is an opportunity for other manufacturers to provide MaGIC compatible M.I. products.

The guitar's digital stream can be sent to MaGIC-enabled amplifiers, recording devices, effects products, or mixers.  The 6-channel digital stream provides unprecedented quality and flexibility previously unavailable to the guitarist.

A MaGIC DAW system can record all six strings, allowing the user to manipulate individual string parameters after recording!  A MaGIC amplifier can provide individual gain, panning, and routing.  An effects device can provide individual effects for each string.  You could use an amplifier for each string if you wanted to.  An effects device could provide individual processing per string including string MIDI data.

These are just a few of the examples for MaGIC musical instrument applications.

Okay, I'm interested in MaGIC for my company's development.  What now?

Please send us an e-mail at info@gibsonmagic.com stating that you are interested in MaGIC licensing.  We'll initiate a dialog with your development contact and start the process.

What tools are available to help with my MaGIC implementation?

Here is a list of development tools.  To order any of the items below or to contact us regarding other issues please go to:

http://magic.gibson.com/contact.html

MaGIC SDK – $2500.  ANSI C implementation of the spec.  Includes MaGIC Control System (MCS) and network simulator software.  We can also provide MaGIC SHARC libraries (price to be determined).

MaGIC Eval Board - $600.  This is a 5"x7" evaluation board that includes a SHARC and a 50k gate FPGA (used for the shift register functions).  The board has a pin controller for general I/O, analog inputs, breakout for LCD and conforms to the 802.3AF power over Ethernet standard.  Most of the board's signals are broken out to a header to analyze the signals.  Our engineers will help you get the board running (assuming the help needed is reasonable) at no additional cost.  The board comes with a suite of s/w tools that places the board in various modes, i.e. sends out packets of known values, outputs a signal generator, and steps you through the enumeration process.

MaGIC Engineering Help – We will provide a reasonable amount of engineering help to companies that purchase one or more of the development tools.  Since we are not charging for support, we must limit our help to reasonable requests.

How can I receive updates on your MaGIC Technology?

Please send an e-mail to: info@gibsonmagic.com and put the following in the title of the e-mail: "send e-mail updates".  (You can unsubscribe at any time.)

Should I be concerned about audio jitter with your design?

Absolutely not.  Our PLL (Phase Lock Loop) design has less than 80ps of jitter which is basically immeasurable.  The PPL design in most audio gear is *much* higher than 80ps.

Is MaGIC limited to a point-to-point topology?

No.  Historically, other Ethernet media protocols are limited to a point-to-point configuration.  The problem is that as you add devices you increase latency.  MaGIC can function in a point-to-point configuration but we have control over the numbers of points in the system.  Also, we can function in a star topology and provide specific ways to limit latency.

Can MaGIC carry video signals?

Yes.  MaGIC can carry three channels of compressed D1 at the NTSC resolution of 720x454.  Since the bandwidth is shared by all media, roughly ten channels of 48k/24-bit audio equal one channel of compressed D1 video using 100 base-T.

Can MaGIC Support Gigabit Ethernet?

Yes.  MaGIC is scalable to 10 gigabit Ethernet.  We are limited to 512 channels in each direction so one cable can theoretically support 1024 discrete channels.

Do you use standard Ethernet packets in MaGIC?

The footprint of our packet is the same as Ethernet UDP.  We differ from standard Ethernet because our packet size and transmission rate do not change.  Please see the specification for more information:  http://magic.gibson.com/specification.html

Does MaGIC require a unique MAC implementation?

Yes.  We route on the MAC layer which is layer two.  We refer to data as frames on this layer instead of packets.  Some parts of the MAC layer can be incorporated into software.  See the question *What tools are available to help with my MaGIC implementation?* for more information.

What about power over Ethernet issues?

We use the standard pin out for power over Ethernet which is documented in the 802.3 spec. The spec states that you supply the line with 48v 300 milliamps.  However, some manufacturers don't implement full voltage for the AF spec so please proceed accordingly.

Can MaGIC devices connect to common Ethernet switches and repeaters?

Bandwidth is of concern due to lack of proper uplink, and possible insufficient bandwidth on the switch's backplane. However the main problem with off-the-shelf switch solutions is proper propagation of sync.

We are working with several major switch manufacturers so they can reconfigure their firmware to support MaGIC.  These products (available from the specific manufacturer) will be approximately the same price as a common switcher.

Two 3rd party companies are working on ASICs that are also compatible.  We will provide more information on these products as they become available.

A repeater is a one in-one out device. Often they also change media, for example copper to fiber.  These devices do work right off the shelf.

How are physical addresses (MAC) resolved between source and destination?  Does Gibson reassign MAC addresses to licensees from a common block?

MAC addresses are obtained for devices by purchasing vendor ID field (first 24 bits)  from IEEE. ($1500) This is common for all Ethernet devices.

http://standards.ieee.org/regauth/oui/index.shtml

Neighbor devices are addressed by updating MAC address register  upon a positive connect and enumeration.  MAC address HAS to be unique for all layer 1 devices, MaGIC or not.

Control messages can be broadcast and are bi-directional. Can audio delivery be broadcast or multicast and do all ports allow bi-directional delivery?

Yes, audio delivery can be broadcast or multicast.  Yes, all ports allow bi-directional delivery.

What is the typical audio drop out period during enumeration on a large LAN (say 50 to 100 nodes on a campus, stadium or studio complex environment)?

Audio will not drop out across a network while a new device enumerates.  Such an operation happens in the control portion only, and existing audio has priority over all other signals.  The only time audio can drop is when the user changes network sample rate.