



UniWire White Paper

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Introduction

Every once in a great while a true breakthrough occurs in the music industry. UniWire is such a breakthrough, allowing you to connect a UniWire-enabled device to a computer system and achieve total integration between the two. Its as if your computer just got a LOT more powerful, and all you did was plug in one cable and install a new plug-in to facilitate communication between your computer and Receptor.

UniWire: the next step in running plug-ins on Receptor

There can be no question that advances in software technology have completely changed the way people make music. Powerful and sophisticated digital audio workstation (DAW) programs for both the Mac and PC make it possible to record, edit, mix, and sequence your music using software plug-in technology. And with literally thousands of plug-ins to choose from, chances are if there is a sound you can imagine then it's a sound you can realize using plug-in software.

There is a downside to this revolution, however, and that is the fact that modern CPUs, although impressive, have failed to keep up with the demands of modern software. As a result, many computer music systems can choke, introduce pops and clicks, or even crash as a result of CPU overload. This problem becomes far worse if you want to re-create the sounds you use in your studio while performing live, since desktop computer gear is not well suited for the rigors of the road and laptops lack the power necessary to run many of the more demanding plug-ins.

Receptor was designed as a high-performance, super-robust, stand-alone solution to running your favorite VST plug-ins. As such, Receptor has been successful in securing a coveted spot in the rack of some of the world's biggest bands: Rolling Stones, U2, Garbage, Nine Inch Nails, Tears for Fears, George Strait, Ricky Martin, and Earth, Wind, and Fire are but a few of the Artists who use Receptor both in the studio and on the road.

Although Receptor has proven itself as a great solution for use live, connection to a computer-based DAW in the studio is limited by Receptor's 4 inputs and 10 outputs. UniWire solves this problem and more by allowing you to connect your Receptor to your computer system with virtually unlimited I/O in addition to allowing you to off-load the "heavy lifting" required by plug-ins to your Receptor, keeping your computer free to record audio, do MIDI sequencing, and perform editing.

UniWire: it's like a virtual-virtual instrument for your computer

So you may ask, how does UniWire integrate into my computer's software? Through a UniWire plug-in, of course! The UniWire plug-in acts just like the plug-ins you already have on your computer.

You simply call up the plug-in and send it either MIDI data or audio data, and get back the results. Only difference is that the UniWire plug-in is actually an interface to your Receptor, allowing you to send MIDI or audio data to your Receptor and have the processed results returned to your computer software *as if it is internal to your computer!* Sometimes referred to as a "virtual-virtual instrument" the UniWire plug-in takes the MIDI and audio data sent to it by your host program, converts it for transmission via Ethernet, sends it over to your Receptor where the audio is processed or generated and then returned to your host computer, all in a matter of a few milliseconds.

UniWire: a simple yet powerful plug-in

The UniWire plug-in will work just like a plug-in that is inside your computer. Simply load it in, send it MIDI or audio, and enjoy the results. You can also select banks and patches in Receptor directly from the UniWire plug-in GUI, as well as launching the Receptor remote control software that allows complete remote control over your Receptor, using Ethernet to control it.

Figure 1 – The UniWire Plug-in



UniWire uses automatic latency compensation to keep everything in sync.

You might wonder how it is possible to do this and not have everything go out of sync. Thankfully, most computer host audio programs have what is called "plug-in delay compensation" built into them, automatically compensating for the processing lag of a plug-in, thus maintaining perfect, sample-synchronous lock with the other audio tracks. There is an added benefit: by exploiting the automatic delay compensation of your host computer, you can actually "buy time", allowing Receptor to do even more processing and resulting in even more impressive sonic results.

Using the UniWire plug-in couldn't be easier! Just select what channel you want to talk to on the selected Receptor, select what you want to control and then determine what to do with the audio that is returned by Receptor. You can even set up a UniWire plug-in just to do MIDI automation and control, so you can automate your plug-ins in real time using your host software.

UniWire: works in your host software just like any other plug-in

UniWire works in your host environment just like any other plug-in. Simply instantiate (a fancy word for 'load') the UniWire plug-in, and you're ready to make the magic of UniWire work for you!

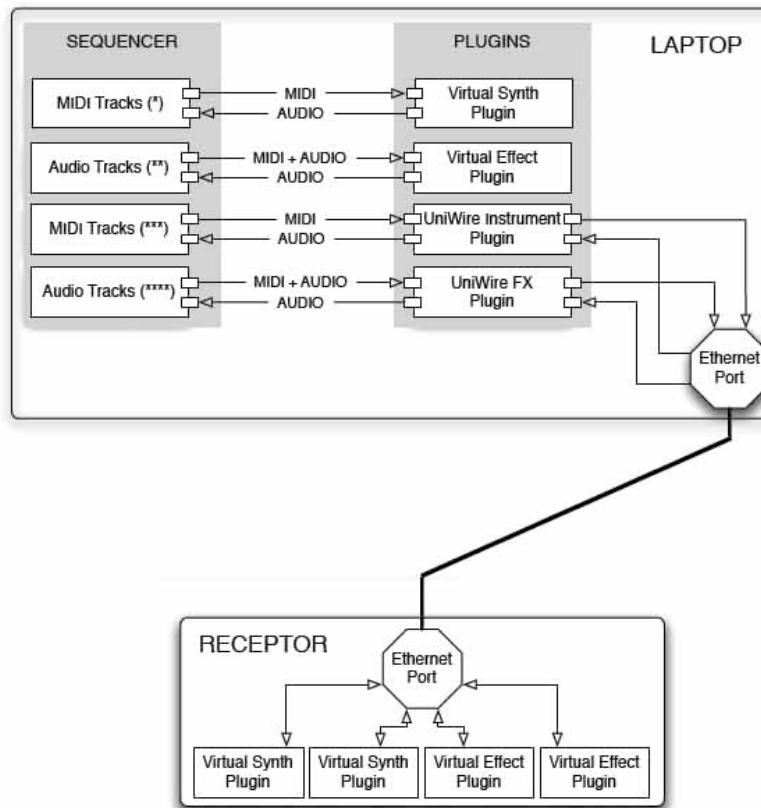
Since UniWire is a plug-in that works with your host environment just like any other plug-in, you can save all the settings of Receptor (via multis) in your host environment for easy system recall when changing projects.

To date, UniWire works with Macs or PCs running Cubase SX, SL and SE, Nuendo 2 or 3, Macs running MOTU Digital Performer, Ableton Live!, and Apple Logic. Cakewalk users will be pleased to know you can use UniWire with Sonar using the VST interface.

Figure 2. Multiple instantiations of UniWire Plug-in loaded into Cubase



Figure 3. Block Diagram of UniWire Functionality



The diagram above shows how the UniWire plug-in in your computer translates the audio or MIDI data and sends it via Ethernet to Receptor where that data is processed by the plug-in that is actually running on Receptor. The audio results are then sent back over Ethernet, where they are re-introduced to the host via the UniWire plug-in just as if that plug-in existed in the computer host.

UniWire: exploiting the Ethernet capabilities of your computer

UniWire uses the Ethernet capabilities of your computer. Ethernet is a fast, reliable, and ubiquitous networking protocol that allows your computer to talk with other computers. Ethernet is present on almost every computer out there, and comes in a variety of speed ratings. Most computers that were purchased within the last few years feature "100base-T" connection speeds, which means that computer can talk over Ethernet with speeds of 100 megabits per second, or 12.5MB per second.

Computer networks are designed to support more than one computer on them at any one time, which means you can use UniWire technology to connect more than one Receptor to your computer. Since many modern computers can support data transfer rates of up to 1 billion bits per second, UniWire gives you the ability to connect several Receptors to a single computer.

UniWire: a high-channel-count tributary for high-resolution audio

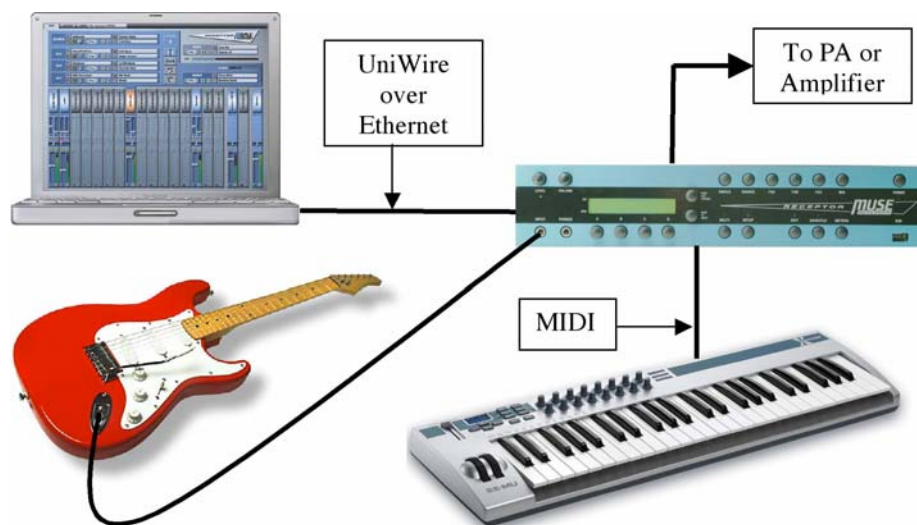
Everybody knows that 16-bit audio is a delivery format, and that most audio professionals need to work with at least 24-bit audio during recording, editing, mixing, and mastering. For that reason, UniWire supports 32-bit floating point data channels and can support up to 32-channels of 44.1kHz audio between a Receptor and a host computer (16 channels at 96kHz). This happens to perfectly match Receptor's 16 channel mixer architecture, meaning that you can have all 16 outputs from Receptor feeding your host computer, or any combination of input and output channels, say 16 inputs (8 stereo channels) and 16 outputs (8 stereo channels).

UniWire: advantages in the studio AND on the road

Even though UniWire has huge advantages in the studio by off-loading processing from your main computer and allowing you virtually unlimited MIDI connections and up to 32-channels of audio between your computer and your Receptor, there are advantages when you take a Receptor and a laptop on the road.

Say that your latest record has backing tracks that are impossible to perform live. With Receptor, your laptop can provide the backing tracks to Receptor where Receptor's exceptional quality I/O can feed your PA system. With your keyboard or guitar you can play on top of these tracks, controlling the performance with Receptor's mixer, embellishing with plug-in effects or virtual instruments as required. Truly, Receptor, thanks to UniWire, is now an incredibly versatile tool both on the road and in the studio.

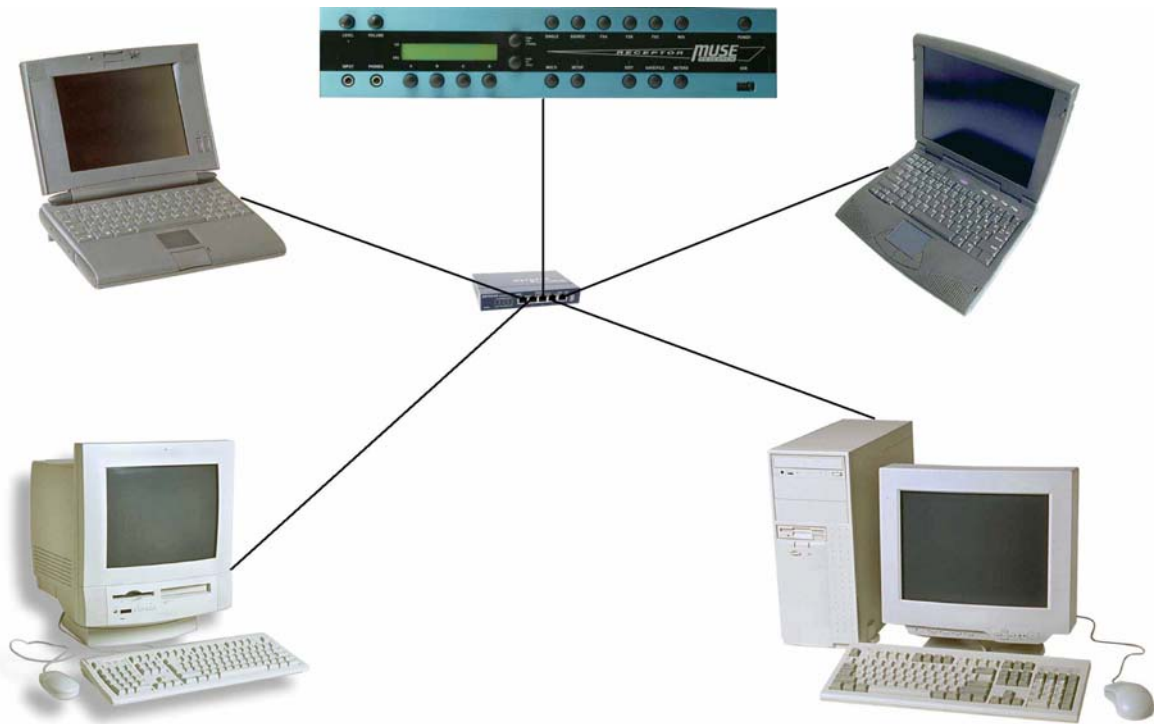
Figure 2. UniWire and Receptor in a live context



UniWire: works with any computer, in the studio or on the road

One of the many cool aspects of UniWire is that since it is based on Ethernet, it is, by definition, cross-platform. It doesn't matter that you have a Mac, or a PC, or prefer a laptop to a desktop or use a combination of all four. UniWire connects to your computer and harnesses the power of Receptor regardless of the particulars of your system. Of course, since UniWire is designed to work with DAW software, your computer must meet the requirements of your MIDI / audio software. Receptor UniWire plug-ins are currently available in VST format for Windows or Macintosh hosts, as well as AU format for use with MOTU and Emagic audio programs. Coming soon is support for RTAS plug-in platforms such as ProTools, Pro Tools LE, and M-Powered Pro Tools.

Figure 3. UniWire works with Macs or PCs and a variety of hosts.



UniWire: a comprehensive, plug-and-play solution for networking your studio

All artists crave the freedom to express themselves without technology getting in the way. Multi-track recording has brought with it huge advances in our ability to make music, MIDI has been nothing short of a miracle for keyboardists and drummers alike, and the advent of sophisticated music recording and sequencing software has enabled anyone with a computer to create studio-quality music at home.

Receptor with UniWire solves the critical problem facing professional musicians and project studio musicians alike: what do you do when your computer runs out of power and can no longer handle the load demands of the software you are using?

Sure, there are some solutions out there, like "freezing tracks", but this takes away the flexibility of being able to change anything at a moments notice. Adding a second computer is another possibility, but this path typically results in the frustration of having to manage two computers, two operating systems, along with the requisite problems of getting them to behave themselves individually much less as part of a cohesive system. And of course there are accelerator cards and Firewire boxes, but these run only a few proprietary format plug-ins, severely restricting your freedom of choice.

Receptor with UniWire solves these problem and more. Receptor gives you impressive processing power combined with unrivalled stability, and UniWire provides a way to integrate one or more Receptors with your computer as if all of its power resided inside your computer.

The fact that UniWire uses Ethernet networking technology has added benefits. You can connect multiple Receptors together with multiple computers. Any computer can talk to any Receptor, or multiple Receptors can do processing and provide the results back to a single computer. Forget about patching systems together – simply connect them all to an Ethernet switch and you can instantly access any Receptor on the network, individually or as a team.

UniWire: making distributed processing in the studio a simple reality

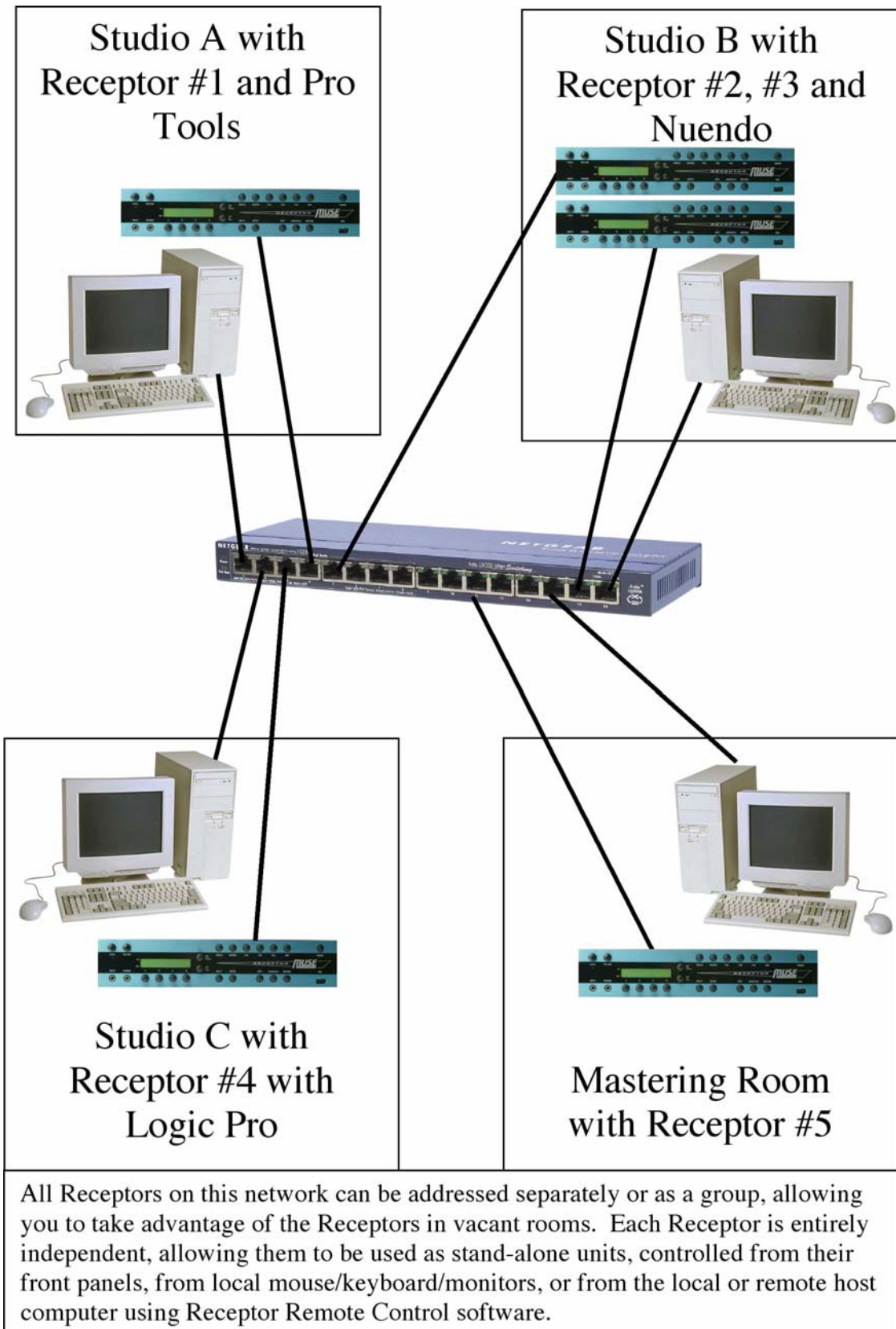
Distributed processing, or "blade" computing is a common way that you can divide up computationally intensive tasks and spread them out among several computers all connected with a network. This networked computer configuration is commonplace in computer animation facilities, Universities, and research and development institutions.

UniWire takes this concept of distributing processing and brings it to your studio, or even live on the road. The notion is simple: assign processing tasks to one Receptor from your host computer and when that Receptor is fully utilized, send additional tasks to the next Receptor on the network.

This has incredibly practical advantages in a studio where you might have Receptors in each room of a studio. Each Receptor could be used locally as a synth, sampler, sound module, effects processor, or guitar processor. And when it isn't being used locally, it can be used as part of the distributed processing network for use by another room. The unit never has to move from its rack since total remote control of each and every Receptor on the network is part of UniWire.

In fact, the UniWire remote control function, called Receptor Remote, has been part of every Receptor since the first one shipped, and gives you the same screen and controls you would see if you connected a mouse, monitor, and keyboard directly to the Receptor!

Figure 4. Multiple Receptors networked in a studio using UniWire



UniWire Features and Benefits

Feature	Benefit
UniWire lets you accelerate your existing computer host system simply and easily.	No complex drivers, no radical system changes, simply install the UniWire plug in, connect a Receptor, and your computer system just got MUCH faster.
UniWire is free to all registered Receptor customers	Receptor just became an even better value with UniWire, available for FREE!
UniWire works equally well in the studio or when used live.	You can maximize your Receptor investment since UniWire lets it work as a system accelerator in the studio, or as an I/O module / live performance tool onstage, doubling its value to you.
UniWire works with Macs or PCs, desktop or laptop configurations.	UniWire lets you leverage your investment in your existing computer and host software.
UniWire works with Cubase, Nuendo, Logic, MOTU DP, and soon Pro Tools	You don't have to learn a new host app, simply install the UniWire plug-in and go!
UniWire gives you up to 32 channels of audio I/O between your Receptor and computer	UniWire lets you keep all your tracks separate, using Receptor's 16 stereo mixer channels as independent multi-effects processors.
UniWire lets you connect multiple Receptors to a single host computer.	UniWire's modular and scalable design approach lets you add more processing power as you need it. Just add more Receptors as you need more voices or processing channels.
UniWire lets you accelerate your existing computer host system simply and easily.	No complex drivers, no radical system changes, simply install the UniWire plug in, connect a Receptor with a single cable, and your computer system just got MUCH faster.
UniWire brings PC VST software into the Macintosh world	UniWire and Receptor gives you the best of both worlds by letting you use PC VST plug-ins in the Apple realm, just as if they were working inside your Mac!
UniWire is sample synchronous and high-resolution	UniWire supports 32 bit floating point audio channels and uses your host's automatic latency compensation to zero out any latency from the network.
UniWire gives each plug-in its OWN MIDI INTERFACE!	UniWire lets you create elaborate MIDI networks since each plug-in gets its own dedicated 16-channel MIDI port!

Summary

Muse Research has revolutionized the way that musicians are able to harness the creative freedom and power of computer-based software plug-ins. Receptor lets a musicians use software plug-ins as if they were dedicated hardware. And Muse Research's innovative software host environment makes it possible to use software plug-ins with confidence, with minimal latency, remarkable stability, and maximum flexibility.

Receptor owners love the fact that Receptor can be used either from the front panel, from a local mouse, monitor, and keyboard, or remotely using Receptor Remote software. Now with UniWire, we've taken Receptor's versatility and usefulness up a notch by letting you install a UniWire plug-in into your host environment and run a plug-in in Receptor as if it was actually inside your computer.

This breakthrough in audio networking brings with it a variety of additional benefits – you can use UniWire in the studio to off-load the burdensome plug-ins to Receptor and free up valuable CPU cycles to focus on your host application. You can also take Receptor on the road with your laptop, and use Receptor's studio-grade I/O to play your backing tracks as well as playing live over the top of it.

Finally, Receptor with UniWire makes distributed processing a reality, allowing you to add more Receptors as your processing load increases, or install Receptors in various locations where they can be used locally or as a distributed processing network across your Ethernet network.

Be sure to check out everything that Receptor and UniWire can do for you at your local music dealer, by visiting our website at www.museresearch.com, or by contacting Muse Research below for more details.

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