At NAMM 2020 Roland introduced a new high-end keyboard with weighted action and lots of extras. The most dramatic revelation was that this is the first ‘MIDI 2.0’ instrument from Roland. The A-88MKII has three configurable zones, an advanced arpeggiator, chord memory, and multipurpose pads that can trigger commands and events. All these features can be customised via a new control app for macOS and Windows, giving an overview of all your layers and control mappings at a glance. Plus, you can assign commands to the pads with custom colours for visual feedback, create custom setups to control specific soft synths or external hardware, and instantly recall everything with a Snap Shot function.

The new Roland instrument seemed especially significant because the MIDI standard was originally born out of discussions between Roland founder Ikutaro Kakehashi, Oberheim Electronics founder Tom Oberheim, and Sequential Circuits president Dave Smith at the Summer NAMM show in 1981. Before this time, any communication between electronic musical instruments was limited to proprietary protocols linking synths from the same manufacturer. Dave Smith and Chet Wood presented a paper that year at AES proposing a concept for a Universal Synthesizer Interface running at 19.2kBaud, using regular 1/4” phone jacks. At the following NAMM show in January 1982 improvements were made to the specification: increasing the Baud rate to 31.25, adding an opto-isolation circuit, and using the now-familiar DIN connector.

MIDI (Musical Instrument Digital Interface) as its name was finally chosen, was announced in 1982, and by December 1982 actually appeared on the Sequential Prophet 600. Roland’s MIDI-equipped JP6 quickly followed. The two were successfully linked with a DIN-to-DIN cable at the January 1983 NAMM Show — and a new chapter in the history of electronic musical instruments was born.

It seems amazing to think we have been using the same protocol for musical communication since our venerable editor was crouched over his Atari 1040ST running Pro 24 (the forerunner to Cubase) in 1984. Which other software has remained at version 1 since then?

MIDI 2.0 is backwards compatible, meaning all new MIDI 2.0 devices will be able to use and send MIDI 1.0 data. If there’s a mixed setup of older 1.0- and new 2.0-equipped instruments, the MIDI 2.0 models will interact together with the fresh capabilities of the new spec, while the MIDI 1.0 models will continue to work as they always have.

We thought we’d get Brett Porter, a developer who in 2018 was invited by the MIDI Manufacturers Association to join a group of programmers tasked with creating implementations of the 2.0 protocol, to give us the low-down on MIDI 2.0.

MIDI 2.0 developer Brett Porter writes:

When a standard stands for nearly four decades, with only minor adjustments, it’s clearly powerful and useful. MIDI is such a standard, and it’s served producers, musicians, technologists, and instrument and gear makers well. But eventually, even truly great frameworks need to be realigned with changing needs and uses.
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Prototyping and validation stage as one of the team behind the new standard — I want to emphasize that MIDI is not just about hardware. The new standard has exciting implications for software too, including virtual instruments. VST3 and AU plug-ins will support MIDI 2.0, weaving in the same new capabilities to everything across the board, not just hardware.

A product of its time, but with no timing

MIDI has worked well, but it was a product of its times. The original MIDI standard was designed in the ‘80s for low-powered systems, which led to several key limitations that MIDI 2.0 addresses. One of these limitations was that MIDI had no concept of time, a vitally important variable for music. Thus, for 30+ years, those of us who work with MIDI have been complaining about timestamps, or the lack thereof. MIDI 2.0 communicates the time an event is supposed to happen. When you’re sitting at a DAW, you will have that sound right at the time you specify, not whenever the message reaches the synth through the wire.

Along with timestamps, data messages in MIDI 2.0 are much higher resolution than in the existing standard. There are an entire new set of channel voice messages in the MIDI 2.0 protocol, all contained in what’s known as the “Universal MIDI Packet.” Where MIDI 1 messages consist of (at most) a status byte and 2 data bytes, all of the MIDI 2.0 channel voice messages use a packet size of 64 bits, so that 7-bit velocity limitation gets blown up to 16 bits of resolution.

With higher resolution comes an opportunity to be more expressive and, naturally, more accurate. Think of early digital cameras and the images they took. They now look grainy and ‘janky’ compared to today’s high-res images. This radically improved resolution unlocks the potential of existing controllers, and may inspire new hardware of all kinds. Wind controllers, for example, have been around since the ‘80s, but their output was forced into a lo-res data space. Now, MIDI 2.0 will enable them to deliver far more nuance. A designer in 2018 who had access to really high quality pressure sensors that weren’t available in the ‘80s could measure a performance at a fine level of detail, but would have needed to discard most of that precision when encoding the data into MIDI. After MIDI 2.0, there’s a way to use that more expressive data, as manufacturers start building out compatible products.

Exciting future for controllers

Gestural controllers and other sound sources, including biological tissue like leaves or skins, will be able to trigger a wider range of sounds and timbres. Look to some of the things that are emerging in the modular space, where companies like Sensel are building flexible pressure controllers that can do things like emulate classic analogue controllers like the Buchla Thunder, or practitioners in the experimental music world who’ve been using other protocols like OSC to communicate finer-grained control data around. A lot of the more interesting things that will happen with this haven’t been thought of yet, because MIDI has lacked a suitable way to express the data needed.

Expressiveness is one of the aspects of MIDI 2.0 that most excited me as a developer on the team. The new standards have the ability to manipulate sound on a note-by-note basis. Every MIDI keyboard in the world has a pitch bend controller, for example. With MPE and MIDI 2.0 I can bend individual notes. MIDI 2.0 takes that even further: you can hold two fingers on middle C and bend in opposite directions from a single note.

Articulation in MIDI 2.0 is also user assignable, and you can map any physical change you can make to any sound at a very fine level of control. You can control the vibrato on a single note. You can assign specific articulations to different spots on your controller. For example, if you’re using an orchestral library and a suitable MPE-style keyboard controller, you can assign a pizzicato sound near the edge of a key versus a different articulation at a different spot on the key.

Intelligent connections

There are also some new features in MIDI 2.0 that will play into how devices interact in cool and helpful ways. MIDI 2.0 will bring in CI (capability inquiry), or auto-configuration. This will let a user plug two pieces of gear together. They will automatically communicate their capabilities to one another, taking a huge load off the user. You will no longer have to remember that that preset is a certain patch when you put a hardware synth and a keyboard controller together, for example. MIDI 2.0 means when the user turns a certain knob, this parameter in the synth will change. Things will talk together, or give you a more sensible way to communicate with them as a user.

This is a unique time, one where MIDI might be used in all sorts of new ways we can barely imagine. MIDI 2.0 possibilities are already being imagined as a way to coordinate flocks of tiny lighted drones. We’ve been able to build on what was working and modernize the standard enough so that it’s going to last another 35 years. MIDI 2.0 can create music that is more fluid, with better timing. Thanks to the better data it generates, it may spawn new generations of controllers and ideas — and a new wave of electronic music and entertainment creativity.

Brett Porter is the Lead Engineer at Art+Logic, where he has worked on over 200 software development projects, many of them related to audio and music tech. He’s a musician himself with a Master’s in Electronic/Computer Music and can be followed on Twitter @bgporter.

Art+Logic has been designing and developing innovative custom software since 1991. They have built software for over 900 clients from a diverse set of industries including education, aerospace, music technology, consumer electronics, entertainment, financial services, and more. They are industry leaders in providing software solutions to companies like NASA, General Electric, Google, Apple, Intel, and Motorola. Contact them at https://artandlogic.com.