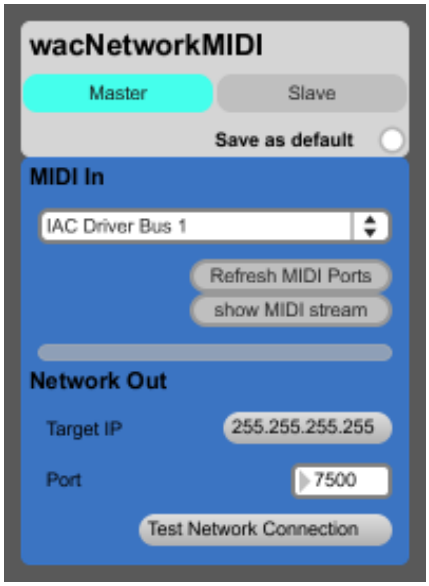
wacNetworkMIDI



wacNetworkMIDI is a utility for sending MIDI from one computer to another via a local network. The application can run on Windows and OS X, and provides an inter-platform MIDI communication bridge without the need for external MIDI hardware.

An instance of the application can either:

- Source a MIDI stream from any MIDI port present on the system (including internal MIDI buses such as MidiYoke on Windows, or the IAC bus on OS X) and forward this to a designated network port (using the UDP protocol)
- Listen to a network port and forward any UDP traffic received on it to a designated MIDI port

It is possible to transmit MIDI from a (music) application running on a 'master' computer to an application running on a second 'slave' computer via wacNetworkMIDI. Possible uses include:

- Forwarding MIDI Timecode (MTC) from one DAW to another
- Forwarding real-time MIDI messages to enable inter-application MIDI-sync
- Playing a software synthesiser hosted on a second remote computer from a sequencer on the first computer

This manual has the following sections

Software Overview

Mode Selection
wacNetworkMIDI can operate in Master or Slave or mode. When either is selected, the other mode becomes inactive.

Master Mode
MIDI received on the selected MIDI port is forwarded to the specified IP address via the selected network port.

The *MIDI In* drop-down selects the port to use. A button can be clicked to refresh the list of available ports. If your ports change (e.g. due to adding a USB MIDI device from your system), restarting wacNetworkMIDI may be more reliable than simply refreshing the ports list.

A click-able button brings up a dialogue box for typing the *Target IP* address of the slave computer, using standard notation, e.g. 192.168.10.1. The UDP transmission occurs on a selectable network *Port* in the range 5000 to 10000.

The *Test Network Connection* button sends a message that will be displayed in the *Max Window (cmd+m)* by an instance of wacNetworkMIDI running in Slave mode on the computer with specified Target IP address.

Slave Mode
In Slave mode wacNetworkMIDI receives MIDI (via the UDP protocol) on the selected network port and forwards it to the specified MIDI port.

The network *Port* listened to is user selectable (7500 by default) and must match that used by the Master instance of the application. If the chosen port is already in use by another application a warning message will be printed in the *Max Window (cmd+m)*. In this case another port must be selected (for both Master and Slave instances of the application).

The *MIDI Out* port is selectable via the drop-down menu. Again a click-able button refreshes the list of available ports on the system.

Show MIDI Stream buttons
Debugging displays are available that show either

- MIDI received over the selected MIDI input (Master mode)
- MIDI received on the selected network port (Slave mode)

These display the most recently received raw MIDI bytes, and flash an LED to show activity. They can be used to verify the successful transmission of MIDI from one computer to another, or from another application to wacNetworkMIDI (running in Master mode). Once the connection has been verified the debugging displays should be closed to save systems resources.

Default Settings
On first load, wacNetworkMIDI is configured with no MIDI input/output ports selected, and uses the broadcast IP address (i.e. 255.255.255.255) as the target IP address.

Once you have changed the software settings as required, the *Save As Default* button can be used to store these settings; they will be automatically recalled next time the application is loaded.

Default settings can also be used to recall whether wacNetworkMIDI should be run as Master or Slave.

Network Communication Between Master And Slave

A Master instance of wacNetworkMIDI can forward MIDI to one or more Slave instances running on other computers on the local network.

Single Slave

Explicitly specifying a Target IP Address in the Master instance of wacNetworkMIDI, will forwarded a MIDI stream to a single Slave instance only.

This setup is suited to:

- Networks with multiple computers running wacNetworkMIDI where it is essential that ONLY ONE of the Slaves receives the MIDI stream from a given Master (such as a post production facility or music studio)
- Situations where you want to minimise network traffic by directing it to one computer only (and not every computer on the local network)
- A network where the computers use static IP addresses (and hence the Target IP Address is known)

Multiple Slaves

By utilising the special *Broadcast IP Address* (255.255.255.255) any Slave instance of wacNetworkMIDI will receive the MIDI stream forwarded by the Master instance. This is advantageous as less setup is required, however, control is lost over exactly which computers the MIDI stream is forwarded to.

The setup is suited to:

- A local network where the computers are assigned an IP address by a DHCP server
- A two computer network (created via an Ethernet crossover-cable) where there is only one possible recipient
- A situation where applications on several Slave computers may need to follow a sync source from an application on a single Master computer

By default wacNetworkMIDI uses the broadcast IP as its Target IP Address to make initial setup straightforward.

More Information

There are various resources available online if you need to know more about:

- Networking computers (and IP addresses)
- Static IP addresses and DHCP assigned IP addresses
- Network ports
- Ethernet crossover
- The broadcast IP address (for the local network)

Network Communication Setup Examples

Set Up Example Over A Network

Assuming you have a two computers connected to the same network, either via a (wireless) router or directly via a crossover cable:

- Load wacNetworkMIDI on the first computer and select Master mode
- Set the target IP address to 255.255.255.255
- Load wacNetworkMIDI on the second computer and select Slave mode
- Set the network port to match that used in the Master instance
- Press cmd+m to open the Max Window (Slave computer)
- Press the Test Network Connection button (Master computer)
- Observe a message printed in the Max Window of the Slave instance

By utilising the Broadcast IP address, the above will work regardless of whether the two computers use static IP addresses or if they are assigned by DHCP.

Setting Up A (Crossover) Two Computer Network

For time-critical work it may be advantageous to network the two computers together directly via an Ethernet crossover cable:

- Disable wireless network connections on both computers (if available)
- Connect a crossover cable between the two computers' Ethernet ports
- If the Ethernet ports automatically assign an IP address by DHCP, wait a few minutes for the two IP addresses to resolve
- If using static IP addresses, the network should come up with minimal delay
- In either case, the computer may complain about 'restricted' access or 'having no internet access'; this can be ignored
- Now that the two computers are 'on the same network' follow the steps as in the example above

DAW To DAW MIDI Setup Example

In this setup, *Ableton Live,*running on a slave computer, is synced to a master computer also running *Ableton Live*. The details in this example are specific to a pair of computers running OS X, but are equally applicable to Windows.

The main modification is the need to install and use a third-party internal MIDI bus (such as MidiYoke), as the *to/from wacNetworkMIDI* internal MIDI buses are only available when the application is run under Os X.

The MIDI stream will take the following path:

Ableton Live (master)
---> MIDI --->
Internal MIDI bus
---> MIDI --->
wacNetworkMIDI (master)
---> UDP --->
Network
---> UDP --->
wacNetworkMIDI (slave)
---> MIDI --->
Internal MIDI Bus
---> MIDI --->
Ableton Live (slave)

1. Follow the setup instructions in the Network Communications Setup Examples section of this manual to get a Master and Slave instance of wacNetworkMIDI communicating with each other

2. On the master computer
   1) Set up *Ableton Live* to output Sync on the following MIDI port:
      `- to wacNetworkMIDI 1`
   2) In wacNetworkMIDI select as MIDI In port:
      `- to wacNetworkMIDI 1`

3. On the slave computer
   1) Set up *Ableton Live* to receive Sync from the MIDI input:
      `- from wacNetworkMIDI 1`
   2) In wacNetworkMIDI select as MIDI Out port:
      `- from wacNetworkMIDI 1`
   3) Set *Ableton Live* to chase external Sync by clicking the 'EXT' button

4. Tempo and transport of *Ableton Live* on the slave computer will now follow *Ableton Live* on the master computer

Technical Note

wacNetworkMIDI is written in Cycling 74's MaxMSP and uses the *udpsend/udpreceive* objects to convert MIDI data into UDP packets for transmission across a network. A 'busy' network may incur delays or packet loss which will adversely affect timing and reliability of the MIDI stream being sent.

Optimum time-critical network communication between two computers should therefore be implemented over a private two-computer network (via a crossover cable).

For proper operation, it may be necessary to register the application with your operating systems firewall. Under OS X this is managed under System Preferences. When first run under Windows, a window should pop up warning about the application trying gain network access. You should choose 'unblock' to grant the wacNetworkMIDI access through Windows' firewall.

Source Code & Contact

wacNetworkMIDI was written by Will Crossland.
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The Max patch used to make wacNetworkMIDI is included (as a .maxpat file) in the download for others to modify and use according to their requirements. Note this is only compatible with version 5 of MaxMSP.