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The Arduino Uno (ATmega328) has a single hardware serial connection. If more serial connections are needed, you must implement these in software. Luckily, there is a very easy to use library to implement software serial connections. It is called `SoftwareSerial.h` and is included with the latest Arduino IDE. The following code demonstrates how to use this library to implement more than one software serial channel. Importantly, no more than one software serial connection can be in use at a time so an open connection must be terminated before another can be started.

```
#include <SoftwareSerial.h>

// define the digital pins to use as RX and TX for two
// software serial connections
const int RX1 = 8;
const int TX1 = 9;
const int RX2 = 10;
const int TX2 = 11;

// create SoftwareSerial objects
SoftwareSerial SoftSerialOne(RX1,TX1);
SoftwareSerial SoftSerialTwo(RX2,TX2);

void setup(void) {
  // setup the software serial pins
  pinMode(RX1, INPUT);
```

## PCB assembly

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```
void loop(void) {  
  SoftSerialOne.begin(9600); // begin communication on the first  
  // software serial channel  
  SoftSerialOne.print("Hello World"); // send something  
  SoftSerialOne.end(); // end communication on the first software  
  // serial channel  
  SoftSerialTwo.begin(9600); // begin communication on the second  
  // software serial channel  
  SoftSerialTwo.print("Hello World"); // send something  
  SoftSerialTwo.end(); // end communication on the second software  
  // serial channel  
}
```

Note that before using the second software serial connection, the first connection must be terminated using `SoftSerialOne.end()`. If this is not done your code will probably compile but will not do what you expect it to do. Also, the hardware serial connection can be open and used at the same time as a software serial connection without problems.

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**CLOUDY**9 YEARS AGO // [REPLY](#)

Hi,

Has Arduino uno multiple hardware serial ports?

Because I am doing Arduino connect to other module. But how to send 'z' to other module from Arduino uno?

Thanks

**JEFF**9 YEARS AGO // [REPLY](#)

The Uno uses the ATmega328 which has a single UART (hardware serial channel). You can always use the SoftwareSerial library to simulate more. That is what I am talking about in this post.

**SHIFA**8 YEARS AGO // [REPLY](#)

Hey,

Thanks for the post. Cleared up a lot of doubts. I wanted to know the maximum number of serial software ports that can be created on Arduino Uno (atmega328) practically. I need to connect three/four modules, all using serial UART. The above mentioned code lets me use 3 devices right? One using hardware serial, and the other two using software serial?



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connection before starting another.



**SRIKER DEKONDA**

7 YEARS AGO // [REPLY](#)

why can't the two(or)more software serial ports be open parallely



**ROM**

8 YEARS AGO // [REPLY](#)

if i have arduino having 2 h/w serial, and i want to use only 1 software serial so 3 serial interface in total, can i still obtain a simultaneous reading of data from 3 uart-devices?



**JEFF**

8 YEARS AGO // [REPLY](#)

Do you mean the mega? Yes, you should be able to have all three simultaneously turned on if two are hardware UARTs and the other is software serial.



**BASSANT**

6 YEARS AGO // [REPLY](#)

Can i send and receive at the same time ?



that software serial pins can only read each other and not hardware pins. I just wanted to double check with you. Thank you!



*JOHN DAVE*

8 YEARS AGO // [REPLY](#)

Hi Jeff, this was a great thread, but were you able to make this program work? doesn't SoftwareSerial need PINs with Interrupt, whereas in UNO, only DP2 and DP3 has INT support. thanks in advance! i was thinking of buying either Uno or Mega but i need cheaper :p thanks!



*JOHN DAVE*

8 YEARS AGO // [REPLY](#)

Hi Jeff, this post is interesting. Uhhh, just wondering, were you able to make this program work with Arduino Uno?  
TIA!



*BALAVINOTH*

7 YEARS AGO // [REPLY](#)

I am trying to receive two uart in softwareserial but it is not getting into the while loop mentioned below

```
while (portOne.available()) {  
  Serial.println("Data from port one:");  
  inByte[count++] = portOne.read();  
}
```

if (count > 0) {

my full code is

```
/*
```

Software serial multiple serial test

Receives from the two software serial ports,  
sends to the hardware serial port.

In order to listen on a software port, you call `port.listen()`.

When using two software serial ports, you have to switch ports by `listen()`ing on each one in turn. Pick a logical time to switch ports, like the end of an expected transmission, or when the buffer is empty. This example switches ports when there is nothing more to read from a port

The circuit:

Two devices which communicate serially are needed.

- \* First serial device's TX attached to digital pin 2, RX to pin 3

- \* Second serial device's TX attached to digital pin 4, RX to pin 5

Note:

Not all pins on the Mega and Mega 2560 support change interrupts, so only the following can be used for RX:

10, 11, 12, 13, 50, 51, 52, 53, 62, 63, 64, 65, 66, 67, 68, 69

Not all pins on the Leonardo support change interrupts,

✓ so only the following can be used for RX:

---

by Tom Igoe

based on Mikal Hart's twoPortRXExample

This example code is in the public domain.

```
*/
```

```
#include
```

```
// software serial #1: TX = digital pin 10, RX = digital pin 11
```

```
SoftwareSerial portOne(10, 11);
```

```
// software serial #2: TX = digital pin 8, RX = digital pin 9
```

```
// on the Mega, use other pins instead, since 8 and 9 don't work on the Mega
```

```
SoftwareSerial portTwo(8, 9);
```

```
unsigned char inByte[64];
```

```
int count=0;
```

```
void setup()
```

```
{
```

```
// Open serial communications and wait for port to open:
```

```
Serial.begin(9600);
```

```
while (!Serial) {
```

```
; // wait for serial port to connect. Needed for Leonardo only
```

```
}
```

```
// Start each software serial port
```

```
✓ portOne.begin(9600);
```



```
// By default, the last initialized port is listening.  
// when you want to listen on a port, explicitly select it:  
portOne.listen();  
//Serial.println("Data from port one:");  
// while there is data coming in, read it  
// and send to the hardware serial port:  
while (portOne.available()) {  
  Serial.println("Data from port one:");  
  inByte[count++] = portOne.read();  
  if(count==8)break;  
  Serial.write(inByte,count);  
  clearBufferArray(); // call clearBufferArray function to clear the stored data from the array  
  count = 0; // set counter of while loop to zero  
  
}  
  
// blank line to separate data from the two ports:  
// Serial.println();  
  
// Now listen on the second port  
portTwo.listen();  
// while there is data coming in, read it  
// and send to the hardware serial port:  
// Serial.println("Data from port two:");  
while (portTwo.available() > 0) {  
  char inByte = portTwo.read();
```

```
}  
void clearBufferArray() // function to clear buffer array  
{  
  for (int i=0; i<count;i++)  
  { inByte[i]=NULL;} // clear all index of array with command NULL  
}
```

*ASWINI*3 YEARS AGO // [REPLY](#)

did you solve the issue of two serial receive? please tell me if you got the solution.

*PRT*7 YEARS AGO // [REPLY](#)

My project consist xbee and rfid both uses serial comm, how to connect the hardare pls let me know

*SAINT*7 YEARS AGO // [REPLY](#)

now how do i select which port to use?

*HERICK*7 YEARS AGO // [REPLY](#)

**BASSANT**6 YEARS AGO // [REPLY](#)

How to solve the problem of being used at same time plz ?

**PRASAN**6 YEARS AGO // [REPLY](#)

Thanks for clear description of working with two software serial. I was working with GSM and GPS both instantiated as serial objects. But nothing was appearing on Serial monitor. It works now.

Still I need to know how software serial exactly works. If it is same as UART connection then how any digital/analog pin can be assigned as RX/TX ??

**MIRO**5 YEARS AGO // [REPLY](#)

i got a same problem ... my serial monitor dont show anything up ... can u help me sir ?

**ERVIN BRUBAKER**6 YEARS AGO // [REPLY](#)

This answered my problem.

I was using two Software serials and the hardware serial talking to a robot over XBees, but I kept getting



no more than one software serial connection,must be terminated before another can be started.

**EDGAR MARTÍNEZ**6 YEARS AGO // [REPLY](#)

So, Let me get this straight, If I use this library I can then connect lets say two bluetooth modules to the Arduino, then one of the módulos can recieve/send serial data to the PC but the other one can only recieve data via bluetooth (to activate leds) but I cant send data to the serial port on the PC? If that is how it is then this is pretty much what I need .

**JEFF**6 YEARS AGO // [REPLY](#)

I think you are better off starting with the Arduino 101 if you need bluetooth connectivity as it comes with an intel chip with bluetooth functionality built in. The problem with using software serial for multiple linkups is you can't use the connections concurrently which will probably be unacceptable when interfacing with external devices.

**JEFF**3 YEARS AGO // [REPLY](#)

Does the number of software serial ports you can open scale 1:1 with HW ports? Say I have a mega with 4 HW serial ports, each connected to a HC-05. Do I get four Software Serial virtual ports or only one?

**COSMO**3 YEARS AGO // [REPLY](#)

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