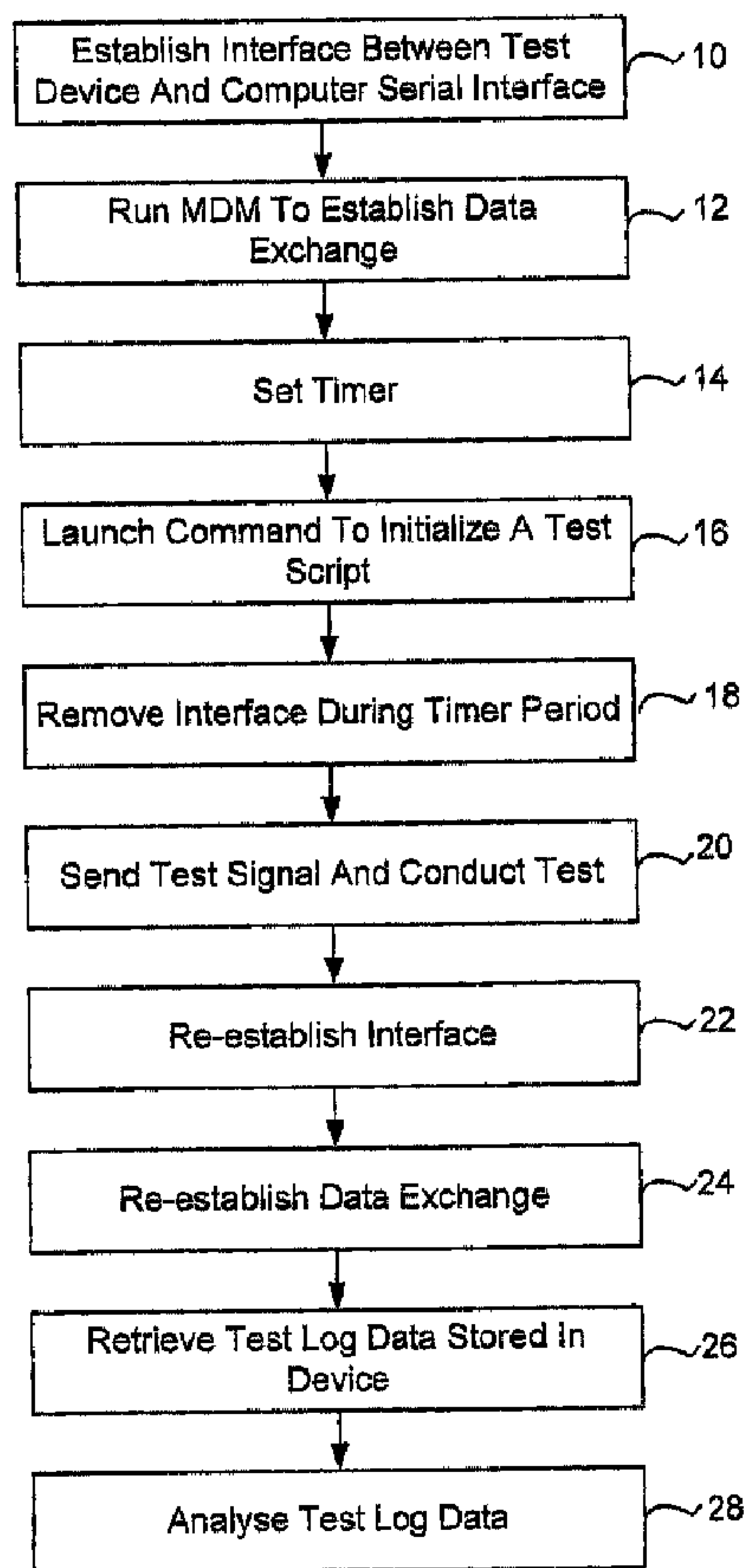




(22) Date de dépôt/Filing Date: 2004/09/09  
 (41) Mise à la disp. pub./Open to Public Insp.: 2005/03/16  
 (45) Date de délivrance/Issue Date: 2009/12/01  
 (30) Priorité/Priority: 2003/09/16 (EP03020959.7)

(51) Cl.Int./Int.Cl. *G01R 31/00* (2006.01),  
*H04B 17/00* (2006.01)  
 (72) Inventeurs/Inventors:  
 ZHAO, WEN, CA;  
 JIN, XIN, CA;  
 BUGNARIU, C. NICOLAS, CA;  
 ISLAM, M. KHALEDUL, CA;  
 LUO, FANGYI, CA;  
 CHEN, JIANGSHENG, CA  
 (73) Propriétaire/Owner:  
 RESEARCH IN MOTION LIMITED, CA  
 (74) Agent: MOFFAT & CO.

(54) Titre : METHODE D'ESSAIS DE FONCTIONNEMENT PAR RAYONNEMENT D'UN DISPOSITIF SANS FIL  
 (54) Title: METHOD FOR CONDUCTING RADIATED PERFORMANCE TESTS OF A WIRELESS DEVICE



(57) Abrégé/Abstract:

A method for conducting a radiated performance test on a wireless device in an anechoic chamber where an interface and data connection are established between the wireless device and a test computer, the method comprising the steps of: initializing and

(57) **Abrégé(suite)/Abstract(continued):**

starting a timer for a predetermined interval on the wireless device; starting a test script on the wireless device; removing the interface during the predetermined interval; running the radiated performance test after the predetermined interval has expired; storing a log of the radiated performance test on the wireless device; and analysing test results based on the log.

**ABSTRACT**

A method for conducting a radiated performance test on a wireless device in an anechoic chamber where an interface and data connection are established  
5 between the wireless device and a test computer, the method comprising the steps of: initializing and starting a timer for a predetermined interval on the wireless device; starting a test script on the wireless device; removing the interface during the predetermined interval; running the radiated performance test after the predetermined interval has expired; storing a log of the radiated  
10 performance test on the wireless device; and analysing test results based on the log.

## **METHOD FOR CONDUCTING RADIATED PERFORMANCE TESTS OF A WIRELESS DEVICE**

### **FIELD OF THE APPLICATION**

5 The present application relates to a method for conducting radiated performance tests, and in particular to a method for conducting radiated performance tests without disrupting the antenna pattern of a wireless device.

### **BACKGROUND**

10 The results of radiated performance tests, including sensitivity tests, of a wireless receiver in an anechoic chamber are strongly dependent on the antenna pattern. The antenna pattern can be altered if additional wires or cables are attached for test purposes but which do not exist under the normal operating conditions for the device. By attaching wires or cables for test purposes, the accuracy of the  
15 test results are affected.

Inaccuracies are also further caused by signals travelling along the wires or cables attached for test purposes. These signals generate interference that is radiated into the space around the receiver or are coupled through surrounding  
20 circuitry, and this interference or coupling may also affect the test accuracy.

If wireless means such as Bluetooth or IrDa are used instead of cable, the spurious emissions from a Bluetooth or IrDa transceiver may also cause interference that is radiated into the space around the receiver, affecting test  
25 accuracy. It is therefore desirable not to use wireless communications other than the test signal during testing.

In wireless devices that normally operate in two directions simultaneously, i.e. transmitting while receiving (either simultaneously in time or being time  
30 multiplexed), the transmitting channel can be used as a means to report the receiving performance values. These receiving performance values include bit

error rate, frame error rate, block error rate, detection rate, or misdetection rate, false alarm rate, etc. In a device which operates in two directions, no attached wire or cable is necessary. Instead, such devices loop back data that is received or send messages in the transmit direction that report performance values.

5

For wireless devices that only operate in one direction at a time, or for testing operating modes that only use one direction, or for the type of test equipment that does not have the capability to obtain reported test messages over the air, or for prototypes that have limited test support functionality, other means of  
10 retrieving performance data from within the device are needed.

A current method of testing devices includes attaching a cable between the device under test and a computer through a serial interface. Test scripts, which are prepared in advance of the tests, are initiated from the computer and the  
15 contents are sent through the data cable to the device. Software on the device under test has the capability of accepting commands received through the data cable. The software further interprets the commands and acts according to these commands. The results of the actions are logged and these logs are sent back  
20 to the computer using the same data cable. These log results are further interpreted to obtain the results of the test. Since the data cable is attached to the device all the time during the test to maintain the communication between the device under test and the computer, the results of the test are tainted by the use of the cable.

25 One such method is taught by U.S. patent application 2003/0003883 to Wallace et al. Wallace teaches an anechoic chamber design in which a computer 70 communicates directly with a wireless communication device 15 using a cable coupled between the computer 70 and the keypad connection for initiating  
30 operations of the wireless communication device 15. Wallace further teaches that the computer 70 may also send commands to the wireless communication device 15 to control its transmitter, receiver and control circuitry during testing.

This reference therefore exhibits the deficiency of having a cable connected during testing which leads to interference and alteration of an antenna pattern.

5 A further reference of interest is European patent application no. EP 1,309,214 to Koivukangas et al. The '214 application teaches the testing of a mobile station in the field by having the mobile station log various events that occur and storing these events as a set of product performance counters (PPCs) 24A. These PPCs are periodically downloaded to a network computer either through an inband communication or using a digital interface upon the occurrence of a  
10 triggering event. Nothing in this reference however teaches the reduction of interference, spurious emissions or altered antenna patterns in an anechoic chamber, nor any method to solve this.

### **SUMMARY**

15 The present invention seeks to overcome the deficiency of the prior art by providing a method and apparatus for performing a test while a cable is not connected during the radiated test. The cable can be connected prior to the test and after the test to upload the test instructions and download the logged data respectively.

20

In one embodiment of the method, a test cable is connected to the wireless device being tested. The test scripts are uploaded and pre-stored within the storage of the device. A command is sent by the test computer through the data cable to initiate the test script. This start test command also includes a delay of a  
25 predetermined length in which a tester can disconnect the cable, orient the device in its proper orientation, and close the door of the anechoic chamber before the test is allowed to run.

After the test is completed, the tester can reconnect the data cable and download  
30 test logs, which were stored on the device during the testing period. These logs can then be analysed to obtain the test results.

The present application therefore provides a method for conducting a radiated performance test on a wireless device in an anechoic chamber where an interface and data connection are established (10) between the wireless device and a test computer, the method comprising the steps of: initializing and starting a timer (14) for a predetermined interval on said wireless device; starting a test script (16) on said wireless device; removing said interface (18) during said predetermined interval; running said radiated performance test (20) after said predetermined interval has expired; storing a log of said radiated performance test on said wireless device; and analysing test results (28) based on said log.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 is a flow chart of the method of the present invention;  
Figure 2 is a flow chart of an alternative method; and  
Figure 3 is a flow chart of a third alternative method.

### **DETAILED DESCRIPTION OF THE DRAWINGS**

Reference will now be made to the drawings.

Figure 1 shows a preferred embodiment of the present method. Commencing with the step identified by reference numeral 10, a data cable is connected between the device that is being tested and the test computer. Preferably, this cable is a serial cable that allows data flow in both directions between the test device and the computer conducting the test. One skilled in the art will however realize that other types of data cable or short range wireless communications means may also be used, and the examples below using a serial cable are not meant to limit the invention. Such wireless communication means may include Bluetooth or IrDA,

The tester next moves to step 12. In step 12, data exchange is established between the test device and the computer. In a preferred embodiment, a software tool such as a mobile diagnostic monitor (MDM) is used. One skilled in

the art will realize that other test tools are possible and reference to the use of the MDM is by way of example only. The MDM has the capability of sending commands to establish data exchange with the device through the data interface. It also has the ability to initialize test scripts and timers, to terminate data  
5 exchange and to send commands to receive test logs from the device.

Once data exchange has been established, the tester next moves to step 14. In step 14, the MDM is used to set a timer. The timer is set for a predetermined amount of time, for example 30 seconds.

10 The tester next moves to step 16 in which a command is used to initialize a test script. This test script is generally prepared in advance to program the actions and configurations of a test. Such actions include configuring test log settings, setting up a call, waiting for a settled receiver condition, configuring the receiver settings to the desired test condition, initializing the receiving session, and  
15 repeating the operation a predetermined number of times. Other functions of the test script will be known to those skilled in the art.

The next step 18 is performed during the timer period. In this step, data exchange is terminated, and the tester physically disconnects and removes the  
20 data cable from the device. If short range wireless communications are being used rather than a cable, the communications are stopped and the transceiver devices used to communicate with the wireless device under test are preferred to be moved out of the anechoic chamber. The device remains in the anechoic chamber in the desired position and orientation for the test and is ready to  
25 perform the received test. The door to the anechoic chamber is closed.

Moving to step 20, a test signal is sent and the radiated test is conducted. The test signal can and in many instances should be radiated within the anechoic chamber in the desired configuration before the timer set in step 14 expires, and  
30 this signal should continue to radiate at the given configuration until the test finishes.

Continuing in step 20, the device is receiving the test signal. Software on the device begins executing at the end of the timer period, and the device executes the test script. Data that is gathered from the test is stored in a test log within the  
5 device's storage.

At the end of the test period, the tester moves to step 22. In step 22, the door of the anechoic chamber is opened and the data cable is reconnected to the device under test. If short range wireless communication means are used, the wireless  
10 communication means are initiated rather than a cable being reconnected.

The tester next moves to step 24. In step 24, the MDM is run to re-establish the data exchange between the test device and the computer.

15 Moving on to step 26, a command is sent from the MDM to the test device to retrieve the test log data that was stored in the device's storage during the test. This data is received at the computer.

In step 28, the test log data is analysed to obtain the test results.

20 The above method overcomes the disadvantages of the prior art by providing for testing without a data cable being attached. This ensures that the data cable does not interfere with the antenna pattern of the device and therefore more accurate radiated test results are obtained.

25 Reference is now made to Figure 2. In Figure 2, the method of the test is shown in a flow chart with the steps common between the methods of Figure 1 and Figure 2 being identified using the same reference numerals. The principal difference between the methods of Figures 1 and 2 is the addition of steps 30 and 32. Rather than setting the timer and launching the command to initialize a  
30 test script from the MDM, the method of Figure 2 contemplates pre-storing a test script, and the timer and test script being initialized from the user interface of the

device in steps 30 and 32 respectively. Such initialization could occur from the menu of the engineering section of the device instead of being launched by an MDM command.

5

The remainder of the steps in the alternative method shown in Figure 2 are the same as the steps described above with reference to Figure 1.

In a further alternative embodiment, step 28, in which the test log data is  
10 analysed by a test computer, is replaced by an analysis of the test results by the test device itself. This alternative can be accomplished using software running on the device that displays the test results on the user interface of the device. For example, a page on the engineering section can show the test results. In this alternative, steps 22 to 28 are replaced with step 34 as illustrated in Figure 3.

15 One skilled in the art will realize that the alternative method of Figure 3 can be combined with the method of Figure 2, thus utilizing steps 30 and 32 rather than steps 10 through 16 in Figure 3.

In yet another alternative, the MDM and software running in the device allow test  
20 scripts to be downloaded or recorded onto the device in step 14. This saves the device's memory when the device is not performing the test, and allows flexibility to alter test scripts. The other parts of the methods of Figures 1 and 3 remain the same.

25 The above described embodiments of the present application are meant to be illustrative of the preferred embodiments and are not intended to limit the scope of the present invention. Various modifications which would be readily apparent to one skilled in the art are intended to be within the scope of the present method. The only limitations to the scope of the present method are set forth in  
30 the following claims.

**WE CLAIM:**

1. A method for conducting a radiated performance test on a wireless device in an anechoic chamber where an interface and data connection are established (10) between the wireless device and a test computer, the method comprising the steps of:
- initializing and starting a timer (14) for a predetermined interval on said wireless device;
  - starting a test script (16) on said wireless device;
  - removing said interface (18) during said predetermined interval;
  - running said radiated performance test (20) after said predetermined interval has expired;
  - storing a log of said radiated performance test on said wireless device;
  - and
  - analysing test results (28) based on said log.
2. The method of claim 1, wherein said interface is a data cable.
3. The method of claim 1, wherein said interface is a wireless communications means.
4. The method as claimed in any one of claims 1 to 3, wherein said analysing test results includes:
- re-establishing said interface (22);
  - re-establishing said data connection (24) between said test computer and said wireless device;
  - retrieving said test log (26) from said wireless device to said test computer; and
  - performing an analysis of said test log to provide test results.

30

5. The method as claimed in one of the claims 1 to 3, wherein said analysing test results includes:

performing an analysis (34) of said log on said wireless device to obtain test results; and

5 displaying said test results on said wireless device.

6. The method claimed in any one of claims 1 to 5, wherein said computer includes a software tool for communications between said wireless device and said computer.

10

7. The method of claim 6, wherein said step of establishing said data connection includes said software tool sending a command to said wireless device.

15 8. The method as claimed in one of the claims 6 to 7, wherein said step of starting a test script includes said software tool sending a command to said wireless device.

20 9. The method of claims 6 to 8, wherein said step of initializing a timer (14) includes said software tool sending a command to said wireless device.

10. The method of any of claims 1 to 5, wherein the timer is initialized and started (30) from said wireless device.

25 11. The method as claimed in any one of claims 1 to 10, wherein said step of starting the test script further includes loading the test script from said computer to said wireless device.

30 12. The method of any of claims 1 to 11, wherein said test script pre-exists on said wireless device.

1/3

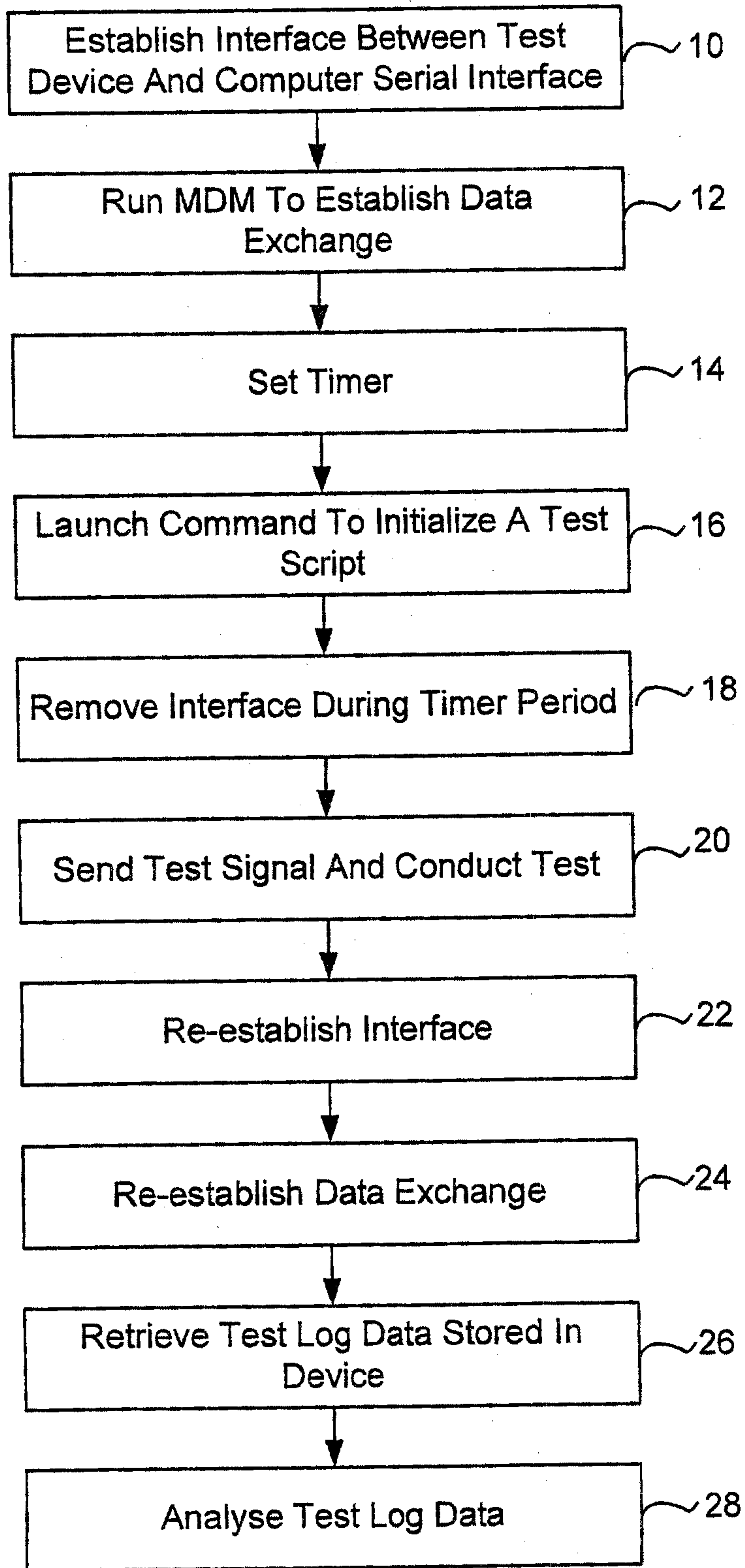


Figure 1

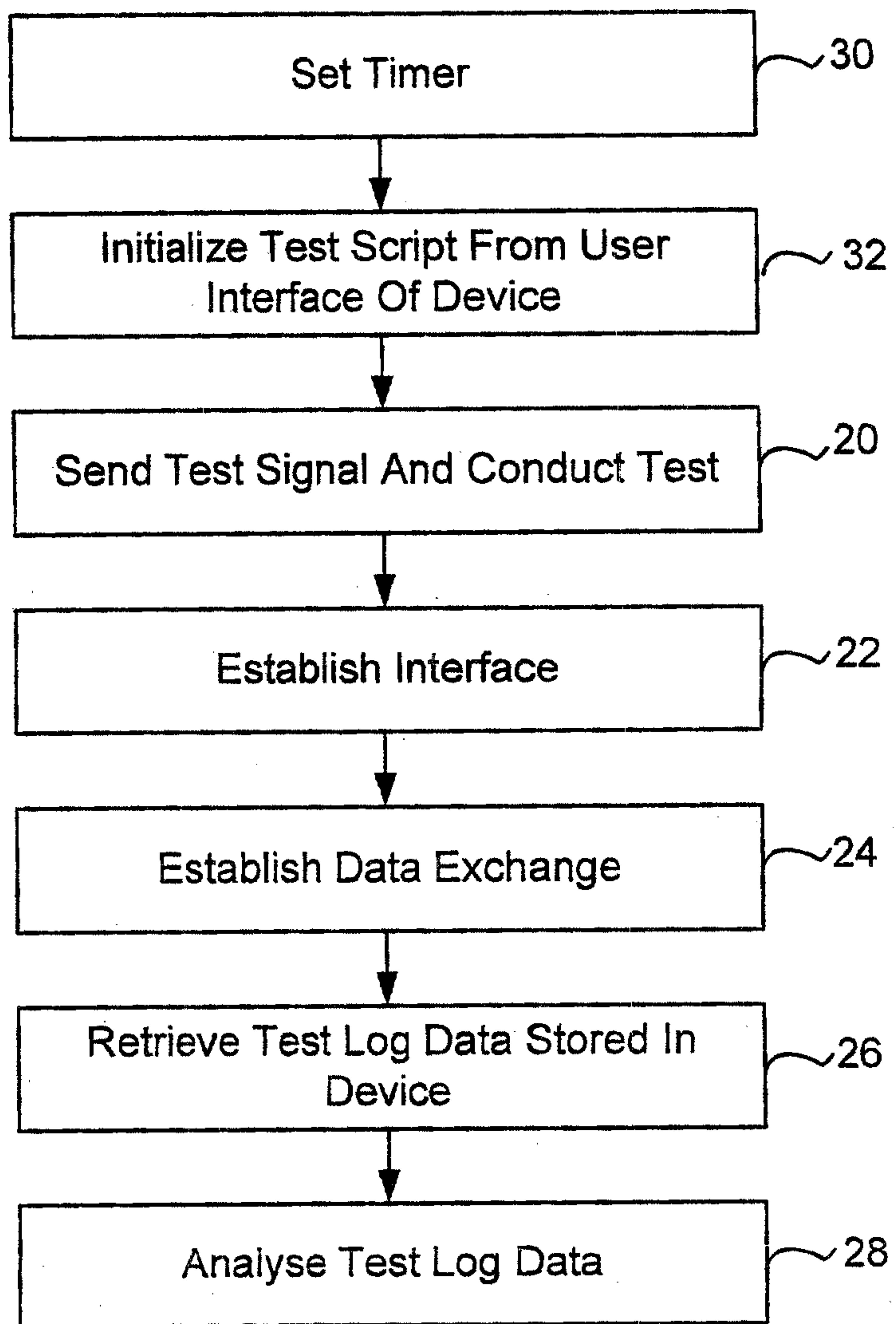


Figure 2

3/3

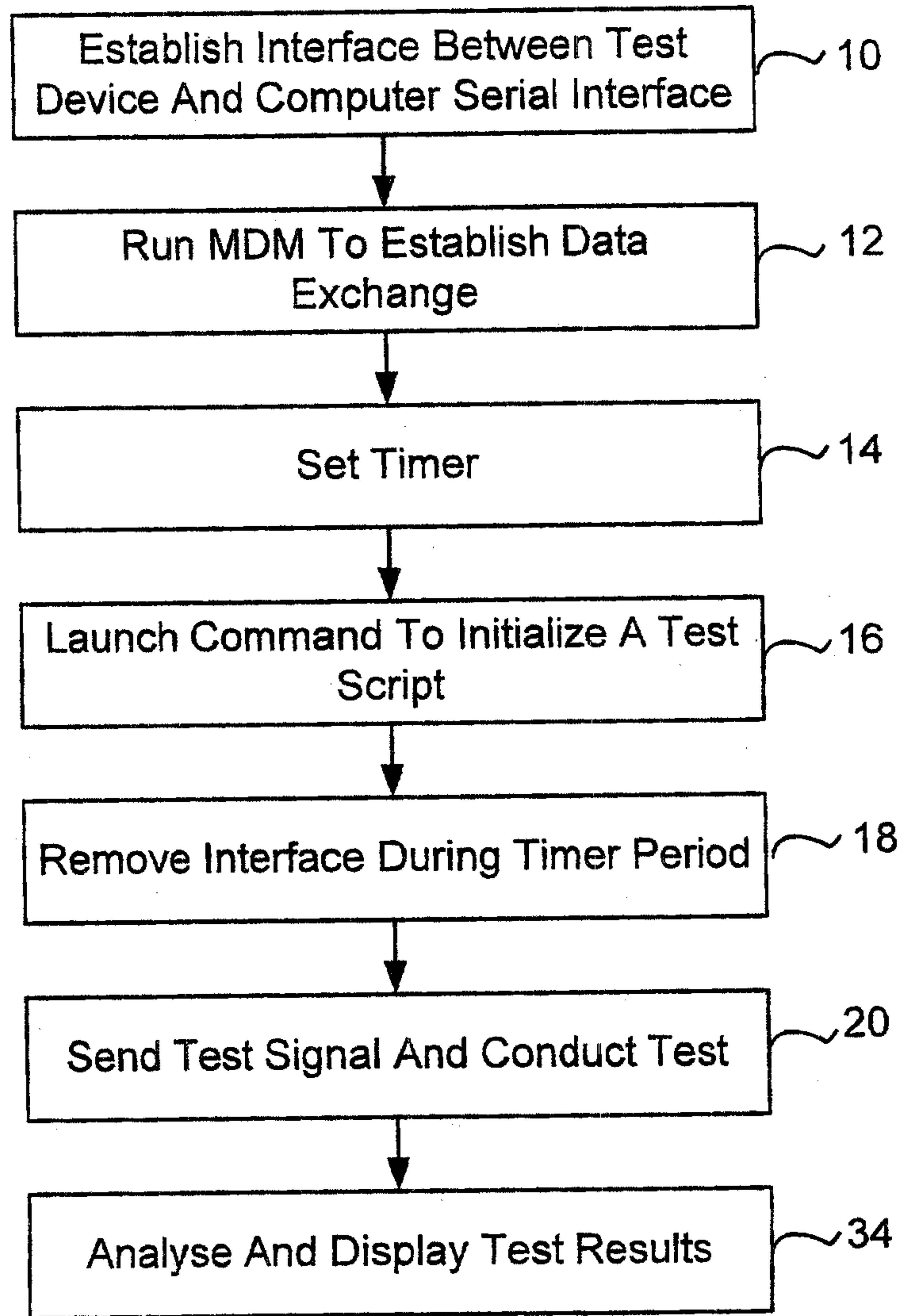


Figure 3

