

The testing of SpaceWire network switching devices

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Testing... 1,2,3



Testing is an important step in the development and functioning of any device, its intended to determine the efficiency of the device and its compliance with the specified characteristics.

Testing stages

- Self-test: these are test that are carried out by the device when it is turned on.
- Testing a single device
- Testing a single device

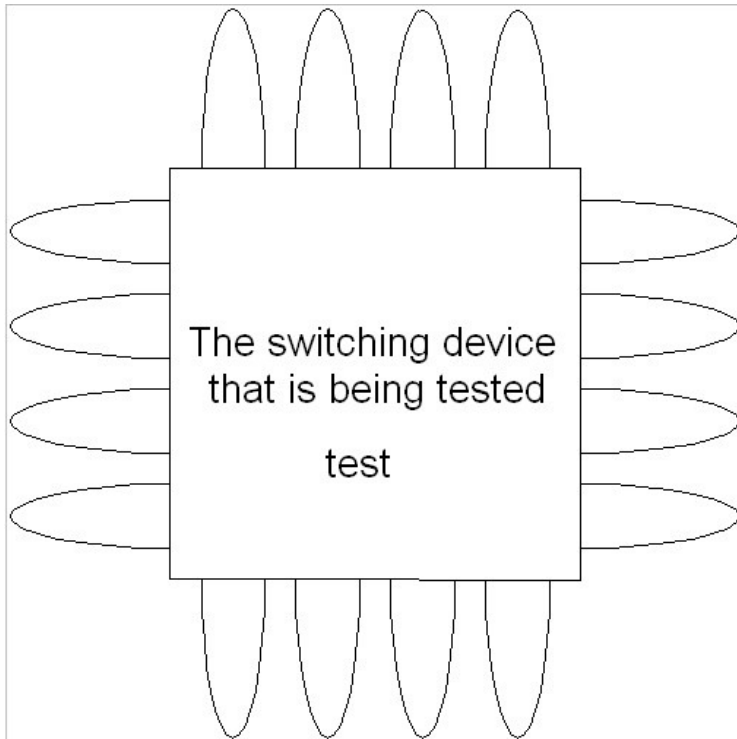
The test suite consists of

- Tests for establishing a connection on the base speed
- Tests for the speed that is available in the channel
- Packet transmission test at different speeds with different network loads (with validation of an incoming packet)

After the device has passed our tests we can get the following characteristics:

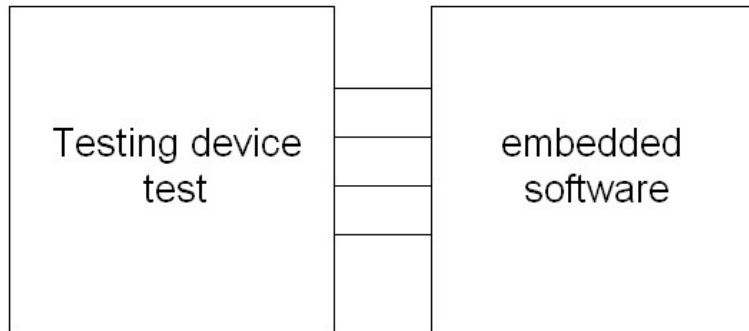
- The average time it takes for a connection to establish at different speeds.
- The minimum and the maximum speed available for this channel.
- The average size of a packet that is transferred without error at different speeds.
- The maximum intensity error-free transmission of different packets.
- And so on...

Testing a single device



With this type of testing the tests run on the device that is not connected to the network or other device. SpaceWire ports are interconnected, forming a loop.

Testing a single device in a network



Testing is done to a device which has the same configuration as an end user's device (i.e. board + embedded software).

When testing network switching devices on the network we accomplish the following tasks:

1. Testing how the connection establishes different speeds.
2. Testing the transmission of packets at different speeds with different intensities.
3. Testing adaptive multicast routing.

Different parameters – different test

Changing the speed.

- Rise the speed to a maximum with a jump.
- A smooth rise to the maximum speed (different length steps).
- so on...

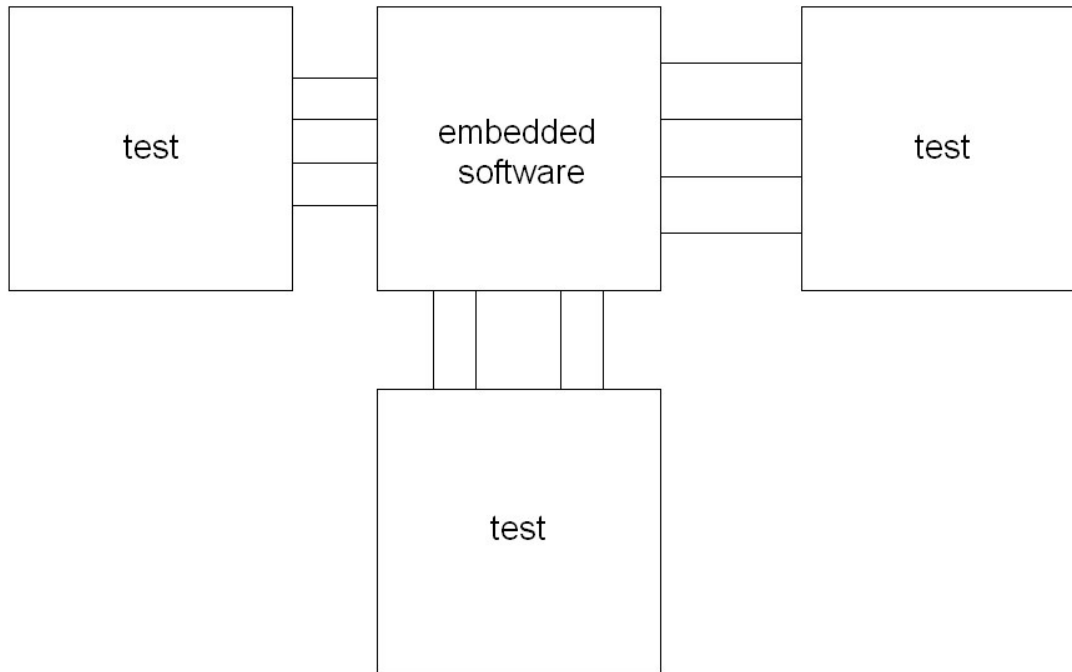
Changing the content of a packet

- short header + short data
- long header + short data
- so on...

Changing the flow rate of the packets

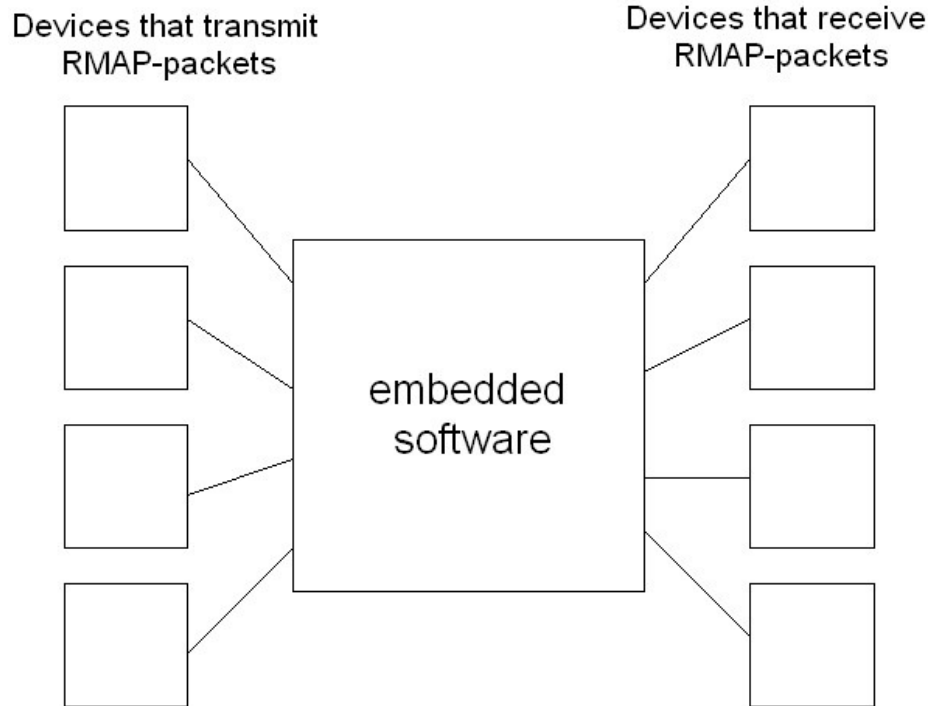
- A light network load
- A heavy network load

How to create a heavy network load?



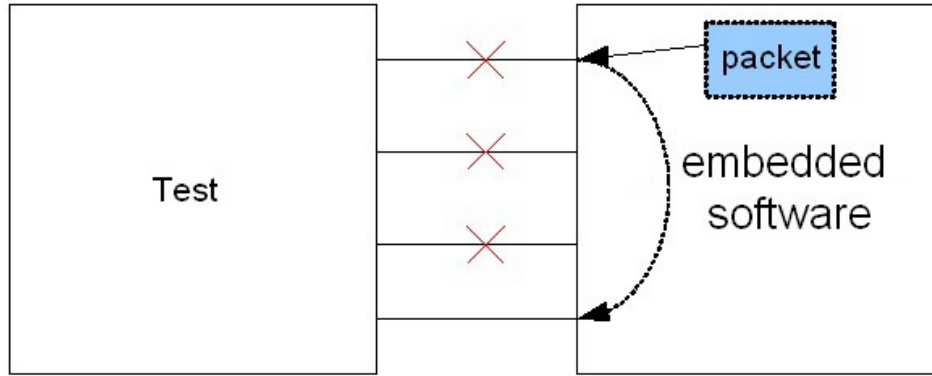
To create a heavy network load we connect additional boards to the network of the device that is being tested with the packet generating tests on them.

Is there another way?

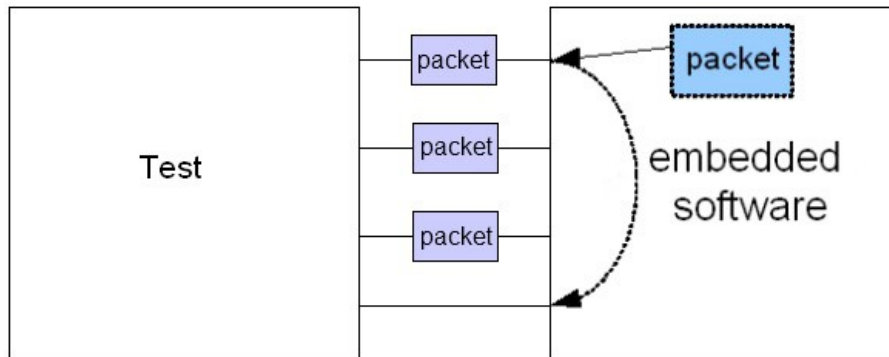


In this case, our switching device is running on its firmware, we connect devices which are transmitters of RMAP-packets and devices that receive RMAP-packets (any device capable of sending an answer about the correctness of the packet).

Testing adaptive multicast routing



- Some of ports in the group do not work and a packet has arrived on one of them, this packet is redirected to a working port.



- A packet is sent and some of the ports are busy, to avoid a delay the packet is redirected to a free port.

Conclusion

- The test suit allows us to define main characteristics of the device that is being tested, to evaluate the limits of external parameters.
- Combining the values of various parameters allows us to achieve a universal and maximally flexible test suit.
- If the device successfully passes the testing, then we can make a foregone conclusion about its effectiveness and compliance of its network parameters and declared characteristics

Thank you for your time!