Frequency Hopping Spread Spectrum Transmitter

Transmitter Certification

FCC ID: JEH7730GA2

ACS Report Number: 04-0209-15C

Manufacturer: NCR Corporation
Models: 7730-2011, 7730-2012, 7730-2014 and 7730-2015

FCC Correspondence on Dwell Time

Sam Wismer

From: Duncan, Forrest [FD123822@ncr.com]
Sent: Friday, September 03, 2004 12:36 PM
To: Sam Wismer
Subject: NCR 7730 FCC compliance email

Attached is the email from the FCC indicating the 7730 meets the 15.247 requirements

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From: Joe Dichoso [mailto:Joe.Dichoso@fcc.gov]
Sent: Monday, August 30, 2004 9:04 AM
To: Albert.Claessen@NCR.com
Cc: Rich Fabina; Andrew Leimer; Joe Dichoso
Subject:

Hello Albert,
For your device, although the worst case total time on a channel within the applicable time period exceeds 400 msec, the device still meets the intent of the 400 msec average dwell time limit. The device will comply with the intent of the dwell time requirement if it has a dwell time less than 400 msec and the device uses all frequencies equally on average.

On another note for this device, a review of the theory of operation on file reveals that the device is capable of operating in a CW mode. How would the device meet the bandwidth requirement, the matching receiver input bandwidth requirement and the definition of a Frequency hopping system in Section 2.1 that requires that a the carrier of a frequency hopping system is modulated with coded information?

-----Original Message-----
From: Claessen, Albert [mailto:AC160010@ncr.com]
Sent: Fri 8/27/2004 11:56 AM
To: Joe Dichoso
Cc: Richard.Fabina@FCC.gov; Duncan, Forrest
Subject: NCR RealPrice system compliance with FCC par. 15.247

Mr. Dichoso,

Yesterday Forrest Duncan of NCR and myself had a short phone conversation with Mr. Fabina of your office on an issue that arose during certification testing of one of NCR's products. He suggested to contact you on this matter.

NCR has been marketing an electronic shelf label system for several years under the NCR RealPrice trade name. The base station of this system was granted approval on 5/29/2001 and the FCC ID is JEH7730GAI. We have recently re-designed the base station to take advantage of cost reductions and performance improvements possible with state of the art electronic components.

The base station is a Frequency Hopping device that uses the 2400-2483.5 MHz band. The modulation bandwidth is 130kHz, it uses a hopping table of 83 frequencies that are pseudo randomly selected out of a larger number of channels that are available in the 2400-2483.5 MHz band. The dwell time is 362.5 msec.. This causes the base station to cycle through the hopping table in 30.08 seconds. This satisfies par. 15.247 section a.1.ii as the rules were written when the original design (JEH7730GAI) was granted approval.

In 2002 the rules were amended to allow for wider bandwidth frequency hopping systems and section a.1.ii

was split in two sections with separate wording for the 5725-5850 MHz band and the 2400-2483.5 MHz band. The new wording for the frequency usage in the 2400-2483.5 MHz band, now in section a.1.iii, reads: "The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed".

The test house that is performing the qualification testing of the re-designed base-station and two independent TCBs that we have contacted on this, all infer from this new formulation that the device can not use the same frequency for a period of more than 0.4 seconds within a period of 83 (our hopping table size) times 0.4 seconds, resulting in a time period of 33.2 seconds.

This presents a problem for our device as it cycles trough the hopping table in a period of 30.08 seconds and re-uses the same frequency twice in one period of 33.2 seconds. The end result is that our device, in a worst case maximum communication traffic scenario, can transmit for 725 msec. in that period of 33.2 seconds.

We have considered adding more frequencies to the hopping table of the device, this would have minimal impact on our system. However, this does not solve the issue as it also extends the time period for measuring the frequency use. The only ways to satisfy the new wording is to have a dwell time that is an integer division of 400 msec. or to reduce the duty cycle of the transmitter such that the maximum transmit time on any frequency is less than 400 msec., even if that frequency is used more than once within the 33.2 second period. Both approaches would require a major system redesign resulting in equipment that is not compatible with the currently marketed system.

The First Report and Order (FCC 00-312) introducing this rule change clearly did not intend this consequence. The change was intended to amend the rules to allow frequency hopping devices with 5MHz wide hopping channels.

This issue did catch us by surprise and halted the approval process for our design. We would appreciate it if you could clarify the intent of the rule for the benefit of our test house and it's associated TCB.

Sincerely,
Albert Claessen,
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