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To:  
Federal Communications Commission  
Authorization and Evaluation Division  
7435 Oakland Mills Road  
Columbia, MD

**Proposal for Alternate DFS Test Procedure for Zebra Thermal Printers  
Model QLn220 with FCC ID: I28MD- EXLAN11N**

FCC ID : I28MD- EXLAN11N is a single modular approval application, since DFS testing was unable to be performed in module standalone so the module was installed in representative host Zebra Thermal Printers Model QLn220.

Zebra Thermal Printers Model QLn220 use an 802.11abgn radio module in a proprietary form factor. The primary market space is targeted at industrial Thermal Label Printing applications.

The radio module would be factory installed inside the printers. The module has a SDIO 4bit@max50MHz interface which limits the data rate between the host device and the radio to 200Mbps minus SDIO overhead (5%). The module supports operation in the DFS bands of 5250-5350 MHz and 5470-5725 MHz, and is a client device without radar detection. The printers will not support the playing the movie file specified in FCC 06-96. There is no driver for the module for use in a typical label printing application; therefore streaming the movie file is not possible. Furthermore, Zebra printers' operating system does not allow multimedia file streaming; only proprietary label files get transferred to the printer, for printing receipts, labels, etc.

**Proposed Alternate Method:**

Zebra proposes performing the DFS testing while the system is performing a FTP file transfer of a Zebra proprietary 50MB label file representing the biggest label file a customer could send over WIFI to the printers. The data rates will be adjusted to allow for the highest channel loading possible in theory by the system, up to a maximum loading of 22%. The 22% is based on the expected channel loading of a typical 802.11n radio link while running an FTP for transfer of the label file.

**General Test Setup Procedure:**

- Connect FCC approved Master AP (Cisco XYZ, FCC ID: XYZ) to a network, via wired Ethernet, that allows connection to FTP server.
- ...Insert SIEMIC test set-up here...
- Use a proprietary 50MB label file as a representation of the biggest label file a customer could send over WIFI to the printer.
- Gather the data, using OmniPeek to filter out all STAs and APs except for the DUT, 00:22:58:2C:3B:A6. Hiding all packets not involved in the 50 MB file transfer, and using

the information in the Statistics->Summary view for the total traffic and duration. The rest of the calculation to be done according to channel bandwidth from the IEEE 802.11n-2009 specification.

**Test Data:**

Total bytes transferred between AP and STA for complete file transfer: 44,874,626 (358,997,008 bits)

Duration of transfer: 60 seconds

Average data rate: 5.98 Mb/s

*Channel bandwidth: 135 Mb/s (MCS 7, channel 64(60), 40 MHz)*

*Approximate channel utilization: 4.43%*

Total bytes transferred between AP and STA for complete file transfer: 59,344,224 bytes (474,753,792 bits)

Duration of transfer: 72 seconds

Average data rate: 6.6 Mb/s

*Channel bandwidth: 65 Mb/s (MCS 7, channel 64, 20 MHz)*

*Approximate channel utilization: 10.15%*

**Conclusion:**

Testing showed that the maximum channel loading achievable by the system was 10.15%. This represents the worst case situation in a real world application for DFS testing; as the printers are not designed for operation in systems that would allow for

- (a) Greater data transfer over the digital interface to the QLn220 and
- (b) The operating system of the end-use QLn220 does not support streaming video.

Sincerely,



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