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verizon

October 22, 2015

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Ex Parte

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: Amendment of Parts 1, 2, 22, 24, 27, 90 and 95 of the Commission's Rules to Improve Wireless Coverage through the Use of Signal Boosters, WT Docket No. 10-4; Wireless Telecommunications Bureau Seeks Comment on Kathrein Request for Waiver to Permit Equipment Certification for Sale of Mobile Phone Signal Booster, DA 15-834.

Dear Ms. Dortch:

On October 20, 2015, representatives from Verizon and V-COMM met by telephone with Roger Noel, Moslem Sawez, and Amanda Huetinck of the of the FCC's Wireless Bureau to discuss issues raised in the above-captioned proceeding. Consistent with their respective filings in the proceeding and the attached technical analysis, Verizon and V-COMM explained how the consumer signal booster proposed by Kathrein Automotive GmbH & Co. KG ("Kathrein") would cause interference to wireless networks due to "oscillation" – a condition where the receive antenna picks up and re-amplifies the signal from the transmit antenna, creating radiofrequency noise that causes interference. This interference would occur even if the Kathrein booster were properly installed and operating as intended. Granting Kathrein's waiver of the requirement to build oscillation detection and prevention into mobile signal boosters would thus significantly increase the threat of interference to commercial wireless networks.

This letter is being filed pursuant to Section 1.1206 of the Commission's Rules. Should you have any questions, please contact the undersigned.

Sincerely,

Andre J. Lachance

Attachment
Cc (by email): Roger Noel, Moslem Sawez, Amanda Huetinck

KATHREIN AUTOMOTIVE WAIVER REQUEST
VERIZON / V-COMM TECHNICAL ANALYSIS
OCTOBER 20, 2015

1. Kathrein's technical argument is flawed. Kathrein claims that its booster will not oscillate because isolation between the external and internal antenna is 70 dB. But this high level of isolation will not continue as the automobile in which the booster is installed travels close to obstacles that can and will cause signals to reflect into the vehicle. These signal reflections from nearby cars, trucks, buildings, walls, fences, bridges, tunnels and garages will reduce the antenna isolation to far less than 70 dB; as a result, oscillation will occur when the vehicle is moving. Oscillation will also occur when the vehicle housing the Kathrein booster is parked and the door is open because there will be a direct path for the reflected signal to the inside antenna.

a. Kathrein's proposed booster operates with a total system gain of 30 dB (23 dB gain for booster, plus 7 dB gain for antennas, per Attachment B in Kathrein's waiver request).
b. Industry standards and practices require a minimum 15 dB to 20 dB of isolation-to-gain ratio for signal booster performance and to prevent booster oscillation. This is a long-standing industry and engineering best practice for all signal boosters. The minimum isolation level accounts for reflections resulting in combining signals and the statistical variability of signal propagation.
c. Kathrein's booster (with 30 dB of system gain) would require a minimum isolation of 45 to 50 dB to prevent oscillation in all environments and cases. But reflections from common obstacles can cause the isolation to drop to the 30 to 50 dB range.[1] This decrease in isolation creates the potential for the booster to oscillate.
d. Signal booster oscillation can cause harmful interference to wireless networks, and occurs on uplink and downlink spectrum bands. Because wideband signal boosters operate on the entire band, they can interfere with all spectrum blocks at nearby base stations and devices. Depending on the proximity of the oscillating booster, the impact to the network can vary from mild to severe degradation of wireless service. The impact can even include complete loss of service for users within range of the interference. For this reason, the ability to detect and mitigate oscillation is an important part of the interference safeguards in FCC rules.

2. Oscillation can also occur if a booster is not properly installed, which can occur if the initial booster installation is modified or the booster is installed in another vehicle. There is a

[1] The isolation in typical mobile booster applications can vary considerably, depending on the environment and reflections surrounding the vehicle, including the antenna placement and type of vehicle, and can be in the 30 to 50 dB range in some cases.

vibrant aftermarket for used automotive boosters.[2] So it is reasonable to expect the Kathrein boosters to be sold and installed in different vehicles. The antenna recognition system that Kathrein claims prevents the external antenna from being moved appears to be relatively simple mechanism that can easily be circumvented by an informed consumer.[3]

3. Kathrein has provided no good reason for avoiding the signal booster technical requirements adopted by the Commission. Those requirements were developed by both carriers and booster manufacturers to protect wireless networks from interference while enabling consumers to enjoy the benefits of better wireless service in areas where coverage is marginal. All consumer boosters are required to demonstrate compliance with these technical rules and to be tested by an independent, accredited and FCC-approved lab trained on certification testing procedures. No party has performed a technical assessment or independent testing of Kathrein's proposed booster to verify any of Kathrein's claims. Kathrein seeks a waiver to be excluded from this long-standing certification and verification process without just cause.

4. All signal boosters should have anti-oscillation detection and protection capabilities. Oscillation detection and prevention is an engineering best practice for signal boosters because oscillation is one of the most significant causes of harmful interference to wireless networks. The benefit of preventing significant detrimental effects to wireless networks by requiring signal booster oscillation detection and prevention outweigh the minimal additional costs of including this capability. There is no reason Kathrein cannot comply with this FCC rule.

Sean Haynberg

Sean Haynberg, V-COMM

Frank Jager / SET

Frank Jager, Verizon

October 22, 2015

[2] A quick search of ebay.com, shows 148 listings/products of used BMW compensator boosters. *See* http://www.ebay.com/sch/i.html?_from=R40&_trksid=p2050601.m570.l1313.TR0.TRC0.H0.Xbmw+compensator.TRS0&_nkw=bmw+compensator&_sacat=0. Used automotive boosters are on sale at many other web sites as well.

[3] See Joint Comments of V-COMM, Wilson Electronics and Cellphone-Mate, WT Docket No. 10-4 (Aug. 10, 2015) at 7.