

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of)
Elastic Networks Petition for Waiver of the Signal)
Power Limitations Contained in Section) File No. NSD-L-00-254
68.308 (e)(1) of the Commission's Rules for the)
EtherLoop/Stormport 400 Modem)

MEMORANDUM OPINION AND ORDER

Adopted: July 13, 2001

Released: July 16, 2001

By the Acting Chief, Network Services Division:

I. INTRODUCTION

1. On November 15, 2000, Elastic Networks (Elastic) filed a Petition with the Network Services Division (Division) of the Common Carrier Bureau (Bureau) for waiver of the out-of-band metallic signal power limitations contained in 47 C.F.R. section 68.308(e)(1) of the Commission's rules, so that it may register its EtherLoop Stormport 400 Modem under Part 68 of the Commission's rules.1 In this order, we grant the waiver request subject to the conditions described herein.

II. BACKGROUND

2. Signal Power Limitations. Section 68.308(e) contains limitations on metallic and longitudinal signal power to protect the network from crosstalk.2 Metallic signal power levels in the 100 Hz to 4 kHz range are limited by section 68.308(b). Section 68.308(e)(1) limits the power level of metallic signals in the 4 kHz to 6 MHz range.3 These limits are represented by a maximum value of root

1 Elastic Networks Petition for Waiver, filed November 15, 2000 (Elastic Petition). See also Network Services Division Seeks Comment on Petition by Elastic Networks Petition for Part 68 Waiver, Public Notice, DA 00-2921, released December 29, 2000.

2 47 C.F.R. § 68.308(e). Crosstalk was initially used to designate the presence in a telephone receiver of unwanted speech sounds from another telephone conversation. The term has been extended to designate interference in one communication channel or circuit caused by signals present in other communication channels. Consideration is limited here to the interference of one signal by another of the same general type - e.g., speech interfering with speech, video with video, digital with digital, etc. Telecommunications Transmission Engineering, Volume I-Principles, Second Edition, at 425 (AT&T, 1997).

3 The limits are: 1) maximum rms values, averaged over 100 milliseconds at the telephone connections in all of the indicated 8 kHz bands within the indicated frequency ranges, of -(6 + 12.6 log f) dBV for center frequencies of 8 to 12 kHz with a terminating impedance of 300 ohms; 2) (23 - 40 log f) dBV for center frequencies of 12 to 90 kHz with a terminating impedance of 135 ohms; 3) -55 dBV for center frequencies of 90 kHz to 266 kHz with a terminating impedance of 135 ohms; and 4) maximum rms values of -15dBV, averaged over 2 microseconds, at the (continued....)

mean square (rms) voltage across the terminals of the equipment, as shown in Figure 68.308(a).

3. Although section 68.308(e) provides two limitations to prevent crosstalk in telephone company transmission systems or services, Elastic seeks waiver of only the first limitation, excessive metallic signal power in the 4 kHz to 6 MHz range, as specified in section 68.308(e)(1). Elastic claims that the Stormport 400 complies with all other sections of Part 68.⁴

4. *Waiver Standard.* In analyzing the waiver request, we consider established legal standards for waiver of the Commission's rules. The Commission will adhere strictly to its rules unless a party can demonstrate that "in the public interest the rule should be waived."⁵ Furthermore, the Commission may only waive a provision of its rules for "good cause shown."⁶ The party petitioning the Commission for a waiver bears the burden of showing good cause: "[a]n applicant [for a waiver] faces a high hurdle even at the starting gate."⁷ The Commission must take a "hard look" at applications for waiver⁸ and must consider all relevant factors when determining if good cause exists.⁹ In addition, "[t]he agency must explain why deviation better serves the public interest, and articulate the nature of the special circumstances, to prevent discriminatory application and to put future parties on notice as to its operation."¹⁰ Finally, a waiver of one or more conditions of the Commission's rules does not excuse an applicant from compliance with the Commission's other requirements.¹¹

5. The test for a waiver of section 68.308(e)(1) is well established.¹² We have formulated and consistently applied a two-prong test, the *Nortel Test*, to determine the merits of a request for waiver of section 68.308(e)(1) to permit registration of non-conforming terminal equipment.¹³ The first prong of the test is an evaluation of the terminal equipment's benefit to the public interest, with an emphasis on the

(...continued from previous page)

telephone connections, in all of the 8 kHz bands within the frequency range of 270 kHz to 6 MHz, with a terminating impedance of 135 ohms. Sometimes these limits are referred to as the out-of-band signal power limitations, because the range 4kHz to 6 MHz is outside the voice-band range of 200 Hz to 3995 Hz. For purposes of Part 68, voice-band is defined in 47 C.F.R. § 68.3.

⁴ Elastic Petition, para. 8.

⁵ *FPC v. Texaco Inc.*, 377 U.S. 33, 39 (1964).

⁶ 47 C.F.R. §1.3.

⁷ *WAIT Radio v. FCC*, 418 F.2d 1153, 1157 (D.C. Cir. 1969).

⁸ *Id.*

⁹ *Citizens to Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402, 416 (1971).

¹⁰ *Northeast Cellular Telephone Company, L.P. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990).

¹¹ See 47 C.F.R. § 1.3; see also In the Matter of Part 68 Waiver Request of Alameda Engineering, Inc., et al., *Order*, 10 FCC Rcd 12135, 12139 (Com. Car. Bur. 1995)(*Alameda Order*).

¹² See, e.g., In the Matter of Tandy Corporation, Walker Equipment Company, Ameriphone, Inc., and Ultratec, Inc. Request for Waiver of Volume Control Reset, 47 C.F.R. § 68.317(f), NSD-L-00-17, NSD-L-00-22, NSD-L-00-63, NSD-L-00-193, *Memorandum Opinion and Order*, DA 01-578 (released March 5, 2001); Alcatel USA, Inc. Petition for Waiver of the Signal Power Limitations Contained in Section 68.308(e) of the Commission's Rules, File No. NSD 00-37, *Memorandum Opinion and Order*, 15 FCC Rcd 4388 (Com. Car. Bur. Network Services Div. 2000) (*Alcatel Order*).

¹³ In the Matter of Paradyne Petition of the Signal Power Limitations Contained in Section 68.308(e) of the Commission's Rules, *Order*, 14 FCC Rcd 4496 (1999)(*Paradyne Order*); In the Matter of Northern Telecom Inc. Petition of the Signal Power Limitations Contained in Section 68.308(e)(1) of the Commission's Rules, NSD-L-98-135, *Order*, 14 FCC Rcd 12048 (Com. Car. Bur. Network Services Div. 1999)(*Nortel Order*).

potential gain in consumer choice and value that it would bring to the market. The second prong of the test is an evaluation of potential for prevention of harm if terminal equipment meets alternatives to waived conditions. We have consistently concluded that when waivers require the imposition of certain alternative performance conditions, those alternative performance conditions become mandatory requirements upon which the grant of the waiver is conditioned.¹⁴ Applicants submitting applications for registration of equipment for which waiver of section 68.308(e)(1) has been granted subject to provision of alternative performance conditions must provide, with their application for registration, test results showing compliance with those alternative performance conditions, as well as compliance with other applicable part 68 requirements.

6. *Elastic's Petition.* As described by Elastic, the Stormport 400 is a "burst mode" modem. Burst mode modems transmit in intervals interleaved with quiet periods (moments in time when no energy is transmitted). The Stormport 400 takes crosstalk measurements in the quiet period between bursts, and uses these measurements both to optimize its transmission speed and to change its mode of operation if it detects the presence of crosstalk coupling with any asymmetric service. The change in mode of operation is accomplished by a "Spectrum Management" feature that switches from the higher power "Native Mode" to the lower power "Safe Mode" upon detection of such crosstalk. Elastic states that if Spectrum Manager's detection of crosstalk is inconclusive, the Spectrum Manager takes the cautious step of switching to Safe Mode. In Safe Mode, Elastic states, the Stormport 400 modem will not cause interference in the PSTN because it complies with ANSI standard T1.417¹⁵ section 5.3.5.1 (Spectrum Management Class 5 PSD criteria and total average power constraints), with section 5.3.5.2 (Spectrum Management Class 5 transverse balance requirements), and with section 5.3.5.3 (Spectrum Management Class 5 longitudinal output voltage requirements). These industry standards are in the same Spectrum Management Class as the ADSL modems for which we have previously granted waivers using a streamlined procedure.¹⁶

7. When operating in Native Mode, the Stormport 400 modem transmits up to a maximum of 14 dBm of total power at each center frequency. In Native Mode, the modem will not interfere with symmetric basis systems, because, according to the Method B analysis of ANSI T1.417, there is sufficient margin for non-interference with such services. Elastic concedes that the modem would interfere with asymmetric basis systems when operating in Native Mode. This interference is avoided by operation of the modem's Spectrum Manager, which will detect signals from asymmetric basis systems and switch automatically from Native Mode to Safe Mode, thus avoiding interference with asymmetric systems. Accordingly, Elastic argues that its modem will not operate in Native Mode in the presence of signals from asymmetric basis systems.¹⁷ Elastic states that its modem has been deployed safely by 28 incumbent local exchange carriers and two competitive local exchange carriers in the United States, as well as by seven incumbent local exchange carriers in Canada.

8. Elastic claims that the EtherLoop/Stormport 400 modem has greater reach than ADSL

¹⁴ Part 68 Waiver Request of Alameda Engineering, Inc., *Order on Reconsideration*, NSD-L-98-154, 15 FCC Rcd 1658 (Com. Car. Bur. 1999) (*Alameda Recon. Order*).

¹⁵ ANSI T1.417, clause 4.2, Spectral Compatibility. ANSI standard T1.417 states that a new technology is spectrally compatible if its service: (A) fits within the power spectral density (PSD) mask of one of the nine defined Spectrum Management (SM) Classes, or (B) is demonstrated by a standardized analysis -- "Method B" -- to cause interference to basis systems that is less than or equal to reference cases. The industry standard was developed by the Alliance for Telecommunications Industry Solutions (ATIS) subcommittee T1E1.4, an open standards development organization that, pursuant to Commission directive in the *Third Advanced Services Report and Order*, 14 FCC Rcd 20,912 (1999), works to ensure spectral compatibility in the unbundled loop environment.

¹⁶ See, e.g., *Alcatel Order*, *supra*, note 12.

¹⁷ Elastic *Ex Parte*, March 8, 2001.

modems, and that this ability to provide high-speed data services reliably at greater distances from the telephone company central office will lead to more ubiquitous broadband service, particularly for rural customers.¹⁸ Elastic argues that its Stormport 400, although not compliant with section 68.308(e)(1), would not cause harm to the PSTN because it complies with the ANSI T1.417 standard. Elastic also notes that the Commission established a streamlined waiver process for ADSL equipment in the *Alcatel Order*.¹⁹ In that order, the Commission determined that, if a petitioner shows that an ADSL device meets two performance conditions established in ANSI standard T1.413, then it is in the public interest to grant a waiver of section 308(e)(1).²⁰ Elastic contends that compliance with ANSI standard T1.417 should be an alternate basis for the Commission to waive the same rule.

III. DISCUSSION

9. The issues raised by Elastic's Petition are similar to those raised in other petitions seeking waiver of the Commission's rules in Part 68. Based upon the record and its application to current law, regulations and precedent, we grant Elastic Network's Petition, subject to the following limitations.

10. *First prong of Nortel Test: New Products and Innovation.* We conclude that Elastic's Stormport Modem would increase consumer access to advanced telecommunication services, particularly in rural areas where ADSL services are not available. Champlain Telephone Company provides evidence of its deployment experience with the Stormport 400, indicating that use of the device would successfully benefit consumers.²¹ We have previously found that the similar ADSL, RADSL, and G-LITE technologies are in the public interest. Accordingly, we find that Elastic's Petition meets the first prong of the *Nortel Test*.

11. *Second prong of Nortel Test: Harm to the Network.* In our analysis of the second prong of the *Nortel Test*, we consider whether certain technical alternatives to section 68.308(e)(1) provide sufficient criteria for prevention of harm to the PSTN from terminal equipment meeting those alternative criteria. We conclude that with the protection of conditions proposed by Verizon and approved by Elastic, Elastic's Petition also meets the second prong of the *Nortel Test*.

12. As a threshold matter, we find Bell South's argument that third party review is necessary for supporting a waiver of the Part 68 technical requirements to be without merit. In our previous Orders waiving section 68.308(e)(1), we based our second-prong analysis on petitioner's representations that its equipment complied with established industry standards that were developed through open, industry consensus-building processes, and intended to protect the PSTN from harm.²² We have previously considered a similar argument by BellSouth that a party applying for a waiver of Part 68 criteria must submit its device to a third party for testing for compliance with conditions imposed by an Order before granting a waiver request.²³ We conclude here, as we did earlier, that requiring third party review for grant of a waiver would unnecessarily duplicate the testing that already occurs as part of the

¹⁸ Petition at 2.

¹⁹ Petition at 3, citing the *Alcatel Order*.

²⁰ *Alcatel Order, supra*, at 4395, para. 17. The modem must (1) meet the transmitter spectral response requirements specified in section 7.14 of T1.413- Issue Two (1998), and (2) operate with an aggregate power of less than 12.5 dBm over the range 25.875 to 138 kHz as specified in section 7.15 of the same document.

²¹ Champlain Telephone Company Comments at 2.

²² See, e.g., *Alcatel Order* at 4395-4396, paras. 16-20.

²³ *Alameda Recon. Order* at 1666, para. 18.

Part 68 registration process, and therefore is not in the public interest.²⁴

13. Verizon proposed five conditions that would ensure that no harm would be caused to the PSTN.²⁵ These conditions are based on compliance with ANSI T1.417 as well as with the "Method B" outlined in that standard. The waiver conditions are different depending upon whether the Safe Mode or the Native Mode of the Stormport 400 is operating. We discuss these conditions below in detail and, with some modifications, include these conditions in our grant of Elastic's waiver request.

14. *User Control of Adaptive Systems.* We conclude that there must be a performance condition that requires the modem to be equipped with circuitry, e.g., a "spectrum manager" feature, that cannot be defeated or adjusted by the operator, and that places the modem in the Safe Mode when signals from asymmetric services are present. Fundamental to Elastic Network's petition is the claim that its modem switches from Native Mode to Safe Mode upon detection of crosstalk coupling with an asymmetric service, even if the detection is ambiguous.²⁶ We agree that a switch to Safe Mode in the presence of asymmetric services is necessary to prevent harmful interference. We further agree with Verizon that the mechanism that insures appropriate switching to safe mode should be beyond control by the user.²⁷ We find it reasonable that a critical safety mechanism must not be easily defeated, for then it would not be fail safe.

15. *Compliance with T1.417, section 5.3.5.1.* We conclude that when operating in Safe Mode, the modem must meet the Spectral Management Class 5 Power Spectral Density criteria and total average power constraints contained in T1.417 clause 5.3.5.1. These technical criteria prevent interference by restricting the amount of electrical power transmitted over the PSTN. Elastic describes the Stormport 400 as a device that complies with T1.417, section 5.3.5.1, PSD and average power limitations when operating in Safe Mode. We agree, as do Elastic and all commenters, that such compliance is necessary to avoid harmful interference in the PSTN.

16. *Compliance with "T1.417 Method B" or PSD masks.* We conclude that when operating in the Native Mode, all transmissions from the modem must have sufficient margin with respect to symmetric systems, as shown by the Method B analysis of ANSI T1.417, to avoid interference. Method B is a set of mathematical models for calculation of crosstalk margins for several transmission technologies. Elastic argues that analysis pursuant to Method B of ANSI T1.417 shows that its modem, operating in Native Mode, is spectrally compatible, without deployment restrictions, with all symmetric basis systems. Power Spectrum Density (PSD) masks set out specific technical requirements for signal power allowed at a given point in the spectrum. Verizon obtained PSD masks from Elastic Networks for the spectra associated with each of the carrier frequencies, or "tones," used by the Stormport 400, and presented those masks to Commission staff as its suggested parameters for conditioning a grant of Elastic's waiver request.²⁸ The PSD masks present criteria that are relatively easy to understand and apply in evaluation of test data for registration of the modem. Their use as a condition for this waiver, however, would be a departure from our practice of considering only widely accepted industry standards in deciding waiver requests. Accordingly, we believe that the better practice is to require compliance with Method B, since it is part of the industry standard ANSI T1.417.

17. *Transverse balance.* We conclude that when operating in either Safe or Native Mode, the

²⁴ *Id.* at 1667, para. 19.

²⁵ Verizon *Ex Parte*, April 3, 2001.

²⁶ Petition at 2.

²⁷ Verizon *Ex Parte*, April 3, 2001.

²⁸ Verizon *Ex Parte*, April 3, 2001.

modem must comply with the transverse balance limits of ANSI T1.417 clause 5.3.5.2. Transverse balance is the term given to a measure of symmetry of impedance.²⁹ The transverse balance limits for Part 68 are presented in section 68.310 for frequencies up to 4 kHz. The transverse balance limits for T1.417, applicable to frequencies above 4 kHz, are presented in T1.417 section 5.3.5.2.

18. Verizon argues that, although Elastic claims that its modem meets the applicable transverse balance limits in the Commission's rules, those limits apply only to equipment operating at frequencies below those of Elastic's modem (up to 4 kHz, as noted above), and Elastic does not show that its Stormport 400 modem meets that standard. In the *Alcatel Order*, we considered the matter of transverse balance and declined to adopt additional limits beyond those in section 68.310 as a condition for granting Alcatel's Petition.³⁰ In that case, petitioner Alcatel did not claim compliance with transverse balance limits of a particular standard, and Verizon (then Bell Atlantic) did not propose that we use an industry standard as a condition on the waiver. Instead, Verizon proposed an unsupported requirement of a minimum of 35 dB of transverse balance across the entire upstream and downstream ADSL frequency bands.

19. In the instant proceeding, on the other hand, Elastic claims that its Stormport 400 is compliant with the transverse balance limits of ANSI T1.417 section 5.3.5.2, an industry standard also proposed by Verizon. The transverse balance limits in ANSI T1.417 section 5.3.5.2 were developed through an industry consensus process for the purpose of protecting the PSTN from interference from devices such as the Stormport 400. We agree with Elastic and Verizon that in view of the existence of this industry standard, it is appropriate to include this standard as a performance condition for grant of Elastic's waiver request.

20. *Longitudinal output voltage.* We conclude that when operating in either Safe or Native Mode, the modem must comply with the longitudinal voltage limits of T1.417 clause 5.3.5.3. Longitudinal voltage is the term given to a measure of symmetry of signals produced by the terminal equipment.³¹ Longitudinal voltage limits for Part 68 are presented in section 68.308(e)(2) for frequencies up to 6 MHz. Longitudinal voltage limits for ANSI T1.417 are presented in T1.417 5.3.5.3.

21. Elastic claims that the Stormport 400 is compliant with both section 68.308(e)(2) and the longitudinal voltage limits of ANSI T1.417 5.3.5.3. As with transverse balance limitations, the ANSI T1.417 5.3.5.3 criteria for longitudinal voltage are designed to protect the network from interference and are applicable to devices such as the Stormport 400. Based on the industry consensus represented by ANSI T1.417, we agree with both Elastic and Verizon that compliance with this industry standard is important for protection of the PSTN from interference, and therefore condition Elastic's waiver on this requirement.

22. *Short Term Stationary criteria.* We conclude that when operating in either Safe or Native Mode, the modem must comply with the short-term stationary criteria of ANSI T1.417 clause 6.5. Short-term stationary criteria prevent interference to the network by limiting the extent to which power

²⁹ There are two types of asymmetry in characteristics of terminal attachments that contribute to interference on loops. One is an asymmetry in the impedance between tip to ground and ring to ground connections. To the extent that such asymmetry or transverse imbalance exists, the terminal equipment will cause signals received from the network in one side of the loop not to be offset by signals of opposite sign in the other side, resulting in greater interference than would be the case if the signals were equal and opposite, or balanced.

³⁰ *Alcatel Order* at 4395-4396, para 18.

³¹ The second type of asymmetry is in the signals produced by the terminal equipment. If they are not equal and opposite at tip and ring (with respect to ground), then the signals in one side of the loop will not be offset by signals of opposite sign in the other side, resulting in greater interference than would be the case if the signals were equal and opposite, or balanced.

transmitted into the PSTN can change in a specified interval. ANSI T1.417 section 6.5 specifies tests and requirements for short-term stationary devices. Elastic claims that its Stormport 400 complies with all of the requirements of section 6.5. of the T1.417 standard. We agree with both Elastic and Verizon that compliance with this industry standard is important for protection of the PSTN from interference.

23. *Frequencies below 25.875 kHz.* In its proposed waiver criteria for Elastic's Stormport 400, Verizon suggests that if the Stormport modem meets the upstream Spectrum Management Class 5 PSD limits in T1.417 for frequencies below 25.875 kHz while operating, then the modem could be presumed acceptable for deployment on the same loop with switched voice services.³² We conclude that it is not necessary to add this condition because the substance of these concerns is addressed by other waiver conditions we adopt herein. With regard to operation in Safe Mode, our performance condition requiring that Elastic's modem meet the Spectral Management Class 5 Power Spectral Density criteria and total average power constraints contained in T1.417 clause 5.3.5.1 will include modem operations on frequencies below 25.875 kHz. Modem operation in Native Mode below 25.875 kHz is addressed by our performance condition requiring that Elastic's modem must have sufficient margin to avoid interference with respect to symmetric systems, as shown by the Method B analysis of ANSI T1.417.

24. *Commission Obligations to Protect the PSTN.* We conclude that BellSouth's argument that section 256(a)(2) of the Act³³ obligates the Commission to develop and institute technical criteria for equipment located on carrier premises in this proceeding is unfounded. In other proceedings, the Commission has imposed obligations on incumbent local exchange carriers (ILECs) to allow connection of foreign equipment to their facilities (collocation) by competitive local exchange carriers (CLECs), and placed the burden of assuring that such equipment did not harm the network on the incumbent carrier, without providing numerical criteria for evaluation of that equipment.³⁴ In any event, this subject area is outside the scope of a waiver proceeding for Part 68, which is limited to the effect of terminal equipment on the PSTN.

25. Based on the foregoing analyses, we conclude that granting this waiver request, subject to the conditions set forth in this Order, will serve the public interest by providing greater consumer choice and value without increasing the likelihood of harm to the PSTN.

IV. ORDERING CLAUSES

26. Accordingly, pursuant to authority delegated in sections 0.91 and 0.291 of the Commission's rules, 47 C.F.R. 0.91, 0.291, and section 1.3 of the Commission's rules, 47 C.F.R. 1.3, IT IS HEREBY ORDERED that the request for waiver of section 68.308(e)(1) of the Commission's rules, 47 C.F.R. 68.308(e)(1), by Elastic Networks for its Etherloop/Stormport 400 Modem is GRANTED to the extent discussed herein.

27. IT IS FURTHER ORDERED that the waiver is GRANTED SUBJECT TO THE FOLLOWING CONDITIONS:

(1) When operating in the "Native Mode," all transmissions from the modem must have sufficient margin with respect to symmetric systems, as shown by the Method B analysis of T1.417, to avoid interference;

³² Verizon *Ex Parte*, April 3, 2001, at 13 (pages unnumbered).

³³ Communications Act of 1934, as amended, 47 U.S.C. § 256(a)(2).

³⁴ See 47 C.F.R. Part 51, § 51.323.

- (2) The modem must be equipped with circuitry, e.g., a "spectrum manager" feature, that cannot be defeated or adjusted by the operator, and that places the modem in the Safe Mode when signals from asymmetric services are present;
- (3) When operating in Safe Mode, the modem must meet the Spectral Management Class 5 Power Spectral Density criteria and total average power constraints contained in T1.417 clause 5.3.5.1;
- (4) When operating in either Safe or Native Mode, the modem must comply with the short term stationary criteria of T1.417 clause 6.5;
- (5) When operating in either Safe or Native Mode, the modem must comply with the transverse balance limits of T1.417 clause 5.3.5.2; and
- (6) When operating in either Safe or Native Mode, the modem must comply with the longitudinal voltage limits of T1.417 clause 5.3.5.3.

FEDERAL COMMUNICATIONS COMMISSION

Diane Griffin Harmon
Acting Chief, Network Services Division
Common Carrier Bureau