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December 14, 1992

Donna R. Searcy
Secretary
Federal Communications Commission
1919 M Street, N.W.
Room 222
Washington, D.C. 20554

Re: Verilink Corporation Petition for Rulemaking to Amend the Commission's Part 68 Rules

Dear Ms. Searcy:

Transmitted herewith is an original and five copies of a Petition for Rulemaking to amend the Commission's Part 68 Rules. Please date-stamp the extra copy of this filing and return it to our messenger.

Any questions regarding this filing should be directed to the undersigned.

Very truly yours,

Catherine Wang

Andrew D. Lipman
Catherine Wang

Attachment

cc: William Buckley
Leigh Belden

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BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

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In the Matter of:	)	
	)	
VERILINK CORPORATION	)	
	)	
Petition for Rulemaking to Amend	)	RM _____
the Commission's Part 68 Rules	)	
to Authorize Regulated Carriers	)	
to Provide Certain Line Build Out	)	
Functionality as a Part of Regulated	)	
Network Equipment on Customer Premises	)	

PETITION FOR RULEMAKING

William Buckley
Vice President, Technology
Development

Verilink Corporation
145 Baytech Drive
San Jose, California 95134
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Dated: December 14, 1992

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SUMMARY

Verilink Corporation herein proposes that the Commission amend Part 68 of the Commission's Rules to authorize line build out ("LBO") functionality to be provided in the transmission path of 1.544 Mbps ("DS1") services as a component of regulated network interface equipment located on customer premises. This modest amendment will bring the Commission's rules in line with the current direction of technical standards for digital services and equipment. Further, the proposed amendment will eliminate a source of customer confusion and network harm. Allowing regulated network provision of LBO will also facilitate the introduction and deployment of advanced transmission services in the public switched network. The proposed Part 68 rule amendments will not impair competition in the equipment market or disadvantage customer premises equipment vendors. To the contrary, the amendment will serve the public interest by significantly benefitting CPE customers, network users and the manufacturing industry as a whole.

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Network Equipment on Customer Premises	)	

PETITION FOR RULEMAKING

Verilink Corporation ("Verilink"), pursuant to Section 1.401 of the Commission's Rules, 47 C.F.R. § 1.401 (1991), hereby petitions the Commission for a rulemaking to amend the Commission's Part 68 rules to authorize line build out ("LBO") functionality to be provided in the transmission path of 1.544 Mbps ("DS1") services as a component of regulated network interface equipment located on customer premises. As detailed below, the rule change proposed in the instant rulemaking petition will permit implementation of the American National Standards Institute ("ANSI") standard for the DS1 Metallic Interface and eliminate a source of network harm, customer confusion and unnecessary equipment costs. The proposed rule change will also facilitate the efficient introduction and deployment of advanced transmission services in the public switched network.

INTRODUCTION

Verilink is a manufacturer of telephone network diagnostic equipment, including a number of customer premises equipment ("CPE") products that contain LBO functionality. Headquartered in San Jose, California, Verilink markets its products to end users and other equipment suppliers. From its inception, Verilink has participated in the Commission's proceedings concerning CPE and in the activities of the ANSI-accredited T1 Committee. As a high-technology CPE manufacturer committed to producing state-of-the-art equipment that best serves its customers' needs, Verilink has consistently taken a real-world, practical approach to resolving technical network and CPE standards setting issues in T1 Committee discussions and in the Commission's Part 68 and other proceedings. In this petition, Verilink urges the Commission to adopt a similarly practical approach to the network provision of line build out in the DS1 transmission path. In Verilink's view, the modest rule amendments proposed herein will bring the Commission's rules in line with the current direction of technical standards for digital services and equipment. The amendments will eliminate a source of customer confusion, and network harm to the significant benefit of CPE customers, network users and the CPE manufacturing industry as a whole. Amendments are also consistent with the deployment of advanced transmission technologies, including integrated services digital networks ("ISDN"), and the efficient technological development of the U.S. telecommunications

infrastructure. Accordingly, the public interest requires that the Commission adopt the Part 68 amendments proposed herein.

BACKGROUND

LBO is a feature that attenuates strong signals transmitted when the distance between regenerators or between a regenerator and the transmit/receive equipment may be short. By attenuating the signal, LBO prevents CPE devices from delivering excessive signal power into the network thereby causing potential network harm. In particular, excessive signal power delivered into the network often produces cross-talk, i.e., noises present in, a channel when currents from one channel interfere with those of another. To guard against such network harm, Part 68 requires all Network Channel Terminating Equipment ("NCTE") to be capable of providing LBO functionality.[1/]

The specific Part 68 rules addressing LBO were adopted as a result of the Commission's decision to treat NCTE as unregulated CPE requiring carriers to unbundle digital NCTE and to state the charges for NCTE as separate rate elements on an unregulated basis.[2/] After its NCTE unbundling and detariffing decision,

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1/ Terminal equipment used in conjunction with carrier provided digital services is generally referred to as NCTE or Channel Service Units ("CSUs").

2/ See Amendment of the Commission's Rules Concerning Connection of Equipment Systems and Protective Apparatus to the Telephone Network, (Interconnection Order I), CC Docket No. 81-216, 94 FCC 2d 5 (1983), recon. denied, FCC 84-145 (released April 27, 1984)(unbundling and detariffing NCTE from network facilities).

the Commission adopted Part 68 rules that would ensure that unbundled NCTE would not cause network harm by delivering high amplitude pulses or voltages into the network. The Commission specifically adopted Section 68.308(h)(2)(iii) which provides that NCTE shall incorporate three signal attenuation settings -- Options A, B and C with a value of 0 db, 7.5 db and 15 db -- that can be selected at the time of installation depending on the level of attenuation needed to protect the network and avoid crosstalk. See 47 C.F.R. §§ 68.308(h)(2)(ii), (h)(2)(iii).

While LBO functionality was initially intended as a CPE-provided feature, the Commission later established an NCTE waiver standard which, if met, would permit a carrier to provide certain LBO functionality as a part of regulated service.[3/] Subsequently, the Commission also carved out an exemption from the unregulated NCTE rule for LBO provided to perform loopback testing.

This petition for a rulemaking follows a petition for declaratory ruling or, in the alternative, a waiver, filed by BellSouth Corporation in 1988. BellSouth requested in that petition a declaration confirming that carriers are permitted to provide LBO in the regulated DS1 transmission path. BellSouth explained in its petition that such a ruling by the FCC would facilitate the implementation of the American National Standard for Telecommunications-Carrier-to-Customer Installation - DS1

[3/] See Amendment to Section 64.702 of the Commission's Rules and Regulations (Third Computer Inquiry), 2 FCC Rcd. 3072 (1987) ("Computer III, Phase II Order").

Metallic Interface ANSI T1.403 in the most technically and economically efficient manner. The standard calls for a single pulse template and a uniform signal level to be transmitted from the NCTE to the network interface. Although the ANSI standard does not mandate any particular method of accomplishing signal power control, BellSouth argued in its a petition that LBO in the regulated network interface is the most efficient manner and the only practical solution to implement the new ANSI standard.

BellSouth asserted that existing Commission rules permit network provision of LBO based on carriers' authority to place network equipment on customer premises to perform loopback testing for digital services in accordance with the Commission's decision in the Computer III Phase II order.[4/] BellSouth asked the Commission to confirm that the same LBO functionality could be used to provide signal power coordination for both looped test signals and customer generated signals. In the alternative, BellSouth requested a waiver of the rules to permit carriers to provide LBO in the DS1 transmission path under the Commission's NCTE waiver standard. In comments and reply comments, Verilink supported BellSouth's request for declaratory ruling or waiver to permit network LBO in the DS1 transmission path.

[4/] See Computer III, Phase II Order, 2 FCC Rcd. at 3072.

In an order released in June 1991,[5] the Commission denied BellSouth's petition on the procedural grounds that the petition did not identify an existing controversy regarding the interpretation of the existing rules. According to the Commission, a number of preceding orders make clear that regulated carrier-provided LBO is permitted only for loopback testing. The Commission also denied BellSouth's alternative waiver request because, in the Commission's view, the implementation of a new ANSI interface standard having broad impact on the telecommunications industry should be considered in the context of a rulemaking proceeding and not implemented through a waiver. Based on the record already developed in that proceeding, the Commission identified in its order specific issues that should be addressed in any rulemaking petition submitted seeking authority for carriers to provide LBO in the DS1 transmission path. Verilink attempts to address these issues herein.[6]

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[5] Bellsouth's Petition for Declaratory Ruling or, Alternatively, Request for Limited Waiver of the CPE Rules to Provide Line Build Out (LBO) Functionality as a Component of Regulated Network Interface Connectors on Customer Premises, DA 91-664 (Released June 6, 1991)("Bellsouth Order").

[6] Bellsouth Order, at ¶ 30.

DISCUSSION

I. ALLOWING REGULATED NETWORK EQUIPMENT TO PROVIDE LBO IN THE DS1 TRANSMISSION PATH WILL ELIMINATE THE NEED FOR CUSTOMER/CARRIER JOINT ENGINEERING AND ALLEVIATE UNNECESSARY USER CONFUSION, EXPENSE AND NETWORK HARM

Under current industry practices and FCC rules, CPE interface devices are capable of delivering signal output at several different levels. Selection of the appropriate signal power output pulse must be accomplished at the time of installation and will depend on the particular interface technology used, such as repeatered lines or multiplexers. As a practical matter, adjusting the CPE output signal power at the time of installation is often left in the hands of the customer since carriers cannot determine the need for LBO when the customer's order is taken. All carriers have procedures for providing this information at installation, but getting it into the hands of the CPE installor, and having it properly interpreted is problematic.[1/]

The requirement that customers select among the multiple power output levels has led to substantial customer confusion and error in selecting the appropriate power settings. Many customers, unable to determine the correct setting from the carrier representative, contact Verilink representatives for assistance. Verilink has found that in many instances, customers

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[1/] It appears that the Commission's order in Docket 88-57, which effectively moved the network interface away from the end user, has aggravated this situation. In particular, the Commission's order has made it more difficult for the standards bodies to dealing with customer-provided LBO.

seeking assistance have already unknowingly misadjusted the signal output level settings and are introducing excessive power into the network through their CPE --often resulting in cross-talk. In Verilink's experience, the customer responsibility to choose among multiple LBO settings has given rise to a joint engineering procedure whereby CPE customers must seek assistance from manufacturers to determine the appropriate LBO setting for the particular installation. Even though product manuals provided with equipment typically include explicit instructions, users often do not follow the instructions or do not interpret the instructions accurately. This is occurring more frequently as T-1 circuits are being deployed more often to smaller businesses (which may be driven, in part, by declining T-1 tariff rates.)

This joint engineering process is time-consuming, costly and inefficient. The joint engineering process is particularly wasteful and unnecessary in light of the fact that carriers are currently permitted to provide LBO for certain other functions. To eliminate the confusion, unnecessary costs and inefficiencies arising from the joint engineering process, Verilink requests that the Commission amend its Part 68 rules to require output pulse templates to include only a single "selection" -- specifically, Option A with a value of 0 dB. Verilink proposes that Sections 68.308(h)(2)(ii) and (iii) be revised to delete all references to Options B and C and the need to select the appropriate output pulse option at installation. These modest

rule changes proposed herein are intended to alleviate the unnecessary joint engineering procedure and facilitate provisioning of T-1 circuits.

A. What savings will result from elimination of joint engineering? What is the annual dollar amount of these savings? How are amounts calculated? Who benefits from each indicated saving?

Currently there is a large number of new metallic T1 facilities or nonmetallic facilities that are installed each year. Verilink estimates that approximately 3,500 new DS1 CSUs per month are installed throughout the country. An estimated 20% of these require servicing at installation and 1% of these may require that a craftsperson be dispatched to the customer site to resolve the problem. A total of approximately 42,000 circuit ends per year are initiated, altered, modified or moved. Approximately 8400 of these have difficulty at turn up and installation and Verilink estimates that approximately one half of these problems are LBO-related problems. The remaining 4200 service problems relate to other circuit problems, manuals, lack of installer's knowledge, or inoperative equipment rather than to difficulties in selecting the appropriate LBO setting. Verilink believes that permitting carriers to provide LBO as a part of regulated DS1 services will eventually eliminate an estimated 4200 service problems per year. Further, the problems are not limited to metallic facilities and, therefore, as fiber in the

loop and associated multiplexing become more widespread, the number of LBO-related problems will increase.

Eliminating the need for joint engineering will result in substantial savings not the least of which is avoiding the lost time to customers in accessing a circuit. Although it is difficult to quantify, users would avoid the significant costs, including the costs of lost business opportunities, arising from the delay that results when a circuit cannot be turned up as scheduled due to customer confusion or errors in selecting the LBO power setting and the need for joint engineering (including user/manufacturer and user/telco joint engineering). Other specific costs incurred in the joint engineering process include communications costs (telephone, facsimile and meetings with CPE customers) and the cost of field service engineering time and occasional travel expenses.

Assuming that each service problem requires one hour of craftsman time and one hour of communications time to resolve, Verilink estimates that approximately 8400 labor hours per year are devoted to resolving LBO problems. This represents a minimum of $210,000 in labor costs (calculated on a $25/hour labor rate). In Verilink's experience, approximately 40 incidences of installation difficulties per year require that personnel be dispatched to the customer site. In these cases, Verilink incurs airfare and various other expenses at an average cost of $1000 per incident or roughly $40,000 for Verilink to resolve hard core installation problems.

Verilink understands that other manufacturers incur similar expenses each year in resolving LBO problems. Thus the savings gained by eliminating the need for LBO joint engineering would be substantial. The beneficiaries of these savings would not only be CSU manufacturers, but also telephone companies and the users who would save the indirect costs of having personnel tied up in resolving these issues.

B. What would be the cost to CPE users of (1) requiring network provision of LBO, or (2) permitting network provision of LBO? Include dollar amounts and method of calculation. How would either (1) or (2) affect tariffed rates for DS1, initially and subsequently?

Network provision of LBO would not increase the cost of CPE and may, in fact, lead to slightly reduced costs based on the elimination of redundant components and switches in CPE devices. Based on changes in production and testing costs, Verilink estimates that CSU prices would be reduced by $3-$7. Verilink believes that a carrier could not justify imposing higher service rates based on network provision of LBO since LBO already is available from the serving carrier for other purposes, i.e., loopback. Accordingly, Verilink does not anticipate that the proposed rule change will have any impact on tariffed rates for DS1 service, but, rather, may even allow rates to be lowered as the administration costs of joint engineering are minimized.

II. PERMITTING CARRIER PROVISION OF LINE BUILD OUT WILL FACILITATE IMPLEMENTATION OF THE ANSI DS1 INTERFACE, WILL REQUIRE MINIMAL RULE AMENDMENTS, AND CAN BE IMPLEMENTED WITH MINIMAL DISRUPTION

A. What impact does the ANSI DS1 Interface standard have on Part 68 or on current interconnection practices under Part 68? What should the relationship be between the ANSI DS1 interface standard and Part 68? What rule changes may be necessary to accommodate the ANSI DS1 interface standard? Should current LBO functionality requirements in Part 68 be eliminated? If LBO were eliminated, how would the transition be accomplished through Part 68, including any proposed rule changes?

Verilink believes that the ANSI DS1 interface standard could be implemented under the existing Part 68 rules and therefore it is not necessary that the ANSI DS1 interface standard have a significant impact on Part 68. Part 68 and the ANSI standard address distinct, albeit related, network concerns. The Part 68 requirements are designed to protect the network from harm. The ANSI DS1 interface standards are intended to ensure interoperability and adequate performance of customer equipment with the network. ANSI T1.403 requires that the signal to be delivered to the network interface be a nominal 3 volt peak amplitude signal with some degradation for wiring. The standard provides for a technology-independent interface so that regardless of the media provided by the serving carrier, the CPE customer will always provide the same signal output power level. No joint engineering (customer/telco or customer/manufacturer) is required at the time of installation. The ANSI standard is not inconsistent with the existing terms of Part 68 rules given that

the ANSI standard requires only that customers uniformly select the 0 dB option already authorized by Part 68.

In light of the Commission's recent opinion in its order denying BellSouth's petition, however, Verilink recommends that Part 68 be amended specifically to accommodate the ANSI standard. That is, Section 68.308(h)(2)(ii) should be amended to delete reference to output pulse options B and C and revised to reflect that a single output pulse level will be permitted for all equipment interfacing the network. Thus, the implementation of the ANSI standard through these rule revisions would eliminate the requirement for LBO functionality in CPE.

Verilink believes that the transition to the new LBO rule could be accomplished easily with minimal impact on existing customers. Currently installed CPE would not be required to be adjusted to the single power setting requirement unless a circuit rearrangement occurs. Provision at only a single setting in new equipment would be optional given that all existing equipment is capable of being set at the 0 db power setting and the cost of LBO is so low.

III. PERMITTING CARRIER PROVIDED LBO IN THE TRANSMISSION PATH WILL UPDATE PART 68 TO REFLECT CURRENT TRENDS IN STANDARD SETTING AND WILL NOT ADVERSELY AFFECT THE CPE INDUSTRY

A. What effect, if any, would mandatory or permissive network provision of LBO at the interface have on competition in the CPE market, and what impact would such provision have on DS1 services? Include quantitative support.

Verilink strongly believes that network provision of LBO will have no material impact on competition in the CPE market, particularly given that LBO in the future will be required less frequently as the market requires more fiber optic circuits to be deployed. The LBO function, whether in a stand-alone NCTE device or integrated into a PBX or multiplexer, constitutes only a small portion of the electronics. NCTE purchasing decisions are typically based on service, features and interoperability and not on subtle differences in price. While permitting carriers to provide LBO in DS1 transmission paths will not cause a dramatic drop in CSU price, it will significantly improve customer perception of service and CSU equipment. The requested rule changes will in no way impede a CPE manufacturer's competitive position and, will eliminate substantial inefficiencies and unnecessary costs.

B. What has occurred in the marketplace or in the regulatory environment to justify any changes in current Commission policies favoring retention of LBO in CPE? Explain the relationship between these marketplace or regulatory occurrences and the need to change Commission policy.

Over the past decade, there has been a dramatic increase in the number of T1 circuits deployed. As a result of that increase, the industry has gained valuable experience concerning the various difficulties inherent in the joint engineering process, particularly the difficulty in educating users and communicating to telephone companies regarding the appropriate switch settings for LBO. Verilink has learned, for example, that some customers attempt to adjust the signal power during installation by selecting the 15 dB setting with an apparent intent of strengthening the CPE signal power or select the 0 dB setting with an intent of achieving a weaker signal power. Because the 0, 7.5 and 15 dB levels inversely correspond to the magnitude of signal power, in the first instance, the adjustment would only attenuate the signal; in the latter instance, the adjustment would likely introduce excessive signal power into the network, contrary to the customer's intentions. The requirement that customers adjust and tinker with their equipment often leads to unintentional and unpredictable difficulties, including the inadvertent adjustment of other equipment settings and knobs to compensate for LBO misadjustment and disruption of service to third parties.

In the future, we can expect to see expanded deployment of DS1 by multiplexers. High-rate Digital Subscriber Line ("HDSL") multiplexing technology will be increasingly used. Multiplexing technologies do not require LBO in CPE and accordingly there is little justification for retaining LBO functions in CPE. Further, Verilink also believes that the proposed modest rule amendment will facilitate the introduction of ISDN in the future by simplifying its implementation. Together, these factors illustrate that the requested amendments are consistent with marketplace and technological developments and therefore should be adopted.

IV. TECHNICAL ISSUES REGARDING LINE BUILD OUT FUNCTIONALITY AND THE DEVELOPMENT AND IMPLEMENTATION OF THE ANSI DS1 INTERFACE STANDARD

A. Provide statistical information regarding the average cable length from the CPE to the interface, including data regarding the current average signal level at the network interface.

Verilink does not have access to specific data regarding the average cable length from the CPE to the interface. The Commission ruling in Docket 88-57, however, requires that the distance be no more than 12 inches.[8/] Under the 12 inch requirement, the transmit power at the network interface would be almost exactly the same as is being transmitted from the NCTE and

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8/ Review of Sections 68.104 and 68.213 of the Commission's Rules Concerning Connection of Simple Inside Wiring to the Telephone Network, CC Docket No., 88-57 FCC 90-220, Report and Order and Further Notice of Proposed Rulemaking, (released June 14, 1990) recon. denied, DA 90-1082 (released August 13, 1990).

the signal being received by the NCTE would be the same as the power at the network interface based on the negligible 12 inch length of transmission wire. (Verilink notes that the last section of a metallic facility is typically engineered to be no greater than 3000 feet.)

In applications where the telephone company is providing the service with a multiplexer, the power going in both directions will be approximately 12 to 19 dBm (as specified in ANSI T1.403). In a metallic facility, if signal power LBO options B and C were not required, the power would always be 12 to 19 dBm which complies with existing Part 68 requirements and ANSI T1.403.[2/]

B. Explain how the specific signal levels proposed by the ANSI standards were arrived at, especially the 12.0 to 19.0 dBm level for NCTE signals at the interface. Are the ANSI minimum signal strength levels higher than current signal strengths to the network interface? If so, why? If not, why not?

Verilink understands that the 12 and 19 dBm levels were included in the ANSI standards in order to comply with the Part 68 rules and to represent historical telephone company engineering practices. These levels are required to minimize cross talk in the network and provide adequate signal level at

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[2/] Some would suggest that because there is more power transmitted, there is a greater potential for extraneous electromagnetic radiation. When a product is designed with three options, however, the device will always be measured for compliance with the Commission's Part 15 rules in the "worst case" condition, i.e., using Option A (0 dB). Thus, eliminating Options B and C will simplify the predictability of radio frequency interference studies.

the maximum distance from the network interface which as stated above is a nominal 3000 feet of 24 gauge wire. The ANSI minimum signal strength levels are not higher than the current signal strength of the network interface. The output under Option A of the rules would certainly be higher than Option B or C. Under the current FCC rules, the LBO switches would lower the power into the network because of the complex nature of the wave shapes in the DS1 signal and the template defined in Section 68.308.

C. Should DS1 services be treated differently from other digital or analog services under Part 68?

Although Verilink does not propose that the Commission undertake a substantial restructuring of the Part 68 rules to distinguish DS1 from other services, it urges the Commission to recognize that DS1 services are in fact significantly different from other services. The rate of one and one-half megabit of data is significantly higher by a factor of 30 over the next highest rate in the Part 68 rules. High speed signals have the potential for more difficulties given that higher DS1 services are ubiquitous and encounter a broader variety of environments.[10/]

[10/] This data rate pushes the performance envelop of twisted pair media, and frequently special provision rules have kept delivered costs higher than desired. Recognizing this, carriers have continually explored other delivery mechanisms including fiber systems and various HDSL technologies. Deployment of some of these has been significantly slowed by concern for customer displacement and/or stepping over the line drawn between network functionality and CPE.

In Verilink's experience, at 45 megabits or broadband ISDN, for example, it will be even more difficult to ensure interoperability. Because it is more difficult to isolate the source of trouble at higher rates, elaborate network management systems are required. In fact, a primary purpose of CSUs and NCTE, in addition to terminating circuits, is to identify the source of difficulties among or between the network, the user or the interexchange carrier. DS1 services thus require that equipment comply more closely with standards than lower digital rates to ensure interoperability.

Verilink therefore believes that DS1 service should be treated differently in some respects. DS1 services have a greater need for joint engineering, and the failure of one user to correctly engineer the facility between the demarcation point to the network interface may have an adverse impact on other users. DS1 services, incorporating relatively complex technology, are increasingly being thrust on "third tier" customers, such as large retail chains, that typically have less experience and a less sophisticated understanding of telecommunications services and facilities relative to larger companies that have historically used these services. Accordingly, the Commission's overarching goal in refining the Part 68 rules to accommodate market trends should be to make circuit provisioning as simple as possible -- a "plug and play" approach. Elaborate provisions that require users to understand and comply with relatively complex rules will discourage customers from using DS1

services. In that event, smaller companies will be less likely to receive the substantial benefits such services can bring to users.

CONCLUSION

The public interest requires that the Commission adopt the modest Part 68 rule amendments proposed herein. The proposed rule changes would permit the implementation of the ANSI DS1 metallic interface standard and eliminate a source of network harm. The rule modifications will also simplify the provision of DS1 circuits by eliminating customer confusion and unnecessary equipment costs. Accordingly, the proposed amendments, if adopted, will serve the Commission's objective to promote the widespread provision of efficient, high quality telecommunications services in the United States.

Respectfully submitted,

VERILINK CORPORATION

By: William Buckley

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Dated: December 14, 1992

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