Information Renaissance

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August 1, 1996

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
Room 222
1919 M Street, NW
Washington, DC 20554

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Dear Mr. Secretary:

Enclosed is the original set of further comments, along with four copies, in the matter of the Federal-State Joint Board on Universal Service, CC Docket No. 96-45. These comments are respectfully submitted on behalf of Information Renaissance, a nonprofit organization which seeks to further the development of computer networks in support of education, community development and economic revitalization. We appreciate your consideration of these comments.

Sincerely,

Robert D. Carlitz
Executive Director
Information Renaissance

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Before the
Federal Communications Commission
Washington, DC 20554

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In the Matter of	)	
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Federal-State Joint Board on Universal Service	)	CC Docket No. 96-45
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Re: Notice of Proposed Rulemaking and Order Establishing Joint Board

Further Comments from Information Renaissance

prepared by

Robert D. Carlitz
Eugene F. Hastings, II
Mario Zinga

(August 2, 1996)

Summaries.

In its comments of April 12, 1996 ***Information Renaissance*** proposed a simple mechanism for providing discounts on data services for schools and libraries. This mechanism is based upon our experience with telecommunications programs for schools, libraries and community centers in the urban environment. Our work has involved data services for this audience, so we will restrict our attention to such services. We can say with confidence that these services are of significant educational value and of broad community interest.

The discount mechanism that we proposed in our previous comments is one that is based on the assumptions of a *competitive environment* with widespread availability of *unbundled services*. In this environment it is appropriate to speak of separate components of the underlying infrastructure. Our comments focused upon one component -- that which links a subscriber's site with the nearest switching center. In the language of the telephone industry, this is the "local loop" portion of the infrastructure.

Our recommendation was that in determining the cost of a given telecommunications service to schools and libraries, the service be priced as if it were being provided at the location of the service provider's switching center or Central Office. The provides a discount model in which the local loop is targeted for maximal discounts. We believe that this is an appropriate and effective strategy, given that the local loop represents that component of the telecommunications infrastructure which is currently least competitive and intrinsically one of the most expensive. We will refer to this proposal in the remarks that follow as a proposal to provide telecommunications services for schools and libraries at "Central Office rates."

The lack of competition in the local loop is an artifact of past telecommunications history which may change in a future more competitive environment. But the local loop will likely remain as an important cost factor in any telecommunications service, since it is the only portion of the telecommunications infrastructure which cannot be broadly shared. New architectures for the local loop, such as those offered by the cable industry, could change this equation, but such architectures have yet to be demonstrated as viable and scalable architectures for data delivery.

Our proposal to provide services for schools and libraries at Central Office rates allows for many simplifications in our answers to the specific questions raised in the FCC's Public Notice of July 3, 1996. We note these simplifications in the summaries which follow. Further detail is given on subsequent pages. The question numbers which follow correspond to the numbers in the FCC's Public Notice. We do not attempt to answer all of the given questions but restrict attention to those areas where our experience qualifies us best to comment.

6. The discount model that we propose is relevant to data services. In our experience these are the services most urgently needed by schools and libraries at the present time.

7. We do not believe that the universal service subsidies for schools and libraries should apply to inside wiring.

8. The provisions of Section 254(h) should provide basic data service for individual students, teachers and library patrons comparable to that which is commonly available

from their residences. The provisions of Sections 706 and 708 should anticipate changes in the level of residential data service and allow the upgrade of institutional facilities to accommodate such advanced services as appear on the broad commercial market.

9. The unbundling of individual services is a key to healthy competition in the telecommunications market.

10. The resale prohibition in Section 254(h)(3) should be narrowly construed only to prohibit the resale of services for a profit. User fees should be allowable to provide cost recovery for services extended outside the school or library, and resale of bandwidth should be allowable as long as such resale is tied to valid programs in the areas of education, library services, public services or public information.

11. Resale should be restricted to entities providing valid educational programs. With this restriction there is no need to limit the scope of allowable Section 254 discounts. Such a limitation would demand very burdensome accounting in any case.

12. Discounts should take the form of direct billing credits. This provides adequate accountability, as described below, with minimal bureaucratic overhead.

13. Direct billing credits provide the preferred form of administration for universal service discounts to schools and libraries.

14. Section 254(h) requires that requests for telecommunications services which qualify for universal service discounts should be *bona fide* requests. This assurance, as described below, will be adequate to assure that the allocated funds are used for their intended purposes.

15. The requests for supported telecommunications services should come from those school officials charged with the responsibility for telecommunications and technology implementation in their districts. Such officials have a responsibility within their districts to make judgments about the appropriateness of individual technology expenditures. Their responsibility with regard to the purchase of supported telecommunications services will be no different from their overall responsibility to purchase services of educational value and relevance to students and teachers in their districts.

16. In a mature competitive market the price of an unbundled local loop will be determined by market forces. In a less mature market one can use the cost of equivalent services, such as bare copper (LADS service, for example) or dark fiber, to determine the base service price for the discounted local loop.

17. Based upon our experience we expect Central Office rates for telecommunications services will provide an effective discount which exceeds that of most current special rates. If this holds true more broadly, we would recommend that our proposed discount supplant existing special rates.

19. Based upon our experience with insular urban sites, we do not believe that special discounts will be required beyond that which we are proposing for all urban schools and libraries.

20. In our recommended approach there will be no need for models to determine which schools are disadvantaged.

21. In our recommended approach there will be no need to allocate additional consideration to schools and libraries in rural, insular, high-cost, and economically disadvantaged areas.

22. The needs of schools and libraries and of rural health care providers are sufficiently different as to justify one funding mechanism for schools and libraries and a separate funding mechanism for rural health care providers.

23. The cost estimates of the McKinsey report and the NII KickStart Initiative are based upon somewhat outdated models of technology implementation and educational applications. Nonetheless the order of magnitude of the cost estimates in these reports can provide an adequate estimate of the cost expected for broad programs in school connectivity.

24. We have detailed data to offer on connectivity for urban schools, libraries and community centers. Our data tends to confirm the order of magnitude of the cost estimates of the McKinsey Report and the NII KickStart Initiative.

25. We believe that the estimates for public schools should be valid for private schools, as long as one applies them on a *per capita* basis.

Detailed Comments on Specific Questions.

6. Should the services or functionalities eligible for discounts be specifically limited and identified, or should the discount apply to all available services?

The experience that ***Information Renaissance*** brings to this discussion is based upon four years experience with computer networking projects for schools, libraries and community centers. In our experience the greatest need for telecommunications services for schools and libraries is in the area of data services. Therefore we suggest that universal service discounts for schools and libraries focus upon such services. We recognize that, over time, telecommunications services will likely to provided in the form of a uniform digital stream, so that all current telecommunications services (voice, video and data) will likely be subsumed under the heading of digital data services. This means that as these separate services merge, our recommended discount structure will apply to all such services.

7. Does Section 254(h) contemplate that inside wiring or other internal connections to classrooms may be eligible for universal service support of telecommunications services provided to schools and libraries? If so, what is the estimated cost of the inside wiring and other internal connections?

The cost of data services for schools and libraries involves a number of components - external connectivity, internal wiring, routers and servers, user devices, training and support. Of these costs the cost of external connectivity is probably the smallest, so it is tempting to consider universal service support which goes beyond external connectivity. While we recognize the need to find support mechanisms for all pieces of the school and library networking puzzle, we do not believe it would make sense to extend universal service support to provide for wiring inside of schools and libraries.

The reason for this is that while some telecommunications vendors also do business with internal wiring plants, there is a far wider selection of vendors who attend to internal wiring tasks and have no larger telecommunications presence. We regard the fair and equitable administration of a universal service fund which would include these other vendors as an extremely difficult task. There is a danger that extension of universal service support to internal wiring plants would give an unfair advantage to those companies which provide both internal wiring and external connectivity. This danger can be avoided if the Commission required that all supported services be available in an unbundled form, but there remains an issue of who would contribute to the universal fund and who would draw from it if applicability of the fund is made too broad.

There is also the danger that an overly broad universal service fund would not be maintained over time. We believe that one of the most attractive features of the Telecommunications Act of 1996 is its recognition of the scope of the problem of networking the nation's schools and libraries. A narrowly drawn universal service fund could plausibly solve the problem of providing connectivity to schools and libraries throughout the nation. While there would remain the problem of how to exploit this connectivity with necessary internal wiring, routers and servers, user devices, training and support, we believe that each of these areas can be approached in turn, once there is adequate external connectivity, distributed equitably to all of the nation's schools and libraries. In this context volunteer efforts such as NetDay become very attractive, as do innovative training programs such as those pioneered by the ***Common Knowledge: Pittsburgh*** project, which minimize the cost of introducing teachers and school staff to networking technology.

One can carry the separation of external and internal wiring issues too far, and we believe it is important that the FCC mandate external connectivity to an extended point of demarcation. This means carrying the external wiring into the school or library to the physical location of their customer equipment. External wiring which ends at the exterior wall of a building may require costly internal links to be of any practical value whatsoever.

8. To what extent should the provisions of Sections 706 and 708 be considered by the Joint Board and be relied upon to provide advanced services to schools, libraries and health care providers?

In our reply comments of May 8, 1996, we recommended that the FCC define a basic service for institutional customers in terms of broadly available residential services, appropriately scaled to the institutional environment. Thus, if residential data service is defined in terms of a single B channel, or 64 kilobits per second of data, then a school site which would support as many as 24 simultaneous users of data services would require T1 service to provide basic data service for the school's users. It is obviously important to distinguish between T1 service in the

institutional environment, where it is essential to provide basic data services, from T1 service in a residential environment, where it would currently be considered as an advanced service.

We regard the provisions of Sections 706 and 708 as excellent vehicles for maintaining the currency of the services available to schools and libraries. We anticipate in the relatively near future that T1-type services will become available to residential customers at prices no greater than current POTS lines. The technology which makes this possible is already available from several vendors to the telephone industry and uses some variant of Digital Subscriber Line (DSL) technology. Equivalent functionality is available through the cable modems now being deployed by many operators in the cable industry.

Once T1-level connectivity is commonplace in the residential environment, we anticipate a profound change in the character of many on-line services. Where content is currently restricted to fixed-frame graphics and text, it will become possible to include large amounts of sounds and video. Once this happens, the current baseline of residential data service, whether it is measured in terms of 28.8 kilobit modems over POTS lines or one or two B channels of an ISDN line, will rapidly become obsolete.

In this rapidly evolving environment it will be important that mechanisms exist which will allow schools and libraries to upgrade their connectivity so as to maintain access to the new on-line services that will be developed. It is important to note that most internal wiring plants under construction today have a capacity for 100 Megabit service (using, for example, Category 5 twisted pairs). Hence the bandwidth bottleneck will occur at a school or library's point of external connectivity. This is just another example of the general theme that runs through our comments in this proceeding: that the local loop is the element of the telecommunications infrastructure that requires the most attention to assure low-cost and equitable access to information.

9. How can universal service support for schools, libraries, and health care providers be structured to promote competition?

The key to a competitive telecommunications environment is the unbundling of telecommunications services. Such unbundling is a prerequisite for the model that we have proposed in these proceedings. If there is no access to the local loop, then it is meaningless to mandate the provision of this portion of the telecommunications infrastructure at a discount.

Our experience with a range of municipal networking projects suggests that there are significant economies available to the local loop, provided that there are mechanisms available to provide customer access to this portion of the infrastructure. High-Bit-Rate Digital Subscriber Line services (HDSL) provide a dramatic example of this trend. In projects in Pittsburgh we are using this technology to provide T1-level connectivity to selected school sites at a recurring cost of only $60 a month. The key to this remarkable economy (aside from the technology deployed for the links in question) is access to the raw copper, here in the form of Local Area Data Service (LADS) lines.

We regard HDSL technology as a likely response on the part of the telephone industry to the expected deployment of cable modems by the cable industry. Indeed, there is already a trend toward using HDSL as a mechanism to reduce the cost of provisioning lines for T1 service. To our knowledge these economies have not yet been passed along to end users of these services.

If the FCC promotes the availability of unbundled services, it will help stimulate competition in this area Likely winners in such a competition will be the end users in businesses, homes, schools and libraries -- and the telecommunications providers themselves, who will enjoy the blossoming of a large new market in high-bandwidth data services.

10. Should the resale prohibition in Section 254(h)(3) be construed to prohibit only the resale of services to the public for profit, and should it be construed so as to permit end user cost based fees for services? Would construction in this manner facilitate community networks and/or aggregation of purchasing power?

A key feature of all of the successful and sustainable school and community networking projects with which we are familiar is an emphasis upon *shared infrastructure*. If the FCC's rules for universal service impede the development of such shared infrastructure, they will have a strongly negative impact upon all school, community and municipal networking efforts. Hence we recommend that the resale prohibition of Section 254(h)(3) be narrowly construed so as to prohibit only the resale of services for a profit. There should be no prohibition of user fees which allow schools and libraries to recover the cost of services outside of their facilities.

A specific example which we would allow under implementation of the Telecommunications Act would be the provision of network access for the parents and guardians of school students. Such access can be a useful mechanism for maintaining contacts with teachers and programs in the schools and for helping students to extend their study time through on-line activities. Parental accounts of this sort should be subject to the same sort of acceptable use policies which presently govern student accounts. Such policies typically rule out commercial applications by individual users and restrict network activities to those which support a school or library's programs in the areas of education, library services, public service or public information.

A second example which we believe should be allowed under the Telecommunications Act is that of charges for dial-up access to a community network which is based at a school, library of community center. There is a need for user fees for such services, since the cost to provide such a service is directly proportional to the number of users. Any successful such service must have some capacity for growth, and that capacity is possible only through an expansion of the number of ports available to dial-up users.

We do not regard these recommendations as being in any conflict with the needs or interests of commercial network providers. Such organizations can provide efficient services of this type through economies of scale, and we expect there to be a trend in which schools and libraries will increasingly contract for services with commercial providers, as has happened already at a number of universities.

11. If the answer to the first question in number 10 is "yes," should the discounts be available only for the traffic or network usage attributable to the educational entities that qualify for the Section 254 discounts?

We regard any scheme which required schools and libraries to account for that portion of their network traffic which lay outside a universal service discount as probably being extremely burdensome to administer. To avoid this problem we would recommend that recipients of

universal service discounts be restricted to engage in the resale of such services only to groups which provide valid educational programs for the schools and libraries in question.

12. Should discounts be directed to the states in the form of block grants?

We regard the involvement of state agencies in the telecommunications purchases of individual schools as unnecessarily burdensome and restrictive. The stated intent of the Telecommunications Act is clearly to provide needed telecommunications services to schools and libraries. From our experience we believe that officials in these organizations can best determine their own needs. The added requirement of a state-approved plan, as has been suggested by several industry commenters, or of a state-run program of disbursement, strikes us as unnecessary and inefficient.

13. Should discounts for schools, libraries, and health care providers take the form of direct billing credits for telecommunications services provided to eligible institutions?

Direct billing credits are probably the simplest and least burdensome mechanism for dispersing universal service discounts. We recommend that the FCC use this mechanism in its implementation of the universal service provisions of the Telecommunications Act as they apply to schools and libraries.

14. If the discounts are disbursed as block grants to states or as direct billing credits for schools, libraries, and health care providers, what, if any, measures should be implemented to assure that the funds allocated for discounts are used for their intended purposes?

This question is closely tied to the question which follows, that of defining a *bona fide* request for telecommunications services. We believe that the answer to both questions lies in the simple requirement that the request for services should come from those officials in a school district or library system who are charged with the provision and maintenance of technology for their institutions. Since universal service support will be in the form of a discount, affected schools and libraries will have to disburse local funds to acquire these services. This will provide adequate means to discourage frivolous purchases or purchases not tied to the institution's primary needs and programs.

15. What is the least administratively burdensome requirement that could be used to ensure that requests for supported telecommunications services are bona fide requests within the intent of section 254(h)?

As argued above, we believe that it suffices to require that requested for supported telecommunications services be initiated by those officials charged with the provision and maintenance of their institution's technology and telecommunications services.

16. What should be the base service prices to which discounts for schools and libraries are applied: (a) total service long-run incremental cost; (b) short-run incremental costs; (c) best commercially-available rate; (d) tariffed rate; (e) rate established through a competitively-bid contract in which schools and libraries participate; (f) lowest of some group of the above; or (g) some other benchmark? How could the best commercially-available rate be ascertained, in light of the fact that many such rates may be established pursuant to confidential contractual arrangements?

In a mature competitive market the price of each element of the telecommunications infrastructure will be determined by competitive forces. While many localities are evolving toward such a market, few can claim to have reached this stage already. In a less mature market it is nonetheless possible to identify services which correspond to unbundled elements of the infrastructure. That service relevant to the model that we have proposed in these proceedings is the unbundled local loop, which can be approximated by cost of Local Area Data Service (LADS) lines, or raw copper wires. Information on these costs is typically available in tariff filings with state Public Utility Commissions.

We should note that LADS lines are not uniformly available in different parts of the country, even though this service is based upon a copper infrastructure which is truly ubiquitous. We recommend as an interim measure to full unbundling that the FCC assure the continued availability of metallic circuits (of which LADS is an example) in all regions of the country. This interim measure would assure that services which will flourish once unbundled copper is available can be provided over LADS lines in the period in which new unbundled services are being defined.

17. How should discounts be applied, if at all, for schools and libraries and rural health care providers that are currently receiving special rates?

Our knowledge of special rates and services is necessarily limited to our own service area, which covers a major metropolitan region. Within this region we know of no special rates which would be more advantageous than our proposal for telecommunications services at Central Office rates. If this situation applies more broadly, then we would recommend that our proposed discount should supplant existing special rates.

18. What states have established discount programs for telecommunications services provided to schools, libraries, and health care providers? Describe the programs, including the measurable outcomes and the associated costs.

We have no information on such programs, aside from bulk purchases of fast packet services, which the local Intermediate Unit has used to provide discounts to school districts in our county. While this discount represents a savings of approximately 20% off of commercial rates, the services provided under this arrangement are still considerably more expensive than what is possible with Centrex ISDN or ISDN in speech bearer mode, to say nothing of the use of more exotic technologies such as HDSL. We regard the use of the best available technology for the local loop, which is what lies at the heart of our proposals in this proceedings, as likely to provide far larger discounts than any bulk purchases or special assemblies of less efficient technologies.

19. Should an additional discount be given to schools and libraries located in rural, insular, high-cost and economically disadvantaged areas? What percentage of telecommunications services (e.g., Internet services) used by schools and libraries in such areas are or require toll calls?

Our experience is limited to urban areas, but it does include inner city neighborhoods which may be regarded as "insular" in the provision of many city services. In this environment we have seen no need for any special discounts beyond what we have proposed in these

proceedings. Since our area does not involve any rural schools, our experience obviously does not extend to this class of users.

20. Should the Commission use some existing model to determine the degree to which a school is disadvantaged (e.g., Title I or the national school lunch program)? Which one? What, if any, modifications should the Commission make to that model?

This is not required - at least for urban schools and libraries - in our model of universal service discounts.

21. Should the Commission use a sliding scale approach (i.e., along a continuum of need) or a step approach (e.g., the Lifeline assistance program or the national school lunch program) to allocate any additional consideration given to schools and libraries located in rural, insular, high-cost, and economically disadvantaged areas?

This is not required - at least for urban schools and libraries - in our model of universal service discounts.

22. Should separate funding mechanisms be established for schools and libraries and for rural health care providers?

The needs of schools and libraries and those of rural health care providers are sufficiently different that it is desirable to use one funding mechanism for schools and libraries and a separate funding mechanism for rural health care providers. Currently rural health care providers are likely to require much higher bandwidth than most schools and libraries and to have a usage pattern which is much more bursty than most schools and libraries. Hence the technologies appropriate to rural health care providers may differ from those required by most schools and libraries. This further suggests that these entities should be treated on a separate footing.

23. Are the cost estimates contained in the McKinsey Report and NII KickStart Initiative an accurate funding estimate for the discount provisions for schools and libraries, assuming that tariffed rates are used as the base prices?

In developing school and community networking projects over the last four years we have gathered a lot of data on the connectivity costs for these entities. The order of magnitude of the costs that we have seen match well with the figures given in these reports. On a more detailed level one should note that the reports in questions were initiated several years ago and that networking technology has been in rapid flux since then. As a result one finds that the patterns of usage upon which these reports are based and the level of technology which these reports have assumed are no longer characteristic of the present school and library environment. It would obviously be desirable to have some mechanism for updating or renewing these reports on a regular basis. Nonetheless they are valuable in establishing a floor for universal service support and the order of magnitude of a universal service fund required to provide basic school and library connectivity.

24. Are there other cost estimates available that can serve as the basis for establishing a funding estimate for the discount provisions applicable to schools and libraries and to rural health care providers?

There are a number of large-scale networking projects from which such cost estimates can be obtained. In our part of the country there is a large-scale school networking project, Common Knowledge: Pittsburgh, and a large-scale library networking project, EINet. Comparable efforts exist in other regions of the country and can be used to provide cost estimates which are more current than those contained in the McKinsey and KickStart reports.

25. Are there any specific cost estimates that address the discount funding estimates for eligible private schools.

We believe that models developed for the public schools and adjusted on a *per capita* basis to reflect the typical size of private schools should provide an adequate basis for cost estimates of private school connectivity.

Respectfully Submitted,

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