STATE OF ILLINOIS
ILLINOIS COMMERCE COMMISSION

Illinois Bell Telephone Company	)
	) Docket No. 00-0393
Proposed Implementation of High	)
Frequency Portion of Loop (HFPL)/Line	)
Sharing Service	)

DIRECT TESTIMONY ON REHEARING OF JAMES D. DUNBAR, JR. ON BEHALF OF SPRINT COMMUNICATIONS L.P.

*****Public Version*****

INTRODUCTION

Q. Please state your name, place of employment, and business address.

A. My name is James D. Dunbar, Jr. I am employed by Sprint/United Management Company as a Senior Manager – Network Costing at 6360 Sprint Parkway, Overland Park, Kansas 66251. I am testifying on behalf of Sprint Communications L.P. (hereafter referred to as "Sprint" or the "Company").

Q. What is your educational background?

A. I received a Bachelor of Science in Engineering degree from Pennsylvania Military College (now Widener University), Chester, Pennsylvania with a split emphasis in Computer Design Engineering and Nuclear Reactor Engineering. In 1983, I received a Master of Business Administration degree from James Madison University, Harrisonburg, Virginia with an emphasis in Business. I have also completed numerous industry engineering, planning, and costing related courses covering general, outside plant, traffic, and transmission engineering, transmission noise mitigation, technical planning, equipment deployment, and costing. I have attended numerous manufacturer seminars on the latest NGDLC equipment and its deployment.

Q. What is your work experience?

A. From 1966 to 1970, I served as an Officer in the U.S. Army Signal Corps leading or commanding signal units on various communications assignments including command of a U.S. Strike Force International Communications Team. Responsibilities included the provision of FM, UHF, microwave radio, radio/wire integrated links, landline, switching, operator services, network control, and secure communications. Following active duty, I continued in a reserve status assigned primarily to the U.S. Army Air Defense School at Ft. Bliss, Texas as a senior communications instructor and course analyst.

From 1970 to 1973, I was employed by the Denver & Ephrata Telephone & Telegraph Company in Ephrata, Pennsylvania. My various assignments during that period included outside plant engineering, traffic engineering, COE engineering, PBX engineering, development of certain cost studies, and some Circuit Equipment maintenance.

Sprint Corporation or one of its predecessor companies has employed me since 1973. From 1973 to 1985, I was located in Virginia. From 1973 to 1974, I was an Outside Plant Engineer with responsibility for many projects including a complete rework of the University of Virginia loop plant. I worked as a Transmission Engineer during 1974 and then was assigned to manage the state capital budget and outside plant planning group for the 1974 to 1976 period. This group was assigned responsibility for engineering all outside plant capital projects in excess of $25,000 and budgeting for all classes of plant. From 1976 to 1978, I was District Plant Manager for the 1800 square mile Southern Virginia District where I managed the Construction, Maintenance, and Installation forces.

From 1978 to 1984, I managed various Regulatory costing functions, including the state depreciation and cost separations group. From 1984 to 1985, I was General Manager - Interexchange Services where I managed the cost separations, rates and tariffs, depreciation, and the interexchange carrier billing/contract and interface functions. I also was a member of the Virginia Telephone Association Separations Committee.

From 1985 to 1993, I was General Staff Manager - Separations for the predecessor Centel Corporation staff in Chicago, Illinois. My job functions included managing the cost separations staff, the revenues and earnings monitoring function, the programming and modeling support for those functions, and cost issue analysis activities such as rate of return versus price caps and FCC/NARUC rule changes. I was the primary corporate interface with USTA and NARUC for technical issues. I served on the USTA Technical Operations Committee, the Price Caps Team (from 1987 to 1991), and the Policy Analysis Committee. I also taught a portion of the USTA Separations Classes.

From 1993 to the present, I have been assigned to the Sprint/United Management Company Regulatory Staff. The departmental focus was changed last year from support of the Local Telephone Division to support of all corporate entities.

From 1993 to 1994, I was Manager - Separations with responsibility for the merger of the Centel and Sprint separations functions and various other costing and monitoring activities. Since 1994, I have been in my current position with various responsibilities including analysis and modeling of costing issues, such as LIDB and 800, broadband implementation, local loop, and the development of the Benchmark Costing Models sponsored by Sprint Corporation and others. I have co-authored each of the Benchmark Cost Models including Benchmark Cost Model (BCM) versions 1 and 2, Benchmark Cost Proxy Model (BCPM) versions 2, 2.5, 3.0 and 3.1 and a Sprint Loop Cost Model (SLCM). I currently manage a group responsible for all loop costing and modeling.

I was also a charter member of the Telecommunications Industries Analysis Project (TIAP) (currently sponsored by the University of Florida) industry team. As a member of that team, I helped to develop the TIAP Broadband Model and participated in the writing of numerous TIAP papers on current telecommunications issues.

Q. Have you testified previously before state regulatory commissions or appeared before the FCC Commissioners and Staff?

A. Yes, I have testified before this Commission and the Commissions in Florida, Kansas, Missouri, Nevada, New Jersey, North Carolina, Oregon, Pennsylvania, Texas, Virginia, and Washington and have presented numerous cost modeling NARUC and Commission workshops on and off the record in states all across the nation. In the Federal arena, I have presented many workshops and exparte presentations to the FCC Commissioners and their staffs. I participated in weekly workshops with the FCC Common Carrier Bureau Staff during the development and selection of an interstate USF cost model.

Q. Did you provide testimony in this case earlier?

A. Yes. I presented Sprint's positions in this docket related to loop conditioning charges. It is my understanding that the Commission did not grant rehearing on that issue.

PURPOSE

Q. What is the purpose of your testimony here?

A. My testimony will demonstrate to the Commission that access to the network created by the Project Pronto upgrades is technically feasible and will not create the exaggerated costs Ameritech has proposed. My testimony demonstrates that Ameritech's claims of additional NGDLC equipment costs and inefficiencies for collocation of line cards in the Project Pronto equipment are highly exaggerated and when properly examined either do not exist or are within reason for a multiple provider local network environment.

To understand the correct nature of any Project Pronto expenditures, it must be recognized that these expenditures are a continuation of a normal upgrade of the Ameritech local network that has been in progress for a number of years. The efficiencies and capabilities incorporated are an inherent part of normal technology upgrades that must be available for use by competitive LECs. Costs related to collocation, network efficiency improvements, and expanded services, *if any and particularly if market driven*, are also part of the normal network upgrade/expansion costs. CLECs should not be denied access to Ameritech's loop network simply because normal network expansion may be necessary to accommodate customer demand. The development of appropriate TELRIC rates for use of capacity in Ameritech's network is the answer; not denial of access to the incumbent's loop network.

Q. How is your testimony organized.

A. First, I will demonstrate how the Project Pronto investments undertaken by Ameritech are more properly characterized as a network evolution or upgrade rather than an overlay as portrayed by Ameritech.

Next, I will address the two key unbundled network element (UNEs) identified in the Commission's Order that Ameritech witness Keown claims would have "a significant impact on the capacity and utilization of Project

Pronto NGDLCs and would add significant capital costs to deployment of Project Pronto equipment".[1]

Finally, I will address several of Commissioner's Squires questions.

PROJECT PRONTO IS A NETWORK UPGRADE

Q. Mr. Keown presents a description of Project Pronto that becomes his basis for the justification of large additional costs related to the collocation of line cards. He characterizes Project Pronto as an "overlay network" on page 4 of his testimony. Is Project Pronto correctly characterized as a separate broadband overlay?

A. No. It is not. First of all it is an upgrade of their network to fully implement the Carrier Serving Area (CSA) design. An integral part of any CSA design is the presence of a remote terminal within the CSA that allows the copper portion of the loop to be limited to 12 kilofeet (kft).

Q. Is this unique to the Project Pronto network?

A. No. CSA design was introduced in the mid 1980's to take advantage of reduced electronics costs that provided an economic alternative to a copper loop. It also was the first loop design criteria specifically designed to provide a higher bandwidth for enhanced services to every customer.

[1] Keown Direct on Rehearing, p. 11.

In the early 1970's, analog carrier became an alternative to copper reinforcement. Vendors produced single and multi-channel carrier that could "ride" existing copper loops to add subscriber pairs. Six and eight channel systems were popular. T1 carrier was present but too costly to replace copper.

As costs of these systems began to decline, it became economical to use these carriers to serve small areas including some loop backfeeding. The concept of planning service areas started to take place. As these plans developed, costs of carrier including the T1 systems were dropping to the point that larger serving areas now using T1 for subscriber loops was economical. By 1987, Bellcore had produced Technical Reference TR-TSY-000057. It was revised in 1988. This reference presented CSA design guidelines that were recommended for use by Network Planners to increase the capacity of every subscriber loop to 56kilobits (kbps) per second. This would allow for the implementation of 56kbps based services and basic ISDN. In section 3.1.3. of T1E1.4/98-002, is found "The concept of Carrier Serving Area (CSA) engineering guidelines was originally developed in the early 1980's to support 56 kb/s Digital Data Service (DDS) delivery to customers served by DLC systems. The concept was then revised very slightly and has been used as the guide for voice grade special services and POTS deployment from the DLC remote terminal."

CSA design included the use of a remote terminal (RT) within the CSA that was connected by carrier to a Central Office Carrier Terminal (COT). This would make all loops appear to the CO switch as if they were within the 12kft limit and giving every customer access to higher speed data. Later in 1988, Bellcore issued document T1E1.4/88-144 that presented several issues needing resolution prior to implementation "of a high rate DSL transmission" - one of which was the new CSA concept into any improved speed services. By the early 1990's, CSA design was an integral part of exchange planning[2].

In the T1E1.4 workgroup minutes of their July 25-28, 1988 meetings you find participation of Alcatel and Ameritech in support of a "high rate DSL project" which Ameritech stated should not be limited "to any bit rate or hierarchy".

In 1992 and 1993, technical discussions were well underway for the implementation of ADSL standards. In a March meeting of the T1E1.4 workgroup, Tom Starr of Ameritech presented a document to the workgroup[3] that included the following statements:

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2 See, for example, the AT&T Outside Plant Engineering Handbook dated 1994.
3 T1E1.4/93-015.

1. "The objective loop range of the ADSL should be all Carrier Serving Area (CSA) loops."
2. "The ADSL is planned to provide local access for Video Dial Tone (VDT) and work-at-home services."
3. "By 1995 Ameritech fiber deployments are expected to result in approximately 90% of copper loops being within CSA loop reach of a Central Office, active carrier system, or a fiber site where a carrier system could be quickly deployed."

Activities identical to a large portion of Project Pronto were obviously underway in the early 1990's. Based on Ameritech's main investor briefing document on Project Pronto[4], project funds include $4.5 billion that "will be directed toward improvements to the basic local loop infrastructure (i.e., fiber feeder and next-generation remote terminals)." This is precisely the same activities that were occurring throughout the 1990's. The briefing also stated[5] that the $4.5 billion will "initially extend the reach of broadband capability to more than 80 percent of its customer base. SBC estimates that this deployment will immediately enable at least 60 percent of its broadband customers to have guaranteed download speeds of six megabits per second (Mbps)."[6] The full CSA design for this

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4 "SBC Announces Sweeping Broadband Initiative", Investor Briefing No. 211, October 18th, 1999, (Investor Briefing), p 2. http://www.sbc.com/Investor/Financial/Earning_Info/docs/IB211.pdf., See JRB-2.

5 Investor Briefing, Page 4.

6 Investor Briefing, Pages 5-6.

60 percent of the 80 percent is absolutely inherent in this statement. That speed cannot be "guaranteed" unless the loop is CSA designed or better.

From the other $1.8 billion portion of Project Pronto expenditures, we see 25 percent being targeted to "upgrading a significant number of copper-based DS1s to new, lower cost fiber facilities. Another 25 percent will be targeted for moving existing voice lines to new fiber-fed remotes. The remaining 10 percent will be targeted for upgrading the overall condition of the network."[7] This equates to expenditures of $450 million for DS-1 conversion, $450 million for movement of existing customers to the new fiber-based remotes, and $180 million for network upgrading. This is a total of $1.08 Billion for additional network upgrades for existing customers to use the new fiber and electronics. Project Pronto <u>does</u> upgrade the outside plant facilities for current voice and data customers in addition to any ADSL implementation. Again, this outside plant upgrade is the same type of work performed in the early 1990's and forward. Competition has merely sped up the upgrading of the network capability.

Q. How do the Project Pronto DLC changes compare to prior network upgrades.

A. DLCs have always been a part of the CSA design. Digital carrier, that was initially T1, carried signals between the RT and the COT. Appropriate service specific line cards were placed at both ends of the circuit. A copper jumper or tie cable carried the electrical signal for each service to its CO destination. Each service had its designated time slot(s) in the carrier signal. DLC implementation provided a significant economic advantage versus copper when doing planning for longer loops including 56kb, ISDN BRI, and DSL loops.

Switch electronics evolved to allow the COT or even the RT to directly connect voice grade services to the switch at a DS1 level using DS1 interfaces in the switch and COT instead of the cost of a switch line card and COT line card per loop. Non-switched services still required individual cards in the COT.

Q. What are the next generation DLCs (NGDLCs) and how do they impact the network?

A. The NGDLC have moved away from the older T1 signaling that assigned a fixed number of bits and position in the 1.544mb bit stream. Because this tied up bandwidth even when the circuits were idle, a statistical sampling process was developed where idle channels no longer used bit positions but released their time slots for use by the active channels. A large portion of our current user data transmissions is sporadic or clustered. This lends itself to the newer packetized signaling of ATM and

[7] Investor Briefing, Pages 6-7.

SONET on fiber. NGDLCs take advantage of this increased data throughput to increase the overall efficiency of the RT to COT data transport capacity. The voice transmission path remains a Time Division Multiplexed (TDM) signal. The TDM architecture in the voice OC-3 is the very same as that of the original T1 – merely faster.

The Alcatel Litespan Planning Guide, JDD-1[8] very clearly delineates the TDM versus ATM usage. Section 2 on page 1 reads ***

*** (Emphasis added.)

The entire industry is moving forward every year to take advantage of these new economies and capacities. Forty percent of the $1.8 billion in Project Pronto ($720 million) is targeted to provide "Voice Trunking Over ATM or VTOA."[9] Since data traffic, for example, for Internet access is usually trunked to another facility via a high speed circuit to an ISP, it also became more efficient to allow packet traffic to connect directly to a traffic

[8] Confidential, Alcatel Litespan Integrated ADSL/G.SHDSL *Planning Guide*, *April 2001* (Planning Guide).

router with ATM trunks. This would eliminate the requirement for individual circuit COT line cards and allow them to be replaced with OC3 direct connections.

These changes are but another upgrade in the Ameritech network that parallels industry and equipment development trends. It is being applied to the voice network as a service upgrade to improve efficiencies and reduce cost while more rapidly making available enhanced service capability. Many of these network enhancements were being incorporated prior to the advent of Project Pronto. Data received by the Competitive Local Exchange Carriers (CLECS) in response to their Data Request Number 1 to Ameritech[10] shows that there are Project Pronto dollars being expended on *** *** RTs during 2000 and 2001. Of this number, *** *** or *** *** are retrofit or upgrades to existing sites. Of the dollars expended on RTs however, only *** *** is assigned to the retrofits and upgrades. Obviously, many of the RT locations were at or close to broadband ready prior to Project Pronto. Again we see that Project Pronto has only compressed the timing on a pattern of network upgrades to higher band services that was started years before.

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9 Investor Briefing, page 4.
10 DR Response 1-1.

Q. Are the Litespan 2000 and 2012 NGDLCs used to provide voice services in addition to xDSL service?

A. Mr. Keown states on page 6 of his testimony that Ameritech primarily intended to use the Alcatel Litespan 2000 and 2012 systems. Both of the Litespan 2000 and 2012 systems support up to 2,016 voice grade lines in addition to ADSL capabilities. In fact, before Project Pronto and before the Litespan 2012 OC-12 optics and ADSL channel cards became commercially available, the Litespan 2000 Alcatel NGDLC was being used throughout the industry for fiber served NGDLC upgrades of the 2 wire voice loop plant. It was an integral part of many LECs CSA implementation. Use of the Litespan 2000 was sufficiently prevalent among all of the larger LECs that it became one of two systems used in the Large NGDLC design and cost inputs in the forward-looking BCM and BCPM voice grade USF national cost modeling. The Litespan 2000 voice over fiber capabilities and costs were still an integral part of the latest BCPM version 3.1 that was adopted by a number of states for forward-looking loop cost modeling.

The Litespan voice circuits ride a Time Division Multiplexed (TDM) OC-3 while the ADSL rides one or more OC-3s. Alcatel confirms this in its practices, presentations, and its October 12, 2000 comments filed with the FCC that have been made a part of this proceeding. Witness Ireland confirms Pronto expenditures for voice service enhancements.[11] Ameritech's response to DR 1-1 shows a table of central office locations with *** *** of the RTs equipped with integrated voice capability. Tab 8.5 of the broadband cost study included as Schedule CM-1 shows the Litespan 2000 system equipped for *** *** voice grade lines and *** *** ADSL lines. The study uses a *** *** allocator of common equipment to ADSL services – the balance being voice service. Thus, even the "new" NGDLC RT system dollars being spent under Project Pronto are attributed *** *** to POTS voice service. The percent of COT NGDLC dollars attributed to voice grade will be even higher since the COT hands off ADSL traffic at the OC-3 level while voice POTS traffic must be multiplexed down to a DS-1 card level for switch integration.

Q. What are the implications of the foregoing discussion if, as you have demonstrated, Project Pronto is more properly considered a general network upgrade rather than an overlay?

A. My testimony has placed the Project Pronto network upgrade into proper perspective from an engineering and cost standpoint. The Project Pronto network is merely a continuation of technology implemented in the 1980's to efficiently engineer local telephone networks. Many of the dollars being spent by SBC/Ameritech on Project Pronto are for voice service enhancements. Project Pronto is not an overlay network; it is an

[11] Ireland Direct on Rehearing, P. 6, f.n. 1.

integration of network elements used to efficiently carry data into the existing CSA design concepts introduced in the 1980's. The addition of ATM trunking between the CO and the NGDLC RT is also just another efficiency improvement over TDM to handle the burstiness of the data traffic. Sprint witnesses Jim Burt and Brian Staihr will address Ameritech's claims that it should not unbundle its loop network.

<u>AMERITECHS CLAIMED COSTS ARE OVERSTATED</u>

Q. From a network engineering perspective, Ameritech witness Keown identifies two of the UNEs ordered by the Commission as having an "adverse impact". Please identify those UNEs.

A. On page 11 of his testimony, witness Keown identifies the UNEs as:

- i. The lit fiber consisting of PVCs and PVPs.
- ii. The ADLU cards owned by the CLEC and "collocated" in Ameritech Illinois's NGDLC equipment at the RT;
- iii. Combinations of the above.

These two UNEs are the primary drivers of the $519 million in costs claimed by Ameritech. I will address each of these UNEs below and demonstrate that Ameritech's claimed costs are highly exaggerated.

Q. Please comment on Mr. Keown's statement beginning on page 8, line 12 of his Direct Testimony that states "Each of the three Channel

Banks in an NGDLC that can provide ADSL service is assigned to a single PVP."

A. While the single PVP per channel bank (CBA), or VPC as Alcatel refers to it, may have been correct for versions 10.x of the NGDLC software, release version 11 that is pending allows for multiple PVPs per CBA.[12]***

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[12] See Alcatel Supplemental Response to Eighth Set of Discovery Requests. ("Alcatel Response") Alcatel claims that Software Release 11 will be available for customer laboratory testing on or about *** ***

[13] Litespan-DSL, ATM/DSL Feature Roadmap, JDD-5, page 27 (Roadmap). See Alcatel Response, pp. 4-5.

Q. How does this impact Mr. Keown's testimony and exhibits?

A. First, his contentions that any use of a PVP causing a channel bank to no longer provide other services is not valid after multiple PVPs are available. Multiple PVPs can be assigned to a channel bank with version 11 of the software. The daisy chain of three channel banks may also be broken to allow fewer than three to be assigned to a single OC-3c. In fact, the optical provisions of the 2012 system assume one OC-3 for voice services and up to the remaining three OC-3s on the OC-12 to be for data[14]. The Litespan 2012 still has only three channel banks available for ADSL so each channel bank theoretically could be assigned a unique OC-3c.

Whole system additions including the placement of new NGDLCs as a result of PVP requests as Mr. Keown contends on page 14 of his testimony are not necessary. The only implication of the greater bandwidth demanded is optical capacity on the fiber. Customer demand for bandwidth is a rapidly growing area of overall service demand. Network expansions for additional bandwidth on the fiber facilities are nothing more than new demand growth. Were the same end user demands to be directly placed on Ameritech and not through a CLEC, the same bandwidth requirements would be present.

[14] Planning Guide, Section 3.2. Remote Terminal Deployment, Page 7.

Q. Is Sprint requesting individual PVPs as UNEs from Ameritech before multiple PVPs per channel bank are available?

A. As of the date of this testimony, Sprint does not need access to individual PVPs. Instead, Sprint desires multiple **PVCs** per customer with enhanced Variable Bit Rate (VBR) capability. The ADLU cards installed by Ameritech do not have that capability. That is why Sprint wishes to pursue different but compatible cards for the NGDLCs.

Putting aside Sprint's immediate needs as we know of them at this time, Sprint deems it reasonable that CLECs not obtain access to a PVP until it is possible to access multiple PVPs per channel bank. This arrangement eliminates much of Ameritech's claimed costs in implementing the Commission's Order.

Q. Do you have other concerns with Mr. Keown's PVP cost analysis?

A. Yes. Not only should there not be any costs assigned for PVP, but the contention that system expansion would require expenditures of $519 million for new investment is highly exaggerated and factually wrong. In fact, Mr. Keown provides no direct support for the *** *** per RT and *** *** per central office numbers presented on page 14 of his testimony.

The average costs from the initial round of Project Pronto expenditures are not at all applicable. In the first $519 million for Project Pronto are expenditures for items that will not recur, even if as Mr. Keown suggests, additional systems were required. Fiber and its placement[15], conduit[16], cutover of existing voice or DS-1 circuits to fiber, and upgrading of existing loop plant to fully implement CSA design will not recur but were included in the $519 Million (see earlier comments above). Since the addition of a PVP does NOT change any working line counts - either voice or ADSL, no line cards, CO line/switch integration costs or frame additions[17] are required but were also included in the $519 Million. Small power additions may be necessary solely for the OC-3 and OCD additions but if they occur should not begin to approach even the $6.6 million Ameritech had for 2001[18]. The power load for a fully equipped set of common equipment and one channel bank in a COT is approximately 10 amps. Optics are only a fraction of that load. Expenditures are limited solely to additional RT and COT optics and possible optical concentration device (OCD) expansion. Tab 8.4 of response 1-6 of the CLEC data request shows an average OCD cost per RT OC-3 terminated of *** ***. The $519 Million supported by the Ameritech witnesses is completely unreasonable and will not occur at all. Any bandwidth additions for optics are demand driven and a normal part of business growth. Unless Ameritech chooses not to meet expanded bandwidth customer demands, it must add the

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15 DR Response 1-1 shows *** *** in 2000 & ***$ *** in 2001.
16 DR Response 1-1 shows *** *** in 2000 & ***$ *** in 2001.
17 DR Response 1-1 shows ***$ *** for 2001.
18 DR Response 1-1.

additional bandwidth regardless of who serves the customer. Any of such costs should be a function of service growth regardless of carrier and is not applicable to collocation costs. Ameritech's $519 million costs attributed to collocation and PVP issues, with the one exception of a cross-connect change or addition at the RT related to card slot efficiency that I discuss later, should be correctly set at zero

The need for bandwidth expansion will occur to meet customer demand whether the customer requests it through a CLEC or Ameritech. If customers request expanded bandwidth products through a CLEC, Ameritech must be responsive to that demand whether or not it or the CLEC directly serve that customer.

Potential bandwidth expansion to meet customer demand does NOT require a fully equipped voice plus ADSL new RT/COT system addition for every PVP. RTs and COTs can take advantage of expanded optics with wave division multiplexing (WDM) with a Litespan 2000 or the upgraded OC-12 electronics in the Litespan 2012. Optics are relatively inexpensive. Sprint material costs for a complete redundant set of OC-12 optics for the Litespan is approximately *** ***. Each redundant OC-3 broadband circuit on the OC-12 adds approximately *** ***. Given SBC's purchasing power with 60 million access lines, it would likely get these units at even lower prices. Since both systems are provisioned in the same equipment cabinet, optical and/or common equipment retrofitting is possible. Smaller cabinets are also available for attachment to or collocation with the 2016 cabinet for expanded optical unit space The Investor Briefing[19] shows Project Pronto funds used for transfer of existing DS-1 customers that are on copper facilities to fiber "at a significant number of locations". No NGDLC capacity is shown for these DS-1s, however, in any of the Ameritech documentation. For example in DR Response 1-6[19], the Broadband Cost Study, there are line cards for Voice and ADSL that fill the NGDLC cabinet to capacity. Any DS-1 capacity must therefore be outside of the NGDLC. Therefore some additional lit fiber capacity with its associated optical electronics must have been envisioned in Project Pronto funding in addition to that of the NGDLCs.

Q. Mr. Keown has also alleged inefficiencies caused by collocation of line cards. Do you have comments in this regard?

A. I have a number of concerns with this issue. The assumptions utilized are not realistic and cause exaggerated results. They assume that each CLEC can only capture <u>one</u> customer per SAI and therefore leave 75% of the card capacity vacant. In fact, each CLEC could just as easily have three or all four occupied.

The second assumption used by Ameritech that dramatically increases the costs is Ameritech's plans to have every card wired to only one SAI. This

[19] Investor Briefing, JBB-2, Page 6.

is an option over which Ameritech has full control and could change. The channel banks and card slots are cabled to protectors in the side of the NGDLC cabinet. Determining which cable pair from each SAI is terminated on which protector and therefore on which card is solely at the discretion of Ameritech. As illustrated in Exhibit JDD-4, the SAI pairs could just as easily have been connected to allow the appearance of four different SAIs on the four circuits of the ADLU card. Ameritech's installation wiring choice of one SAI per line card creates the inefficiency – not the CLEC. The assumptions fail to recognize another important fact. What is completely ignored is the fact that because of its one SAI per card choice and no cross-connect at the RT[20], Ameritech will also have an equal propensity for a partially filled card for each SAI served by that RT. Were Ameritech to wire a portion of its SAI cable/protector combinations differently, it could eliminate the vacant card concerns except for one possible partial card per carrier. That last card would have an equal likelihood of having one, two, three, or four circuits occupied at any one time. *Each CLEC and Ameritech would possibly have one partial card per RT.* One partial card for each carrier is the only additional cost that is applicable to plant facilities in this proceeding.

One last point must be considered. The card formula assumptions are totally unreasonable and inefficient. The assumption of only one SAI

[20] Keown Exhibit 1-4, Assumption 7.

available for the four circuits of an ADSL card is not necessary. Ameritech failed to consider first that the protector area of the RT cabinet can have any SAI pair connected to any protector eliminating all card inefficiencies. As a second alternative, placement of a cross-connect device with permanent or semi-permanent jumpers at the RT could also provide total pair to protector flexibility. This device would be accessed exclusively for the initial wiring setup and any subsequent pair/protector realignments that Ameritech chooses to ensure efficient card usage. Since the hardware would be the equivalent cost of an SAI, it should be approximately *** ***[21]. This would maximize efficiency yet is an extremely small fraction of the cost that Ameritech states would occur with an entire new RT/COT combination.

A compounding of unreasonable or unlikely assumptions in Mr. Keown's calculations in Attachment JEK-4 lead to such extremely worst case results that the likelihood of these results occurring in this competitive environment is almost nonexistent. The assumptions that are out of reasonable range are:

1. While Mr. Keown states that the number of CLECs will vary between 2 and 5, he assumes in his calculations that <u>5</u> CLECs will be present at ***<u>every</u>*** SAI throughout the Ameritech territory.

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[21] Sprint cost for installed 4200 pair (in + out). DR Response 1-1, Cost per unit of new SAIs placed is shown at ***$ ***. Allowing for increase in size to 4200, ***$ *** is also

2. Each CLEC can only capture *<u>one</u>* ADSL customer per SAI
3. Each ADSL card can only be wired to one SAI
4. No cross-connect facility will exist at the NGDLC
5. 50% of the CLEC demand is PVP based and 50% is card based.
6. If a second card type becomes available such as g.SHDSL, assumptions 1,2, and 3 above will repeat for that second service card type.

In summary, Ameritech presents the whole new NGDLC installation as the <u>only</u> alternative for increasing capacity if CLECs or Ameritech use the capacity of the existing NGDLCs. This is unreasonable and not cost effective in my viewpoint. Ameritech ignores less costly alternatives such as a collocated cross connect or NGDLC cabinet SAI/protector splicing choices. The assumptions used to calculate the cost of collocation are unreasonable. Thus, Ameritech's contention that a complete new NGDLC system is required is totally unreasonable, as are the costs that accompany the assumption.

Q. Will this not create a record issue for tracking of cards and cabling?

A. There is no issue beyond that which Ameritech must face with or without a CLEC presence. Because the wiring of SAI pair to a specific card and channel is fully discretionary, Ameritech must set up a card and pair

reasonable for Ameritech.

record scheme to tell a craftsman what channel unit associates with what pair. This scheme could be standardized even with multiple SAI appearances on one card. It would not be difficult, for example at all RTs, to have all cards on shelf one of ADSL bank three all wired to four SAIs per card and terminated on the last or highest pair counts in the respective SAIs. Unless every card is populated in all nine of the RT channel banks, records must also show what card slots are populated to know what corresponding SAI pairs, using the pair/card connection records, are available for service.

QUESTIONS FROM COMMISSIONER SQUIRES

Q. Will you address any of Commissioner Squires' questions?

A. I will address questions 6A, 7, 8, 9B, 10, and 11.

Q6.A. Can and/or should the Commission treat ADLU cards as part of the loop for unbundling purposes?

A. Yes. The loop is a major portion of the end-to-end facilities Sprint must utilized to connect its customers to the network. The loop extends from the Main Distribution Frame (MDF) to the Network Interface Device (NID) at the customer premises. As illustrated in Exhibit JDD-2, when a voice grade loop is provisioned with fiber-fed NGDLC equipment, the loop extends from the NID through the drop and distribution cable to the SAI. From the SAI, it goes by copper feeder cable to the field side of the

NGDLC. Moving through the NGDLC, it goes from the protector blocks through cabling and the channel bank to its assigned line card then back through the channel bank wiring to the multiplexer and on to the fiber. The loop follows a fiber feeder cable into the central office to the fiber inputs in the COT. There it travels back down through a multiplexer and the channel bank wiring into either a voice channel unit or, if integrated into the switch, into a DS-1 channel unit and on to the MDF.

Most other service types, for example ISDN and DDS, follow exactly the same path but use a different channel unit. (See discussion on page on page 12-3 and footnote 7 of my testimony). The voice portion of a voice plus ADSL loop follows the same path into the RT ADSL channel unit, is then passed through a splitter on the ADSL card. Depending on the ADSL card version, the voice then routes out voice ports on the ADSL card, is jumpered to a POTS card and follows the balance of the standard POTS path or is passed to a "daughter" circuit board attached to the ADSL card and routed out of the channel bank on the standard POTS path to the MDF. All circuit paths described thus far use like channel units in the RT and COT as *an integral part of the feeder portion of the loop*.

ADSL and SHDSL would also be provisioned the same way except are routed at the remote channel bank onto the ATM bus and out the ATM fiber feeder to the COT and there from the ATM bus through the line card to a copper termination on the MDF or point of connection. With the exception that the ADSL rides a different OC-3 using ATM instead of the OC-3 with TDM, the use of the loop components is the still the same. The line card is still an integral portion of the loop.

Because most carriers whether CLEC or ILEC are using or moving toward ATM based trunking, the fiber feeder termination can be transferred from the COT termination to an OCD that aggregates traffic. The fiber feeder then terminates on the OCD or a fiber distribution frame (FDF) and passed to the OCD. Although this transfer is made, all facilities from the OCD or FDF to the NID are exactly the same and are a part of the loop. No matter what service is provided, the RT, the common equipment, and the <u>line card</u> are an integral portion of the loop.

As Sprint witness James R. Burt explains, Sprint is seeking an end-to-end facility solution that meets its customers' service requests. If end-to-end loop facilities were available from Ameritech that meet those customer requirements, Sprint would merely request that loop type for its use. Where an end-to-end solution is not available, Sprint must seek out the facility elements or sub-elements that when combined meet the requirements. The capability of the line card used in the RT is a major controller of the loop overall capability. If line card capability must be changed to meet customer loop criteria, Sprint must be able to make that substitution (subject to the vendor compatibility I discussed earlier).

Q. Please comment on the following regarding the line card compatibility:

Q7.i.) Is it possible for a CLEC to enter into a partnership with Alcatel or a licensing arrangement with a third-party to engineer different flavors of DSL cards than what Ameritech-Illinois chooses to deploy?

A7.i.) Sprint believes an arrangement for alternative cards can be made with Alcatel as a Sprint partner or licensee of other manufacturer cards that are Litespan compatible and acceptable to Alcatel for deployment. Alcatel currently has licensing arrangements, for example, for 2 wire DDS and AHDSL cards that are supplied through other vendors[22].

Sprint believes that it must be able to place cards manufactured by Alcatel or licensed by Alcatel that meet customer requests for service that may be different than those of Ameritech. As I stated earlier, Sprint specifically on its customers' behalf needs to have ADSL card capabilities that include classes of service for VBR, similar to those available in current DSLAMs. The current ADLU card only offers Constant Bit Rate (CBR) and Unspecified Bit Rate

[22] Alcatel Practice OSP 363-305-260, Litespan Access Platform, Channel Unit Descriptions, Issue 3, February 2001.

(UBR). If Alcatel were to offer cards with these additional classes of service either from its own product development or through a licensing arrangement, Sprint would want to have the card capabilities in place even if Ameritech chose not to offer the additional classes of service. Any card type requested by a customer that through partnership arrangements or licensing is acceptable to Alcatel should be available for installation in Litespan 2000 or 2012 system channel banks.

Q7.ii.) Are there any established industry standards governing line card interchangeability?

A7.ii.) The work on interchangeability/interoperability is being done by the T1E1.4 workgroup and the Network Reliability and Interoperability Council (NRIC Charter V). They establish the standards for each interface that manufacturers are to meet.

Although work of this type is in progress, it is a moot point in that Sprint is not asking to place cards incompatible or unacceptable to Alcatel or other system vendors. Sprint wishes to insure it is able to have deployment capability of any Alcatel developed, licensed, or approved card as soon as it is commercially available. Sprint must be able to be responsive to its customers with the latest card controlled service offerings even if Ameritech is not ready or chooses not to deploy those cards.

Q8.A. Describe in detail every technically feasible point of interconnection or access to sub-components within the NGDLC Ameritech-Illinois is deploying?

A8.A. As explained in the testimony of Sprint Witness Mr. Burt, Sprint wishes first to have an end-to-end solution that offers all of the options or "flavors" of loops to meet customer demands whether it be different types of services such as xDSL or different classes of service within a type such as ADSL with CBR or VBR in addition to any UBR.

Lacking the full "menu" of an end-to-end loop, Sprint must be able to build the piece parts it needs for competitive customer responses. This would include:

- DS-3 or OC-3 ports on the OCD to terminate DSLAM fiber traffic.
- Access to the fiber at the NGDLC remote location to terminate either internally or adjacently collocated DSLAMs
- Access to the copper on the field side of the NGDLC
- Access to both the fiber and copper portion of the loop with the appropriate and compatible channel unit in the NGDLC channel bank

- Access to the copper at the NGDLC through an ECS if efficient SAI/RT splicing is not completed on the NGDLC protectors
- Access to cards placed in the NGDLC
- Access at the SAI
- Access at the NID

Sub-elements that connect any two of these points should be available for use by the CLEC. For example, if a CLEC collocates at an NGDLC RT, it should be able to secure a fiber facility from its collocated equipment to the OCD or its cage as well as the copper portion of the loop from the RT to the NID.

Q8.B. Is it technically feasible to cross-connect from the central office fiber distribution frame to a CLEC-collocated ATM switch, thereby allowing a CLEC to bypass the Ameritech-Illinois-owned OCD port? Are there any other technically feasible ways to bypass the ILEC packet switching function?

A8.B. Under very limited circumstances it is technically feasible to bypass the OCD. Sufficient individual CLEC traffic load must be present to justify a separate OC-3c. It can originate from heavy use of an Ameritech channel bank or banks not chained to other Ameritech banks or CLEC internally collocated channel banks or a DSLAM that use the fiber capacity from the RT to the fiber distribution frame. A non-shared OC-3c from the RT can be taken directly to a CLEC collocation area.

Q8.C. If Ameritech-Illinois has hard-wired various components of the NGDLC together, please comment on how a CLEC, with collocated stand-alone equipment inside the remote terminal, would access individual copper pairs where NGDLC has been deployed?

A8.C. The existing Alcatel channel banks each contain cables wired to the backplane of the bank that terminate on protectors in the cabinet side. SAI cable pairs are wired to these protectors. The fiber from the channel bank "daisy chains" with the other two ADSL channel banks into a single OC-3c. Were a CLEC to place its own Alcatel equipment in the RT cabinet there would be no difference in connection unless the channel bank was assigned its own OC-3c and not to a daisy-chain. If the CLEC chose to collocate a DSLAM unit, as illustrated in Exhibit JDD-3, it would normally occupy a channel bank position in the cabinet. Its fiber would connect to the CO fibers and its backplane to its own protector pairs and onto the SAI cable stub similar to the Alcatel bank. Effectively the points of interconnection become the protectors and the fiber connectors.

Q9.B. Would any of Ameritech-Illinois' claims of increased costs be valid absent a virtual collocation requirement for line cards? If so, please explain.

A9.B. Ameritech's claims of additional costs absent the line cards are not valid at all. As I stated earlier in this testimony, Alcatel early this year presented plans for version 11 of the Litespan 2000/2012 software that will allow multiple PVPs per channel bank. ***

***.[23]

Q10. Please comment on the technically feasible techniques for expanding fiber capacity between the central office and the remote terminal. Does Ameritech-Illinois have plans to utilize these techniques when additional capacity is needed?

A10. I believe the relevant response deals primarily with the correct optics and not with an increase of the number of fibers. Fiber capacity is only limited by the optics placed on the ends of the fiber. All Litespan 2000 channel banks multiplex up to OC-3 and in the 2012 multiplex up to OC-12. Should additional optical capacity be needed at the RT location, a number of technically feasible options based on additional OC-3s or OC –3cs are available. Some of the options are:

- The current Litespan 2000 RT OC-3/WDM optics can be upgraded to the OC-12 of the Litespan 2012. (Both systems use the same cabinet for like size systems.)

[23] Roadmap, Page 27.

- An additional fiber pair can be activated from the RT to the CO and any optics meeting the combined bandwidth demands can be placed in the CO and at the RT. If the optics do not have space available in the NGDLC, a very small cabinet such as used for a DSLAM or the smallest RT size (maximum capacity of one CBA) can be used to house the optics immediately adjacent to the RT. DR Response 1-1 shows sufficient capacity in fiber sizes (up to 576 fibers per sheath) being placed under Project Pronto to allow for expansion.
- The least efficient option is that of installing another full Litespan 2000 system cabinet and common equipment to power up additional dual OC-3 optics which then ride a new fiber path using WDM.

Q11. Please describe in detail the possibility of crosstalk or interference problems that could occur due to intermingling copper facilities with the NGDLC facilities of Ameritech-Illinois? Please provide specific and verifiable information and/or examples if possible. Will any standards setting body be addressing the issue? Are the rules established in C.F.R. 47 Part 51.233 sufficient to address the possibility of NGDLC-caused interference should it occur?

A11. Crosstalk or interference generally exists when one signal in a nearby facility is powerful enough to overpower the signal being measured.

Signals are always strongest immediately adjacent to the transmitter. One of the major crosstalk issues being addressed by standards bodies occurs in the distribution cable when both an ADSL from a CO based DSLAM is in the same cable and near an ADSL pair from an RT. The signal level from the CO based DSLAM has been reduced due to the length of the copper feeder over which it has traveled to reach the distribution cable. The RT based signal does <u>not</u> have the same copper feeder distance to mitigate its level. Therefore there can be significant strength or power level differences between the two signals. It is easy for the RT signal to overpower its CO counterpart if the RT signal power levels are not controlled.

Numerous national and international standards bodies are actively addressing the ADSL interference issue as well as similar interference issues with VDSL and HDSL. The T1E1.4 workgroup of the T1 Committee and the Focus Group 3 of the Fifth Network Reliability and Interoperability Council (NRIC Charter V) are among the FCC sanctioned standards bodies working on the issue.

Numerous papers have been submitted to these bodies to weigh into any applicable standards. Testing has been conducted to determine the appropriate transmitter power levels for RT based circuits. Complicating the issue is the demand to extend the “reach” or distance over which

ADSL can travel and the corresponding higher power requirements with the need to minimize the interference potential.

Q. Please summarize your testimony.

A. As demonstrated in my testimony, Project Pronto is a normal evolution of Ameritech's network. In other words, a network upgrade to CSA design standards and not the network overlay as Ameritech suggests. The placement of DLCs in a network is part of routine planning. Ameritech documents even prove that in the early 1990s Ameritech implemented activities identical to a large portion of Project Pronto. It simply upgrades the current network to take advantage of the latest technological advancements for data services. CLECs should be able to obtain access to the data portions of the loop in the same manner that CLECs can access the voice portions.

The cost estimates of providing PVPs and collocating ADLU cards have been greatly exaggerated by Ameritech. Ameritech falsely claims that to provide CLECs access to the network, it must make all the upgrades completed for Project Pronto an additional time. These costs are inaccurate since they will have already been accounted for in the normal network upgrades or negated by the normal evolution of the equipment. Ameritech's analysis assumes an extreme situation that goes even beyond a worse case scenario. Sprint's primary intended use of the

Project Pronto UNE will be in an end-to-end manner if it can access all of the features of that loop (including quality of service classes). But as described in Mr. Burt's testimony, in order to ensure its ability to innovate retail services, Sprint also wishes to have the ability to collocate line cards of its choosing that are compatible with the equipment so as to provide Variable Bit Rate ADSL. The result of collocating line cards will not result in the exaggerated costs Ameritech claims as the incremental costs of adding bandwidth capacity are much more reasonable. An alternative, more efficient, wiring scheme will also result in lower costs.

In addition, to address the questions from Commissioner Squires, I point out that Sprint only wants the collocation of line cards that are manufactured by or licensed by Alcatel. This eliminates Dr. Ransom's concerns that CLECs desire to place cards in Alacatel's NGDLCs that will not work. Moreover, Sprint needs access to loop facilities that provide Sprint with the ability to reach expanded customer markets for the products that it seeks to offer in the same way Ameritech is with Project Pronto. By using the same sort of provisioning guidelines used today this could be done without incurring the exaggerated costs Ameritech claims. Collocation of line cards that are compatible with Alcatel equipment would both allow CLECs access and Ameritech access to loop facilities and keep the costs to down to a fiscally reasonable level.

Q. Does this conclude your testimony?

A. Yes.