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STATE OF ILLINOIS
ILLINOIS COMMERCE COMMISSION
DOCKET NO. 00-0393

DIRECT TESTIMONY ON REHEARING OF DR. NIEL RANSOM OF ALCATEL USA, INC.

Q. PLEASE STATE YOUR NAME AND BY WHOM YOU ARE EMPLOYED.

A. My name is Dr. Niel Ransom. I am a resident of Rolesville, North Carolina, employed as the Chief Technology Officer (CTO) for Alcatel USA, Incorporated. I am an authorized representative of Alcatel USA ("Alcatel").

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. I am filing this testimony in response to the Commission's March 14, 2001 Order in Docket No. 00-0393 ("Order"), particularly the requirements that Ameritech Illinois permit CLECs to designate and place their own line cards in Project Pronto facilities used for Digital Subscriber Line ("DSL") service, and provide many pieces of the Project Pronto network as "unbundled network elements." As I discuss, to the extent that Ameritech Illinois deploys Alcatel's Litespan 2000 Next Generation Digital Loop Carrier ("NGDLC") systems as part of Project Pronto, line cards from other manufacturers would not work in those systems and could threaten the reliability of service in those systems. I also address other technical issues that relate to Alcatel's equipment and the impact of the Commission's Order. Finally, I address Questions 6-8 of the list of questions posed by Commissioner Squires.

Q. WHAT IS ALCATEL'S INTEREST IN THIS PROCEEDING?

A. Alcatel builds next generation networks, delivering integrated end-to-end voice and data networking solutions to established and new carriers, as well as enterprises and consumers worldwide. Alcatel has been chosen as the primary vendor for the NGDLC systems that

Ameritech Illinois planned to deploy in Illinois. In addition, Alcatel is a vendor of NGDLC systems for Project Pronto in other states, and would like to be a provider of such equipment to other carriers as well. The Commission's Order, however, could threaten the ability of manufacturers of such equipment to compete on the merits of their technology, by effectively requiring some kind of "standardization" of equipment.

Q. HAVE YOU AND ALCATEL ADDRESSED THESE ISSUES AND CONCERNS IN OTHER FORUMS?

A. Yes. Alcatel filed comments with the Federal Communications Commission ("FCC") on October 12, 2000 regarding the FCC's Order on Reconsideration and Second Further Notice of Proposed Rulemaking in CC Docket No. 98-147 and Fifth Further Notice of Proposed Rulemaking in CC Docket No. 96-98. Alcatel also filed reply comments with the FCC on November 14, 2000 regarding the FCC's Second Further Notice of Proposed Rulemaking proceeding on Deployment of Wireline Services Offering Advanced Telecommunications Capability in CC Docket No. 98-147 and Implementation of Local Competition Provisions of the Telecommunications Act of 1997 in CC Docket No. 96-98. I have attached these FCC filings to this testimony as Schedules NR-1 and NR-2, respectively, and incorporate them into this testimony by reference.

Q. PLEASE SUMMARIZE THE FCC FILINGS YOU ARE INCORPORATING BY REFERENCE.

A. In the FCC filings, Alcatel commented on the use of foreign or non-authorized line cards (or "plug-ins") in Litespan® NGDLC systems. As Alcatel's FCC filings explain, it is **not** technically feasible to install line cards not manufactured or licensed by Alcatel in its systems. Furthermore, as is the case with other internal system components, it is not possible to directly access or interconnect with these line cards. Access is only possible

through the derived (or "virtual") facilities and service lines supported by the systems. Therefore, Alcatel believes that a line card should not be treated as a separate "unbundled network element," and neither physical nor virtual line card collocation is appropriate.

In our FCC filings, Alcatel noted a variety of reasons why it is **not** technically feasible to install line cards designed for other systems into our system, including, but not limited to the following: board and system physical hardware designs, powering requirements, thermal dissipation, software interoperability, and the use of restricted proprietary, copyright-protected intellectual property. If one were to attempt to place a line card designed for other systems in our system, the card in all likelihood would not physically fit correctly into the card guides nor interconnect properly with our backplane electrical pins. If, by chance, one were able to physically get another manufacturer's card plugged into the backplane, it would not inter-operate with our system and element management software, as would be required for service provisioning, surveillance and maintenance. If another manufacturer were to attempt to design a compatible line card for our system, installing it would void our system's warranties. There also is a very high probability that it would cause damage to the system and disrupt service. Developing a new line card to operate in Alcatel's or other manufacturers' systems requires detailed knowledge of the proprietary internal design of the system, and associated changes by the system's manufacturer to the software of the system's controller and element management system.

Q. WOULD CLEC OWNERSHIP OF LINE CARDS CAUSE ANY OTHER PROBLEMS?

A. Yes. As I noted above, it is **not** technically feasible to install line cards not manufactured or licensed by Alcatel in our systems. In addition, the channel bank assemblies (CBAs) in a

remote terminal are cabled directly to cable binder groups serving individual SAIs. As a result, when an ADLU line card is installed in a CBA, all of the lines supported by the card are cabled to the SAI. If the cards were individually owned, significant inefficiencies could arise, because unassigned lines on one CLEC's ADLU line card could not be used by other CLECs or by Ameritech Illinois. I further note that the Alcatel Litespan ADLU cards are combination cards, supporting both POTS and ADSL. Not only would ADSL efficiency be significantly reduced, but the system capacity for basic services would also be substantially decreased.

Q. DO LINE CARDS USED IN THE ALCATEL NGDLCs HAVE ANY FUNCTIONALITY OF THEIR OWN, AND ARE THEY ACCESSIBLE FOR "CONNECTION" WITH ANOTHER CARRIER'S NETWORK?

A. The answer to both questions is no. I should also point out that installation of the ADLU card itself does not establish service, nor are there any physical points of access on the cards for interconnection with other carriers. The system's software is needed to provision the card, monitor its call states, and perform other surveillance and maintenance functions. The software's Right to Use (the intellectual property right) has been licensed to and purchased by Ameritech Illinois. It cannot be modified or used by others. Thus, the only technically feasible points of service interconnection are at the OCD in the central office on one end and, at the other end, **beyond** the RT, at either the SAI (if the CLEC has its own connecting distribution facilities), or at the end-user customer NID.

Q. DO YOU ALSO HAVE CONCERNS REGARDING THE ORDER'S REQUIREMENT THAT AMERITECH ILLINOIS PROVIDE VARIOUS PIECES OF THE PRONTO DSL ARCHITECTURE AS "UNEs"?

A. Yes. Of first note is the Order's creation of the UNE "Lit Fiber Subloops between the RT and the OCD in the CO consisting of one or more PVPs (permanent virtual paths) and/or one or more PVCs (permanent virtual circuits) at the option of the CLEC." The Alcatel Litespan system that Ameritech Illinois had planned to deploy does not have the ability to provide this capability. The Litespan system terminates the ATM fiber on the system on a ATM Bank Control Unit ("ABCU"), which provides one PVP to its associated Channel Bank Assembly ("CBA"). All ADLU line cards that are plugged into that CBA must have **all** of their Permanent Virtual Circuits ("PVCs") provisioned to that one PVP. The PVP is carried through the ABCU over a single OC-3c fiber path to/from the OCD in the Pronto network architecture. Within a system using multiple CBAs to provide DSL service, each CBA has it own unique PVP. The CBAs are daisy chained, according to a proprietary internal format, to share the OC-3c fiber path between the RT and the OCD. If Ameritech Illinois were required to offer the Lit Fiber Subloop UNE at the PVP level, each CLEC would have to be given its own, dedicated CBA. This would drastically reduce the economic efficiencies compared to sharing CBAs.

Q. LET US NOW TURN TO THE QUESTIONS OF COMMISSIONER SQUIRES. QUESTION 6 STATES:

Line Card Collocation: **Considering that line cards are utilized by the current loop infrastructure of Ameritech-Illinois and are treated as part and parcel of the UNE loop,[1] please comment on the following:**

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

B) Is the above interpretation consistent with C.F.R. 47 Section 51.307(c)?[2]

C) C.F.R. 47 Section 51.319 provides for an exception to attached electronics for those electronics used for the provision of advanced services, such as Digital Subscriber Line Access Multiplexers. Does the ADLU card qualify for this exception?

WHAT IS YOUR RESPONSE?

A. Although I am not a lawyer, I will attempt to address parts (A) and (C) of Question 6. The answer to (A) is no and the answer to (C) is yes. Section 51.319 of the FCC's rules identifies the local loop as the transmission facility between a distribution frame and the loop demarcation point. It explicitly excludes the electronics for providing advanced services (that is, the DSL line circuits). The ADLU card contains the DSL line circuit and thus would be excluded from the definition of a local loop. In fact, the FCC has already determined that ADLU cards were "Advanced Services Equipment" in its Pronto Waiver Order (CC Docket No. 98-141, ASD File No. 99-49, released September 8, 2000, at 15).

In any case, the ADLU cards cannot be unbundled as part of the loop as they provide no clear demarcation point for unbundling. Instead, the ADLU cards are an integral part of the

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[1] For example, within its UNE cost studies, Ameritech includes the cost of line cards as an input to the UNE loop, identical to how it treats feeder and distribution cable.

[2] Section 51.307(c) requires an ILEC to provide all "features, functions, and capabilities" of a UNE "in a manner that allows the requesting telecommunications carrier to provide any telecommunications service that can be offered by means of that network element."

Alcatel Litespan 2000/2012 system. It is impossible to make use of the functionality of the ADLU cards themselves apart from the functionality of the rest of the Litespan system. The interface between the ADLU cards and the rest of the system is not an open interface but is rather a complex and proprietary design of Alcatel. The software operation of the system includes downloading software through the system controller into these cards to execute in concert with the software in the system controller. A "network element" for unbundling consideration, then, could be an individual line or circuit supported by the entire system, but not an individual component of the system.

Alcatel does not allow access to the internal buses of its Litespan 2000/2012 system and any attempt to install unapproved equipment would likely harm the operation of the system and would void the warranty of the system.

Q. QUESTION 7 STATES:

Line Card Compatibility: **Please comment on the following regarding line card compatibility: (i) is it possible for a CLEC to enter into a partnership with Alcatel or a licensing agreement with a third-party to engineer different flavors of DSL cards than what Ameritech-Illinois chooses to deploy? (ii) are there any established industry standards governing line card interchangeability?**

WHAT IS YOUR RESPONSE?

A. There are currently no industry standards governing line card interchangeability. Each switching system and each Digital Loop Carrier system of the various manufacturers utilizes unique designs of the line cards. These line cards differ in physical size, the types and sizes of connectors, the functions carried out on the card versus in the common equipment, the formats of signals and operations of the backplane buses, the system

control methods, the means of testing and operation, powering requirements, thermal dissipation, etc. Many of these design elements are proprietary to the given manufacturer, are typically implemented in custom-design ASICs (Application Specific Integrated Circuits), and are often protected by patents and copyrights of the manufacturer. The software running on the processor of the common equipment must be crafted to the unique operational characteristics of the various line cards used. Even for a given manufacturer, the design of the line cards often changes in dramatic ways from one generation of equipment to the next, as new technologies are introduced, and as the range of services demanded in the marketplace evolves.

For a given system and given manufacturer, developing an additional line card, say to introduce a new flavor of DSL, requires detailed knowledge of the system. In addition to the board design itself, this involves making appropriate software modifications in the common control of equipment. In addition, software modifications would be required to the Element Management System ("EMS") which controls provisioning, administration, surveillance, and maintenance of the system. This development must be done with knowledge of and in joint design with whatever other improvements and additions are being made, or are planned to be made, to the system. Careful regression testing is required to ensure that the introduction of this card does not cause mis-operation of other features of the system. For example, this includes testing to ensure that component layout of the board does not result in the new line card coupling signals into adjacent line cards.

It is for the above reasons that it is not possible for a new line card to be developed for a modern digital loop carrier system, such as the Alcatel Litespan system, except by the manufacturer of the system or in a licensing arrangement by another manufacturer working in close collaboration with the system's manufacturer. An example of this latter case is the Alcatel Access Partners Program (AAPP). The AAPP is a program under which Alcatel researches the benefits of licensing the design and build of particular types of Litespan channel units to third party manufacturers. As the needs of our business dictate, we will periodically enter into a Technology License Agreement with another manufacturer. This manufacturer will work in close collaboration with Alcatel on the design and testing of these cards. Those channel units that are licensed are designed solely for use in Litespan systems.

Alcatel's decision to develop a particular type of line card is a business decision determined by such factors as volume of demand, expected selling margin, competitive pressures, and the availability of development resources. Alcatel products are sold to both the ILEC and CLEC markets, and the demands of each of these markets are taken into account in determining which line cards and features Alcatel develops for its products.

Q. QUESTION 8 STATES:

***Points of Interconnection:* Please comment on the following:**

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

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?

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?

WHAT IS YOUR RESPONSE?

A. (Response to Part A). There is no feasible point of interconnection or access to sub-components of the NGDLC system itself. The primary technically feasible point of interconnection for an Alcatel Litespan-2000/2012 system is at the FDI (Feeder Distribution Interface) or other accessible terminal located beyond the remote terminal equipment. It is at that point that flexible interconnections are made between feeder facilities tied to the Litespan system and the distribution facility to the customer. These feeder facilities terminate on 25-pair block connectors within the Litespan cabinet (or hut or CEV). These connectors do not give access to individual pairs of wires.

(Response to Part B). The central office OCD performs a cross-connect function that allows individual ADSL circuits from multiple CBAs to be routed to different carriers. Litespan remote terminals groom the ATM data traffic from the ADLU interfaces to an ATM OC-3c facility for transport to the central office. The interface at each remote terminal is provided

through redundant ATM Bank Control Units ("ABCUs") located in the Channel Bank Assemblies ("CBAs"). Up to 32 ABCUs can be "daisy chained" to the same OC-3c. The OC-3c can be transported over separate fiber facilities (the most popular approach) or, in the case of the Litespan-2012 system, through an OC-3c broadband service interface. In either case, the ATM OC-3c facility can only be terminated at one network element within the central office. Therefore, if it were routed to a collocated ATM switch, all of the ATM traffic in the ABCU chain would be routed to that switch.

The ABCU chains can be split into individual shelf units with additional OC-3c facilities, but, at the least, that means each OC-3c would be dedicated to 224 ADLU lines (56 slots with four-port ADLU cards) that could not be shared with other providers. There is no other way to bypass the OCD.

(Response to Part C) The CBAs are factory wired to connectorized stubs that are connected to the protector block stubs. The protector blocks, in turn, are spliced to the derived feeder facilities that extend from the RT site to SAIs beyond the RT, as noted in the response to the previous question. Although collocation within a remote terminal enclosure may be possible in some cases, it will normally be precluded by one or more restraint, including: space, thermal dissipation limits, rectifier capacity and/or lack of separate access (security). However, there may be space for an adjacent cabinet on the same R/W (assuming no permit or easement restrictions) or at a separate location closer to the SAI, in which case, the engineer controlled splice option can provide access to the cable binder groups (access to individual distribution pairs is provided through jumpers at the SAI, assuming there are spare

terminal blocks for the additional feeder pairs or space for more to be added). For DSLAMs providing business services (such as SDSL), both space and interconnection usually can be better accommodated with installations in the building terminal rooms or closets. Direct access to the inside wiring is provided at the terminal blocks.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY ON REHEARING?

A. Yes.

Schedule NR-1

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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matters of	)	
	)	
Deployment of Wireline Services Offering Advanced Telecommunications Capability	)	CC Docket No. 98-147
	)	
and		
	)	
Implementation of the Local Competition Provisions of the Telecommunications Act of 1996	)	CC Docket No. 96-98

COMMENTS

ALCATEL USA, INC.
James J. Gunther, Jr.
Regulatory Affairs Manager
Government Relations Office
1909 K Street, N.W., Suite 800
Washington, D.C. 20006
202-715-3700

Of counsel:

Robert J. Miller
Gardere & Wynne, L.L.P.
1601 Elm Street
Dallas, TX 75201
214-999-4219

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EXECUTIVE SUMMARY

Alcatel USA, Inc. ("Alcatel") is an "architect" of the Internet and other broadband technologies. As the world's leading supplier of *x*DSL equipment, Alcatel serves the equipment needs of incumbent local exchange carriers ("ILECs"), competitive local exchange carriers ("CLECs"), and consumers.

Alcatel's product line encompasses the full spectrum of telecommunications network architectures and applications, including backbone transport, local and tandem switching, and edge and local loop access. Foremost are Alcatel's state-of-the-art Asynchronous DSL ("ADSL") products. These products include market-leading Digital Subscriber Line Access Multiplexer ("DSLAM"), Next Generation Digital Loop Carrier ("NGDLC") and Wireless Local Loop ("WLL") systems.

In the captioned proceeding, the Commission seeks to establish rules that will strengthen the collocation rights that are so integral to providing robust local service competition. As detailed in these comments, with its leading edge portfolio of network and consumer products, Alcatel is well-positioned to support the Commission's carefully crafted efforts at unleashing full and fair competition in the advanced services market. In sum:

- Alcatel describes how its current and future generation SONET transport systems and DSLAM and NGDLC multiplexing equipment offerings that are being, or will be, used for interconnection or access to unbundled network elements.
- Alcatel supports the Commission's prudent and well-reasoned approach to requiring open network interfaces needed for collocation. Alcatel also urges the Commission to ensure complete protection of manufacturers' proprietary rights in internal interface technology embedded in the equipment used for UNE interconnection and access. Specifically, open network interfaces should be mandated for derived services and facilities at an ILEC's central office or remote terminal facilities. There is absolutely no need, however, to extend such open interoperability requirements to components of this collocation platform, such as line cards. CLECs and other competitive carriers simply do not need the right to use their own line cards to collocate and provide their intended services. Permitting such overly broad and necessary open access would threaten network integrity and would slow innovative product development.

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I. INTRODUCTION

Alcatel USA, Inc. ("Alcatel") herein responds to questions addressed to telecommunications equipment manufacturers in the FCC's Order on Reconsideration and Second Further Notice of Proposed Rulemaking in Common Carrier Docket No. 98-147 and Fifth Further Notice Of Proposed Rulemaking in Common Carrier Docket No. 96-98 (*"FNPRM"*)

Alcatel is a leading manufacturer of telecommunications equipment used by incumbent local exchange carriers ("ILECs") and competitive local exchange carriers ("CLECs") in the United States and worldwide. It supplies equipment for the full spectrum of telecommunications network architectures and applications.

Alcatel's extensive portfolio includes Asynchronous Transfer Mode ("ATM") switches, fiber optic terminals, Digital Subscriber Line Access Multiplexer ("DSLAM"), Next Generation Digital Loop Carrier ("NGDLC") and Wireless Local Loop ("WLL") systems.

These products use and support a wide range of technologies, including Time Division Multiplexing ("TDM"), ATM, Internet Protocol ("IP"), Synchronous Optical Network ("SONET"), Wave Division Multiplexing ("WDM"), Dense Wave Division Multiplexing ("DWDM") and Local Multipoint Distribution Systems ("LMDS"). Equipment and service management is enhanced through a strong platform of element and network management systems. Alcatel designs its equipment to meet and exceed domestic and international standards for performance and interoperability.

In particular, Alcatel is the world-leading supplier of *x*DSL equipment used to provide advanced services. Most notable are its Asynchronous DSL ("ADSL") offerings. Alcatel supplies both network and ADSL customer premises equipment ("CPE"). Alcatel's market leading ASAM DSLAM and Litespan® NGDLC systems are state-of-the-art and use a common set of standards, chipsets and Element Management Software ("EMS").

As an equipment supplier to both CLECs and ILECs, Alcatel is aware of the many issues regarding collocation and interconnection at central office ("CO") and remote terminal ("RT") locations. Alcatel fully supports the Commission's concerted effort in this and other proceedings to identify the best approach to promoting collocation.

Moreover, Alcatel appreciates the Commission's willingness to work not only with service providers, but also with equipment manufacturers to fully understand their products' capabilities and industry concerns as the emerging broadband marketplace matures. Indeed, Alcatel has actively participated in Commission initiatives on this issue, such as the May 10, 2000 *Public Forum on Competitive Access to Next Generation Remote Terminals*. Alcatel welcomes the opportunity to offer comments and suggestions regarding the manufacturing issues raised in this *FNPRM*.

II. SUMMARY OF RESPONSES

The following summarizes Alcatel USA's responses to questions raised in the FNPRM.

Alcatel provides descriptions of equipment that is commonly used in collocation applications for interconnection and access to unbundled network elements ("UNEs"). This equipment performs various forms of multiplexing that are efficient and necessary for optimum performance of the network. These forms include multiplexing wideband and SONET signals in SONET add-drop multiplexers ("ADMs") and electrical and optical cross-connect systems, broadband signals in ATM-based DSLAMs, and combinations of narrowband, wideband, broadband and SONET signals in NGDLC. Alcatel's equipment, like that of other manufacturers, uses internal proprietary interfaces, but it supports standard service and network interfaces for external access to its derived facilities.

Alcatel emphasizes that line cards are integral and proprietary components of its systems, whether the systems support basic or advanced services. ***Non-Alcatel or Foreign manufactured line cards cannot and must not be installed in Alcatel's equipment.*** Neither can the line cards be externally accessed by other outside systems. In addition, service provisioning and maintenance functions, *inter alia*, are enabled only by Alcatel's proprietary software, which is only provided to a licensee under restricted license terms.

In addition, it would not be feasible to develop system software to support a variety of foreign line cards with proprietary features. Therefore, neither physical nor virtual collocation is possible at either the line card level or channel bank assembly level.

However, access may be provided to the derived services of these systems through standard service interfaces. In addition, there are several options for providing services that bypass these systems that render line card "collocation" or "interoperability" unnecessary.

The availability of advanced service line cards in both DSLAMs and NGDLC systems is important for widespread deployment of those services. NGDLC systems are normally deployed in areas beyond the reach of central office DSLAMs. Alcatel notes that NGDLC line card features will continue to be enhanced and new cards and software support will be developed for additional services. These will be driven by rational considerations such as the prevailing regulatory landscape, normal technology evolution, potential market demand and the anticipated development and manufacturing costs.

Alcatel's near-term NGDLC development plans include support for High Bit Rate DSL ("HDSL2") and G.shdsl. As always, Alcatel invites input from CLECs, ILECs and ILECs' advanced services affiliates on other NGDLC enhancements that they feel are important for advanced service delivery and interconnection or access.

Alcatel has several sizes of RT systems and cabinets. Terminal shelves (and line cards) can be added as needed, up to system capacities. Cabinet capacities are fixed, but Alcatel does supply cabinets designed for adjacent installations.

Lastly, herein, Alcatel cites options available for accessing subloop facilities at and beyond NGDLC remote terminals. In addition to mainframe terminated copper pairs, these include access at building terminals ("BTs") and interconnection to cable pairs feeding Serving Area Interfaces ("SAIs"). In most cases, these options can preclude the need to modify or expand RT sites.

III. Discussion

In this section, Alcatel responds to several questions addressed to equipment manufacturers in the *FNPRM*.

As noted above, Alcatel is a key telecommunications equipment supplier for both ILECs and CLECs. In that regard, Alcatel has material interests in the outcome of this proceeding, to the extent that any eventual ruling effects its products.

A. Second Further Notice of Proposed Rulemaking in CC Docket No. 98-147

1. Equipment Description

"*We invite manufacturers to describe their telecommunications equipment offerings that are intended to be used for interconnection or access to unbundled network elements, the various features, functions, and capabilities of such equipment, and any advantages of including these features, functions and capabilities in collocated equipment.*"[1]

Alcatel supplies three (3) primary types of multiplexing equipment that may be used separately or in combination to interconnect or access unbundled loops. These include SONET transport systems, DSLAMs and NGDLCs. Each of these products may also be used in other telecommunications applications. They are not specifically designed for, nor restricted to, collocation applications. A general description of the features, functions and capabilities, as well as the advantages intrinsic in these products for collocation follows.

a. SONET Transport

For collocation applications, SONET transport equipment installed on fiber is used to transport high-speed facilities between a CLEC's point-of-presence ("POP") and equipment located in collocation space at an ILEC's central office premises. In some instances, depending on the equipment, available space and environment, a SONET transport system can also be installed at remote collocation sites. These situations include controlled environmental vaults ("CEVs"), huts and BTs. Some SONET systems, including Alcatel's 1603 SMX system, are environmentally hardened for outside plant cabinet applications.

[1] FNPRM at ¶ 74.

The low-speed service (or "drop") and facility interfaces available on SONET ADMs depend upon the system's high-speed transport rates. For instance, OC-3 SONET systems typically support 84 DS-1 interfaces or three (3) DS-3 interfaces. OC-12 systems support DS-1, DS-3 and OC-3c service interfaces (as well as OC-3 facility interfaces). OC-48 systems typically have OC-3, OC-3c, OC-12 and OC-12c interfaces.

These interfaces are generally used to feed other multiplexing equipment in the collocation space (DSLAMs and/or DLCs or NGDLCs). However, the DS-1 interfaces, with the addition of office repeater bay equipment, can be connected to copper loops conditioned for T-1 services or facilities. DS-3 interfaces can provide DS-3 services using inside wiring at BT locations. The OC-3 and OC-12 interfaces can be connected to fiber facilities in the loop or building, assuming fiber termination cross-connect panels are available.

Large installations, with many multiplexing elements or multiple transport paths, often employ SONET digital and optical cross-connect systems. In addition, systems that combine the functions of a SONET ADM with digital and optical cross-connect functions are used.

The primary advantage of SONET equipment for collocation (and other major equipment installations) is the additional redundancy offered by its various protection schemes. Most commonly, SONET ADMs use unidirectional, path switched rings or bi-directional line switched rings with automatic protection switching schemes that can survive link failures. SONET digital and optical cross-connect systems, along with ADM dual-node ring interconnection ("DRI"),[2] provide additional path recovery schemes to survive node failures.

Alcatel's primary SONET transport product is the 1603 SMX system. Key features of this product are outlined in the attached ***Exhibit 1*** and are available on Alcatel's web site at (www.usa.alcatel.com). Among other things, Alcatel's product description notes:

> "The SMX is built on an industry-proven platform hardened beyond NEBS Level 3 certification. The SMX will function in a temperature of (-40C to +65C). The SMX can be deployed in the controlled environment of a CO, or in a RT pedestal in the worst of conditions."

[2] DRI, also referred to "matched node interconnection," allows the same SONET STS-1 or OC-3 signal to be connected between two rings at two different points in the network.

Alcatel's web site also offers descriptions of its SONET digital and optical cross-connect systems. The digital systems include the 1631 LMX SONET Ring Manager and the 1630 GMS. Alcatel's optical cross-connect systems include the 1680 OGM and OGX systems, the 1640 OADM, and 1690 OADM. In addition, Alcatel recently announced its "CrossLight" photonic cross-connect system.[3]

Wireless systems are used for facility transport, either as a substitute or compliment to the fiber-based SONET systems. The Alcatel web site contains descriptions of its wireless system offerings.

b. DSLAMs

Alcatel is the world's foremost supplier of DSLAM equipment. Its most popular DSLAM product line is the Alcatel ASAM ("ATM Subscriber Access Multiplexer") family of products. These products lead the industry in central office ADSL line deployment.

As the product name illustrates, ASAM supports the multiplexing and delivery of *x*DSL services in both collocation and non-collocation applications. Current systems support a variety of standard and proprietary interfaces. Standards-based Discrete Multi-Tone ("DMT") ADSL units account for over 80% of the *x*DSL services deployed to date. They are used primarily for small office and home office ("SOHO") and residential applications requiring asymmetrical bandwidth for interactive, PC-to-host computer sessions.

As the Commission recognized in its *Line Sharing Order*, a major advantage of this technology is that it can co-exist with Plain Old Telephone Service ("POTS") voice service on the same cable pairs used for primary services.[4] This feature is especially useful for dispersed, residential applications where spare copper facilities are scarce.

Varieties of data, voice and video services can be supported by DSLAMs, using either symmetrical or asymmetrical lines. DSLAMs are used in CO collocation space as well as in RT

[3] In a July 31, 2000 press release, *Alcatel Unveils High-Speed Photonic Cross-connect for Intelligent Optical Networking.*

[4] As noted in the Executive Summary: "In order to ensure that line sharing does not significantly degrade analog voice service, incumbent LECs must provide unbundled access to the high frequency portion of the loop only to carriers seeking to provide xDSL-based service that meets one of the Commission's criteria regarding the presumption of acceptability for deployment on the same loop as analog voice service. Currently, ADSL is the most widely deployed line sharing technology meeting that presumption." (FCC 99-355, adopted November 19, 1999.)

and BT environments. Alcatel also makes environmentally hardened systems that can be deployed in outside plant cabinets.

A major issue for remote deployment at OSP terminal locations is access to the existing copper feeder or distribution pairs. Derived feeder pairs originating at DLC and NGDLC remote terminals are "hardwired" through protector terminals.[5] Distribution pairs normally originate at feeder distribution interfaces, which are also known as Serving Area Interfaces ("SAIs").[6] The pairs are usually hardwired to the terminal blocks. Options for accessing these remote copper facilities ("subloops"), which are discussed below, must be addressed on a site-by-site basis.

Alcatel's most popular DSLAM product line is the ASAM family. Key features and specifications of the latest system, the "Alcatel 7300," are outlined in ***Exhibit 2***.

In addition to standalone applications, ASAM central office terminals ("COTs") can be configured to aggregate *x*DSL traffic from other ASAM and NGDLC systems. This capability allows more efficient use of the transport capacity. This technique also consolidates interfaces to voice gateways and other equipment.

c. NGDLC

With its Litespan® family of products, Alcatel is a leader in "next generation" DLC systems. At the end of 1999, there was an embedded base of over 30 million lines of Litespan® RT capacity in North America.[7]

NGDLC systems were originally developed in response to the design parameters for Carrier Serving Areas ("CSAs").[8] These CSAs required larger systems, with more service

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[5] Protectors guard against equipment and personnel hazards caused by lightning or commercial power hits on "exposed" pairs. The derived pairs in the protector stubs are normally "hardwired" directly to the remote terminal shelves, in the case of "rear access" design, or spliced to stubs with pin connectors in the case of "front access."

[6] Serving Area Interfaces ("SAIs") evolved to common use in the Bell System after the 1977 "Maintenance Task Force Study" identified the advantages of having a "single point of interface" between the feeder and distribution plant for provisioning and maintenance. The terminals supplanted the use of cross-connect boxes (*a.k.a.*, "B" boxes) and "ready access" cross-connect terminals. The term "SAI" and its generic counterpart, "FDI," can be used inter-changeably.

[7] This is based on the number of channel banks shipped for remote terminals, some of which may not have been installed. Each channel bank has a capacity of 224 derived lines.

[8] The Bell System staff defined CSAs in 1982 in Recommendation Letter 82-02-207. The areas extend up to 9 Kft on 26 gauge or 12 Kft on 24 or coarser gauge, including bridged tap. Bridged tap was limited to "a maximum of 2,500 feet, with no single tap greater than 2,000 feet." In addition, the design set a goal to eliminate load coils within the CSA. Loads are still required for mainframe terminated copper feeder pairs serving DAs that have customers beyond the non-loaded loop limits from the CO (18 Kft, including bridged tap). The CSA guidelines supported the evolution of digital services, with basic rate ISDN being a near-term application objective.

features and remotely controlled software. Litespan® features such as integrated SONET transport enhanced the economic feasibility of wider deployment. ATM busses allowed the development of enhanced services. The software supported remote provisioning and maintenance.

CSAs represent the geographic area served by a single RT site. They typically serve two (2) to four (4) Distribution Areas ("DAs"), each with its own SAI. Copper facilities between the RT and the SAI are "derived" feeder pairs. Such feeder pairs, along with mainframe terminated pairs, are spliced through intermediary cable stubs, lateral "facility splices" and terminal stubs. The latter are factory or field wired to "In" cable terminal blocks in the SAI.[9] In the NGDLC remote terminal enclosure, the derived feeder pairs are spliced to protector stubs that, in turn, are "hardwired" to the system shelves.[10] As with mainframe terminated pairs, the derived pairs are normally sized for economic growth periods.[11]

Distribution pairs terminate on "Out" cable terminal blocks. They are sized for "ultimate requirements" based on estimates of dwelling units, lines-per-unit and miscellaneous lines. There are normally twice as many "Out" pairs as "In" pairs terminated in each SAI. Therefore, the SAI provides the flexibility of traditional cross-connect systems. Any spare feeder pair can be connected to any spare distribution pair. Consistent with the service reliability objective of having a "single point of interface," there is no similar interface at the RT in the CSA design.[12]

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[9] The "In" pairs are terminated on a center panel of terminal blocks so jumpers can be run to the "Out" cable blocks on either side. This provides an efficient, low maintenance and reliable wiring arrangement.

[10] The pairs are either hardwired at the factory or combined in cable stubs that have factory installed pin connectors. The shelf density does not allow field wiring changes or cross-connections. In addition, the pre-wired connections support "plug and play" channel unit installations in software controlled systems (NGDLC).

[11] Where there are spare structure spaces for additional cables, the growth periods are often shorter than the sizing periods used for the remote terminal system and enclosure capacities. In these cases, enclosure space must be reserved for additional shelves to support future derived pairs.

[12] Exceptions include CSAs that only serve one DA, such as in isolated development pockets. In these cases, the SAIs may be collocated within the remote terminal housings (but not necessarily). Other designs, such as Rural Allocation Areas and Fiber-To-The-Node ("FTTN"), may also have collocated remote terminals with FDIs/SAIs.

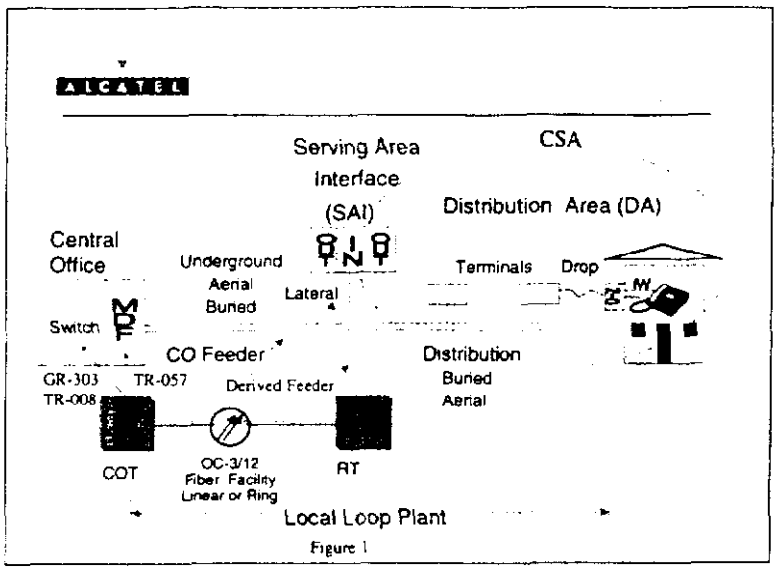

Figure 1

Both traditional DLC and next generation DLC systems were developed as economic alternatives to copper feeder reinforcements and extensions. The economic factors primarily depend on equipment and site installation costs as well as the alternative costs of displacing copper. Although it is often economical to cutover some of the services on existing copper feeder pairs to the derived NGDLC facilities,[13] most of the embedded feeder plant is left undisturbed.[14] This architecture results in a typical network configuration as depicted in Figure 1, above (with only one DA shown for the sake of simplicity).

The larger and higher density "next generation" DLC systems (compared to "traditional" DLC systems) have expanded the economic deployment of DLCs with lower line costs. In addition, NGDLC systems support "last mile" advanced service capabilities that are either impossible or extremely difficult to support on traditional DLC systems.[15]

Developed for widespread service applications, NGDLC systems normally do not support proprietary *x*DSL services and features that are available with some DSLAMs. However, it is

[13] Such cut over work allows the cleared, mainframe terminated feeder pairs to be re-allocated for growth in other areas. These are typically closer to the CO, where the installation of RT sites is either not feasible or is uneconomical for basic service capacity expansion.

[14] Noted exceptions include plant that is defective and/or too costly to maintain.

[15] For this discussion, "last mile" refers to the derived feeder and distribution plant in Carrier Serving Areas. This may be different from the definition in the *Deployment of Advanced Telecommunications Capability: Second Report* (FCC 00-290, August 3, 2000, IV. B. 3, paragraph 28 *ff*). The primary advantage with NGDLC is that it allows continued use of the embedded copper plant.

important to consider the general locations and applications requiring those services.[16] It is commercially unattractive to develop the same capabilities in NGDLC systems. Therefore, the need for other options that support proprietary offerings will continue. These offerings include mainframe terminated copper pairs and access at RTs, SAIs and BTs.

NGDLC systems are used for collocation by multi-service CLECs. The primary advantage for using NGDLC systems as part of a collocation strategy is the wide range of services supported by one system compared to a multiplicity of equipment that would be required with remote switches, channel banks and DSLAMs. Among others, the narrowband services typically include POTS, CENTREX, coin, foreign exchange, Private Branch Exchange ("PBX") trunks, private lines and ISDN-BRI Service. Common wideband interfaces include DS1 and HDSL. As with SONET ADMs, higher speed systems also support DS-3 and OC-3c interfaces. Recent NGDLC upgrades support ADSL and other *x*DSL services.

Like incumbent LECs, CLECs also deploy NGDLC systems at outside plant locations, usually with their own derived feeder and distribution plant. In addition, they deploy NGDLC systems at BTs. They also may be able to deploy such systems at ILEC remote terminal sites depending on space and heat dissipation limits, power feeds, derived feeder access and public or private rights-of-way ("R/W") stipulations (among other constraints).

The primary NGDLC products supplied by Alcatel are the Litespan®-2000 and Litespan®-2012 systems. The Litespan®-2000 is an OC-3 system that supports narrowband, wideband and ATM-based ADSL services. The Litespan®-2012 is an OC-12 system. Approximately 25% of its OC-12 transport capacity is dedicated to the narrowband service traffic (for instance, up to 2,016 POTS lines). The rest of the high-speed transport capacity can be used for combinations of DS-1, DS-3 and OC-3c services. It can also serve sub-tending Litespan®-2000 systems through OC-3 facility links.

Both Litespan® NGDLC systems have integrated SONET optical components and TR-057, TR-008 and GR-303 switch interfaces.[17] A remote terminal supports up to 2,016 POTS

[16] The great majority, possibly over 75%, of existing DLC lines serve residential customers beyond the non-loaded loop limits of mainframe terminated copper pairs (pairs terminated on the central office main distributing frame or "MDF"). For these lines, the only possibilities for line-shared ADSL services are through NGDLC systems with integrated ADSL capabilities or with the combination of remote DSLAMs and copper or DLC fed POTS lines. In contrast, it is likely that over 80% of business services, including symmetrical DSL candidates, are on non-loaded loops, within the reach of central office DSLAMs, and not on DLC.

[17] For general understanding, "TR-057" is also referred to as universal digital loop carrier ("UDLC"). It uses mainframe terminations similar to copper feeder. "TR-008" is a SLC-96 integrated digital loop carrier ("IDLC")

lines. A COT can serve up to five (5) RTs, up to 10,080 lines (using GR-303 concentration), and can interface with multiple switch entities. COT-to-RT transport configurations include point-to-point, star, ring, multiple remotes (chain) and dual-feeder architectures. DS1-fed (usually copper) Litespan®-2000 systems with TR-008 or GR-303 interfaces can be directly connected to the switch without a COT.

Key features of the Litespan®-2000 and Litespan®-2012 systems are outlined on Alcatel's "web" site and in the attached ***Exhibit 3***. The Litespan® element management system, called "AMS," also supports ASAM systems. ADSL is supported in the Litespan® systems with combination, ADSL and POTS line cards ("ADLUs") that have on-board, passive splitters. Each ADSL-capable shelf has an ATM bank control unit ("ABCU") that supports both the ADSL and TDM traffic.

As noted above, the two (2) Litespan® NGDLC systems use different transport options for ADSL delivery, but both have separate OC-3c ATM interfaces for their respective ABCU chains.[18] The Litespan®-2000 system uses a separate fiber pair, sub-tended OC-3 drop, or dual wavelength WDM to obtain the additional OC-3 capacity. The Litespan®-2012 system uses one of its own OC-3 tributaries. Figure 2 shows a general depiction of a Litespan®-2012 configuration.

emulation. "Mode I" is non-concentrated. "Mode II" concentrates 48 derived lines onto 24 time slots. "GR-303" allows the integration of additional services, like ISDN-BRI, and supports dynamic time slot concentration.

[18] Separate OC-3c interfaces are used for the ADSL traffic to avoid congesting the OC-3 links used for TDM services. Up to 32 channel banks with ABCUs can be "daisy chained" to the same ATM OC-3c interface (depending on physical connectivity and traffic requirements). Conversely, chained channel banks can be separated onto separate OC-3c interfaces if the traffic requires (assuming the additional links can be made available).

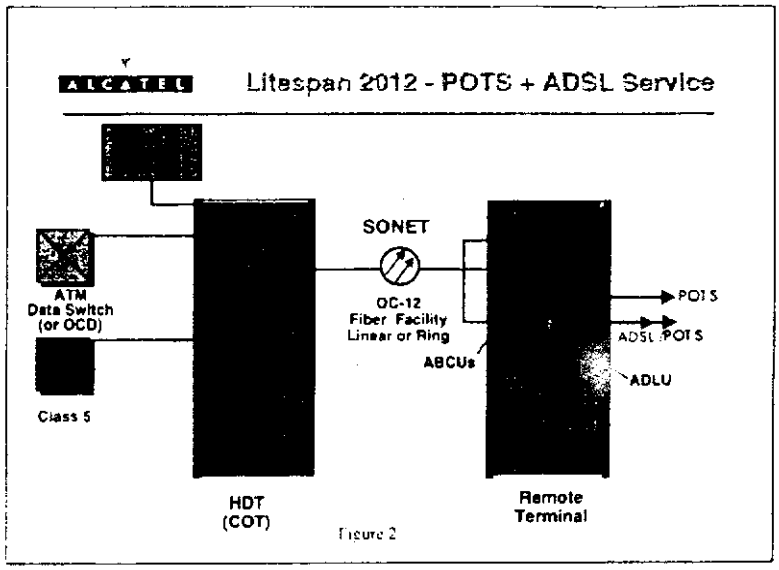

Figure 2

2. Additional Functions

"We seek comment on whether or the extent to which we should consider whether it might be more efficient for manufacturers to design equipment with functions in addition to those needed for interconnection and access to unbundled network elements."[19]

Alcatel's SONET, DSLAM and NGDLC systems all contain efficient combinations of features that are inherent to the various forms of multiplexing these systems perform. "Multiplexing," regardless of form, is a "necessary" feature of electronic equipment used for interconnection or access.[20] Without such an equipment feature, access would be limited to voice frequency ("VF") copper facilities, which, in many cases, could not adequately support POTS.[21]

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19 FNPRM at ¶ 78.

20 As defined in Newton, "multiplexing" or [to] "multiplex" means "1) [To] Transmit two or more signals over a single channel." Examples of equipment that performs this function include channel banks and DLC systems designed to multiplex narrowband signals over T-1 (or higher) signals and DSLAMs that multiplex digital subscriber lines onto ATM channels. SONET ADM and associated digital and optical cross-connect systems and fixed wireless systems multiplex DS1 and DS3 signals on to VT-1.5 and STS-1 channels and lower speed SONET signals onto higher speed channels (for instance, OC-3c onto OC-12). NGDLC systems may multiplex a combination of narrowband, wideband, DSL and SONET signals onto their higher speed interfaces. Forms of multiplexing (among others) include those using pulse code modulation ("PCM"), for DS-0 level multiplexing, as well as various forms of statistical multiplexing and time slot interchanging ("TSI"). TSI is commonly used in NGDLC systems to dynamically multiplex voice channels to available time slots in switch interface channels.

21 This does not mean that there are no efficient or necessary applications for copper VF pairs. They can provide cost effective options for POTS, other narrowband services and even wideband and broadband services when the CLEC or affiliate host location is relatively close to the incumbent LEC central office and/or the latter's

Care must be taken to differentiate between features that are part of a particular multiplexing scheme and functions that are distinct from multiplexing.[22] Neither "switching" nor "routing" equipment is directly required for "multiplexing."[23] However, the integration of some switching or routing functions may allow more efficient use of the transport facilities.[24]

As a leading supplier of switching and routing equipment,[25] Alcatel would not object to the use of such equipment in collocation space. However, Alcatel reserves comment on whether deployment of equipment with multiplexing and other multi-functional capabilities is required under Section 251 (c) (6) of the Act.[26]

3. Manufacturers' Development Incentives

"We ask the commenters to address how each proposed standard would affect manufacturers' incentives to develop equipment having features, functions, and capabilities that increase network efficiency, lower consumer rates, or otherwise advance important statutory objectives."[27]

This is a very important question because it explicitly recognizes that service providers and their suppliers, like most for-profit enterprises, make rational decisions based on business considerations and incentives. The spirit of the question is also consistent with Chairman Kennard's repeated statements that less not more regulation is the best way to ensure rapid

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loops are short. In these cases, electronic multiplexing and associated fiber transport may be cost prohibitive. Exceptions exist for these short loops, however, when electronic multiplexing may be required to support higher bandwidth services or there are structure limitations for the interconnecting cables.

22 For instance, "exchanging cells" in an ATM-based DSL access multiplexer ("DSLAM") performs the same function as "exchanging bits" in a TDM multiplexer.

23 Switching and routing functions allow telephone calls and data sessions to be automatically connected from one station to another using pulse codes, header address information or other forms of routing algorithms. The originating user identifies the terminating address. In contrast, multiplexing simply combines signals onto higher speed interface channels whose routing is fixed by the OSI Layer 1 and 2 paths that carry the channels.

24 For instance, remote switch remote line units perform concentration functions that similar to "time slot interchanging" supported in NGDLC systems, allowing the use of fewer host-to-remote "trunks." Similarly, aggregation routers may combine DSL lines into fewer host channels. In both cases, the host switch is required to complete connections to other stations.

25 *See* the "Switching Products" and "Access Products" sections under the "Telecom" button on Alcatel's Web site (www.usa.alcatel.com) for descriptions of our switching and routing equipment.

26 It is clear that "market forces" may drive such permission, as indicated by Qwest's recent announcement that it will allow the installation of "packet switches" in collocation space (PRNewswire, September 19, 2000, *Qwest Communications Announces Landmark Initiative to Open Local Communications Markets.*

27 *FNPRM at* ¶ 79.

development and deployment of advanced telecommunications infrastructure and services. Service providers make rational, market-based business judgements about what services to offer their customers. Likewise, equipment manufacturers make rational business judgements about what products to develop. These are based on the services their customers -- or potential customers -- are currently seeking or may seek in the future. Nevertheless, not every technically possible or desirable product, function or feature is developed because the underlying economics may not support such a decision.

To the extent that standards are developed by the Commission, or its designee, as voluntary equipment options or sets of options and are not mandated as integral system components, such standards may have only limited impact on a manufacturer's research and development incentives. Product development decisions primarily depend on a manufacturer's estimation of future market demand for specific features and functions and the manufacturer's ability to deliver them in a timely and cost-effective manner. In some cases, market projections alone are insufficient to justify development. Likewise, there may be circumstances where development costs, measured as a percentage of projected sales, undercut the entire business case.

Any regulatory requirements not sufficiently sensitive to these market and business considerations, such as a requirement to develop software support for other vendor's line cards, could seriously hamper or even halt innovation in these systems. Furthermore, a manufacturer could spend millions of dollars for research and development on a product only to have the rules change after the fact thereby totally undermining the investment. One of the things that makes products such as Alcatel's NGDLCs so responsive to the market are the products' proprietary components, typically the wellspring of innovation and engineering creativity. It would be most unfortunate if by a regulatory mandate for the deployment of open systems, the Commission undermined that innovation as well as the underlying intellectual property rights for such products.

Ironically, mandated interoperability could also have a negative impact on other objectives the Commission is striving to achieve. For example, the Commission has taken many steps to ensure prompt and ubiquitous deployment of competing technologies in the local loop. Such a mandate would almost certainly delay or halt the deployment of copper-based broadband

services like ADSL. The unintended consequence of such an undertaking would be to actually reduce technological competition in the last mile rather then enhance it.

4. Space Consumption

"We seek comment on whether the deployment of equipment that provides no functionalities other than those directly related to, required for, or indispensable to interconnection or access to unbundled network elements would consume more or less space in the incumbent's premises than would equipment that has multiple functions"[28]

It is uncertain at this time, if there is any difference in the space required to support switching and routing functions in multiplexing equipment. Answering this question depends on the extent to which additional features can be provided by modifications to the system's software.

Space requirements are a function of component density, the types of services supported and utilization of the equipment.[29] These factors may or may not align with perceptions of what "state-of-the-art" equipment should be or even with what some would consider to the most "efficient" arrangements or equipment configurations.

Stand-alone remote switching equipment typically requires more space because of the need for separate multiplexers to support services that are not supported by the host switch. In these cases, NGDLC systems, with their multi-service support, may consume less space.

4. Necessity of Line Cards

"We ask whether line cards are equipment necessary for interconnection or access to unbundled network elements."[30]

All line cards, especially those supporting advanced services, are integral and proprietary components of the systems themselves. The system cannot be used without the line cards. Conversely, the line cards cannot be separately accessed from other equipment.

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[28] FNPRM at ¶ 80.

[29] For instance, components supporting advanced services tend to consume more power and dissipate more heat than voice services. They, in turn, can require more space because of fewer services per line card and/or service restrictions within a system. Low utilization (and more space) is experienced with low demand for individual providers' services that may be more efficiently combined on shared facilities. Options include sharing the derived facilities of incumbent LEC NGDLC systems as UNEs and/or sharing adjacent equipment and enclosures.

[30] FNPRM at ¶ 82.

Line cards cannot be substituted with other line cards that are not supplied (or licensed by) the system vendor and supported by the system's software. The system software and associated element management system software are intellectual properties protected by copyright and are distributed for use under restricted warranty and contract provisions. What can be used for interconnection or access are the derived service and facility interfaces supported by each system, its software and its line cards, all operating together.

6. Impending Card Development

"We request comment on impending developments in these cards."[31]

Alcatel's development focus for advanced services line cards is to increase line card density and expand service features. Detailed plans are proprietary, but they include the development of G.shdsl and HDSL2 line cards and software, as well as enhancements to the features and functions of our existing ADSL line cards.

7. Limiting Line Card Functions

"We ask whether limiting the functionalities of the line cards that a competitive LEC could collocate would reduce innovation in digital loop carrier systems, assuming that these line cards are necessary for interconnection or access to unbundled network."[32]

This question may be moot since a CLEC could not collocate a line card separately from a system. Nor could a CLEC install a line card in an ILEC system, unless it were supplied and supported by the system's manufacturer. Furthermore, with software controlled systems, even if it physically "fit" into the system slot, installing the card itself does not establish service. Operation is dependent upon other components of the system and its software configuration and provisioning features.[33] In addition, there would be cumbersome contractual issues related to system maintenance. If a CLEC or advanced services affiliate plugs a non-authorized line card into a system, and the system fails, many customers on authorized line cards will be left without

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31 FNPRM at ¶ 82.

32 *Ibid.*

33 Further, such configuration and provisioning capabilities depend on the system already having the hardware and software required to support the service. In some cases, it may not be physically possible or economically feasible to upgrade existing systems with this capability (for instance, systems that are at or near the exhaust of their service capacity).

service. Then, who is responsible for fixing the system? The Commission will need to consider existing warranty arrangements as well. Most, if not all warranties on these NGDLC systems would be voided if non-authorized cards were placed in the system.

As for card development implications, market forces influence those decisions. Those forces include new interface and service standards and the anticipated demand for new features.

8. Remote Terminal Sizes

"We invite manufacturers to state whether they make or plan to make each type of remote terminal in a range of sizes, rather than in one standard size, and whether these structures are capable of expansion."[34]

Alcatel provides a variety of Litespan® RTs in sizes ranging from two (2) shelves, with a common control assembly ("CCA") and a channel bank assembly ("CBA") that support 224 lines, to nine (9) shelves supporting 2,016 lines. Shelves can be added as needed, up to the system capacity, depending on the enclosure capacity (hut, CEV, cabinet or building closet).

Alcatel also makes a wide range of outside plant cabinets for Litespan® RTs,[35] as described on its web site. Cabinets are selected to fit specific equipment requirements (usually covering five to ten years or more) and are not designed for expansion. Adjacent cabinets also may be installed and connected. In addition, other vendor cabinets are available under OEM arrangements. These resources enlarge the options for collocation space.[36]

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[34] FNPRM at ¶ 104

[35] Note from this that we would separate the terms "terminal" and "structure." Our use of "terminal" generally refers to the electronic system equipment installed at the remote sites. Structures supporting (and protecting) that equipment are normally cabinets, huts, CEVs or building terminal closets or rooms designed for communications equipment. The term "remote terminal" may also apply to the combination of the system equipment and the enclosure, but rarely to the enclosure (or "structure") itself.

[36] Further, note that the largest Alcatel and OEM cabinets have separate compartments with lockable doors that could provide separate and secure access to CLEC and ILEC equipment. Further security within the compartments, with cages or covers, is not currently available and may or may not be possible, depending on the cabinet and the equipment. There are no feasible options for covering, locking or otherwise securing individual line cards.

9. Adjacent Cabinets

"We also request comment on whether manufacturers of remote terminals currently offer or intend to make available structures that are suitable for collocation adjacent to remote terminals, such as small cabinets that can be interconnected with incumbent LEC remote terminals."[37]

Alcatel currently makes two (2) cabinets designed for adjacent collocation; one (1) sized for 224 lines and the other for 672 lines. They can be used for Litespan® or ASAM installations and the larger cabinet can support both.

Use of adjacent cabinets could resolve many of the issues generated by space sharing limitations within existing cabinets, especially the issue of security. A large number of existing cabinets do not have rack or sub-rack cage or cover options, and retrofit costs could exceed the cost of adjacent cabinets (where such retrofits are even possible).[38] Using separate cabinets can also resolve issues regarding power, rectifier and battery capacity and thermal dissipation and EMI issues that may exist in existing cabinets.

On the other hand, installing as few cabinets as possible may be in the public interest. This would avoid the "picket fence" or "tombstone" effect of adjacent or closely located cabinets. This configuration can be accomplished with multiple service providers sharing adjacent cabinets.[39] In such cases, it would also be more efficient to share common transport facilities. That, in turn, could require interconnection between collocation spaces in a serving CO building.[40]

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[37] FNPRM at ¶ 106

[38] In addition, it would not be possible to provide physical access security at the line card level, whether in a cabinet or in a line rack installed in a hut, CEV or building terminal.

[39] One variation of this would be for CLECs who normally build loop infrastructure to install the cabinets and transport facilities and lease space to other carriers, in the same fashion as "CLEC Hotels."

[40] This would have the additional benefit of conserving scarce CO space that would otherwise be consumed by separate, under-utilized transport equipment.

10. CLEC Line Card Collocation

"We invite comment on whether it is feasible for competitive LECs to collocate their own line cards, either physically or virtually, within incumbent LECs' digital loop carriers."[41]

Neither physical nor virtual collocation of a CLEC's own line cards in an ILEC's NGDLC system is feasible. As noted above, NGDLCs are software-controlled systems, and line cards are integral components of these systems. The only line cards that can be installed are those supplied or authorized by the system manufacturer and supported by the system software. Even when supported cards are installed, service is not available until the software controlled configuration and provisioning functions are completed.[42] In the case of Alcatel's Litespan® products, the software can only be accessed by the system owner, subject to the manufacturer's licensing terms and warranty provisions.[43]

Most line cards support multiple customers and some even support more than one type of service on the same card. For instance, current *x*DSL and combination ADSL and POTS line cards are advertised in ranges varying from two (2) to eight (8) lines, and higher capacity cards are under development. Cards supporting POTS and other narrowband services have 2, 4, 6, 8, 12, 24 and even 32 lines.[44] Each card slot is hardwired to the equivalent number of derived cable pairs. Therefore, it should not be assumed that installing or gaining access to a line card, if either option were possible, would be the same as gaining access to an individual copper pair, line or customer.

Furthermore, the cards and slots vary in physical size and connect to backplanes with varying capacities. It would not be physically possible to install cards from other systems (such as DSLAMs) into the same slots. Even if the cards were redesigned mechanically, they could not support the same capacities and features of their native installations.

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41 FNPRM at ¶ 109

42 The EMS is also used for other functions such as security management, inventory management, system surveillance and fault isolation.

43 Licensing is covered under purchase contracts. The contracts also contain warranty provisions that further limit use or modification of the software and prevent the installation of non-compatible components.

44 Litespan's narrowband line cards currently support four services and the slots are hardwired to four cable pairs.

Contrary to reports, state public utility commissions ("PUCs") have not been allowing CLECs to install their own line cards in incumbent LEC DLC systems.[45] Of note is a recent decision[46] in which the Illinois Commerce Commission, citing operational and security reasons, *inter alia*, requires the ILEC to install line cards ("plug-ins") ***for*** the CLEC petitioners. However, even in this ruling, the fact is lost that it takes all system components and software provisioning to derive a service from a line card.[47]

As a line card manufacturer, Alcatel recognizes that it would not be feasible or practical to develop line cards that could be used in a multiplicity of other systems, even if there were no backplane or software access restraints. There must be several dozen (or more) system and software vintages in the country. The combination of mechanical and software requirements that would have to be met would be overwhelming. Likewise, it would be just as difficult for other manufacturers to develop line cards for the many vintages of Alcatel's systems and software releases (if the software were even accessible) along with others.

Fortunately, there are feasible options that allow access or interconnection to the derived services (or virtual facilities) supported by NGDLC systems. The accessibility options vary by service type and need to be reviewed independently. For example, CO collocation access to POTS and other switched narrowband services may be possible through integrated, GR-303 access (in DS-1 increments), or, more commonly, through TR-057 universal digital loop carrier ("UDLC") interfaces. The latter interfaces are wired through the central office MDF, in a similar fashion provided for mainframe terminated copper pairs.[48] For ADSL services, the OC-3c transport facility (in the case of Litespan®) can be routed to an external Optical Concentration Device ("OCD") and then distributed to ILEC advanced services affiliate and CLEC service providers through their CO collocation equipment.[49]

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[45] For instance, in a PRNewswire article, August 24, 2000, "*Rhythms Wins Groundbreaking Line-Sharing Decision in Illinois.*"

[46] ICC 00-312 and 00-313, Consolidated, August 17, 2000, Issue 7, Section D, "Commission Analysis and Conclusion."

[47] In addition, putting the burden of proof that a requested card is incompatible on the incumbent LEC appears unnecessary and overly burdensome, since compatibility is *de facto* determined by the system hardware and software specifications.

[48] Note that Litespan systems support both GR-303 and TR-057 access (as well as TR-008) in the same COT. TR-008 is not considered an unbundling option because of the fixed association between the switch and DLC lines.

[49] Note that similar, multi-provider interconnection or access is not available at a remote terminal.

Of course, neither the unavailable option of CLEC line card installation nor access to the NGDLC derived facilities would satisfy CLECs which want to provide proprietary services or features that are not supported by the incumbent LEC's NGDLC systems. However, this appears to be a limited problem and there are other feasible solutions. For example, proprietary Symmetric DSL ("SDSL") services, which are generally used for business applications,[50] are mostly located within the copper reach limits of the CO collocation space. Locations farther out are typically served by building terminal DSLAMs fed by fiber or copper T-1 transport. In addition, there are other options covered in the *Subloop Unbundling Order*. These options include DSLAM collocation at, or adjacent to a DLC remote terminal or at an FDI or other "accessible terminal" located beyond the RT. Providing such services through the incumbent LEC DLC systems, therefore, appears unnecessary for service delivery

11. Limits on Other *x*DSL Services

"We request comment on whether and to what extent providing service through digital loop carriers owned by an incumbent LEC might prevent a data LEC from offering the xDSL-based services it wishes to offer."[51]

As noted above, there are other options for deploying services (or features and functions) not supported by an incumbent LEC's NGDLC systems. Additionally, continued development of NGDLC features and functions will likely support standard service options over the proprietary services supported by DSLAMs. Therefore, today's service restrictions may eventually dissolve.[52]

In the meantime, not using NGDLC systems to provide the advanced services that they support now would severely limit the deployment of advance services overall. Currently, ADSL is the most important example. ADSL's primary advantage is its ability to provide high-speed access on a line shared with POTS. That advantage is essential for mass deployment to residential and small and medium business customers. Line rate and bandwidth, however, are reduced with distance and interference from other advanced services in the same cable binder

[50] See FCC 00-290, August 3, 2000, Footnote 100.

[51] FNPRM at ¶ 109.

[52] In any case, access to incumbent LEC NGDLC derived service features, as they exist, at least provides CLECs the quality of interconnection or access that the ILECs provide to themselves.

group. Further, the service cannot be provided at all on POTS lines that require loading. For these and other considerations,[53] NGDLC systems with integrated ADSL capabilities are often preferred over CO-based ADSL for customer applications beyond 12 Kft from the CO. This is also the approximate distance where NGDLC tends to be more economical than new copper feeder cables for basic service capacity expansion.[54]

From the standpoint of CLEC service delivery, the availability of NGDLC systems with integrated ADSL services, if they can be shared, provides the easiest way to gain a widespread customer base with a minimum of equipment.

In addition, with the popularity of ADSL, this question should be turned around and asked a different way. "*What effect would the deployment of other non-standard xDSL services have on the rapid and ubiquitous deployment of ADSL, which will satisfy the raging demand of American consumers?*"

Of particular concern to Alcatel is the interference potential of proprietary SDSL lines and other symmetrical services with repeaters. These services can significantly degrade the transmission capabilities of adjacent ADSL lines, similar to T-1 spans. Prior to any action the Commission might take with respect to SDSL, the potential impacts of interference must be reviewed.[55] Incidentally, such services could be segregated onto separate facilities by installing DSLAMs at BT locations, using separate fiber feeds or copper feeds.[56]

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[53] As noted in the FCC's "Second Memorandum Opinion and Order" to the *SBC/Ameritech Merger Conditions* (FCC 98-141; Adopted September 7, 2000). Of particular note here is the advantage of sharing advanced services supported by an ILEC's NGDLC systems among multiple service providers. This applies to providers whose individual service demand may not warrant separate DSLAM or NGDLC equipment. For example, each Litespan® OC-3c ABCU interface currently supports up to 1,024 ADSL lines, each of which can be "groomed" through an OCD to a particular provider.

[54] This does not preclude the possibility of economic NGDLC deployment closer to the central office. Such deployment is often economic where there is inadequate supporting structure (vacant conduit, pole line or buried cable spaces) available for additional copper feeder cables.

[55] Some interest has been expressed in the possibility that ADSL lines originating at remote DLC locations could interfere with ADSL lines originating at the central office. The Litespan ADLU cards have level setting options to mitigate such interference, should it exist.

[56] One option, when available, may be to use G.shdsl lines served by NGDLC systems to substitute for, or replace, SDSL, HDSL and HDSL2 lines with repeaters ("doublers").

B. Fifth Further Notice of Proposed Rulemaking in CC Docket No. 96-98

Networks are being upgraded with fiber transmission facilities and advanced user-based electronics. Deployment of NGDLC facilities is increasing at a rapid pace. In its Fifth Further Notice of Proposed Rulemaking (CC Dkt. No. 96-98), the Commission seeks comment:

> "on whether the deployment of new network architectures, including the installation of fiber deeper into the neighborhood, necessitates any modification to, or clarification of [its] local competition rules, particularly [the] rules pertaining to access to unbundled transport, loops, and subloops.[57]"

Alcatel with its NGDLC product line, appreciates the opportunity to assist the Commission in answering this important question.

12. NGDLC Development Plans

"We seek comment from equipment manufacturers regarding their plans to build NGDLC systems in response to carriers' plans."[58]

Alcatel builds NGDLC systems both in advance of and in response to carriers' plans. Specific plans and customer commitments are proprietary, but, as noted previously, Alcatel's development plans are influenced by considerations such as the prevailing regulatory landscape, state of technology evolution, potential demand and development and manufacturing costs.

In relation to near-term service development for Litespan®, Alcatel plans to support HDSL2 and G.shdsl in hardware and software releases next year. Alcatel will also enhance the Litespan® ADSL features.

Historically, Alcatel has relied on direct input from its customers for near-term development plans. With the advent of shared use of equipment supplied to ILECs, Alcatel invites CLECs and advanced services affiliates which are not Litespan® customers to provide input on the features and functions they would like to see developed in Alcatel's systems. This can be done through Alcatel's ILEC customers and/or through Alcatel's local sales channels.

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[57] *FNPRM* at ¶ 118.

[58] FNPRM at ¶ 120