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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

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

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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 <u>within</u> 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.

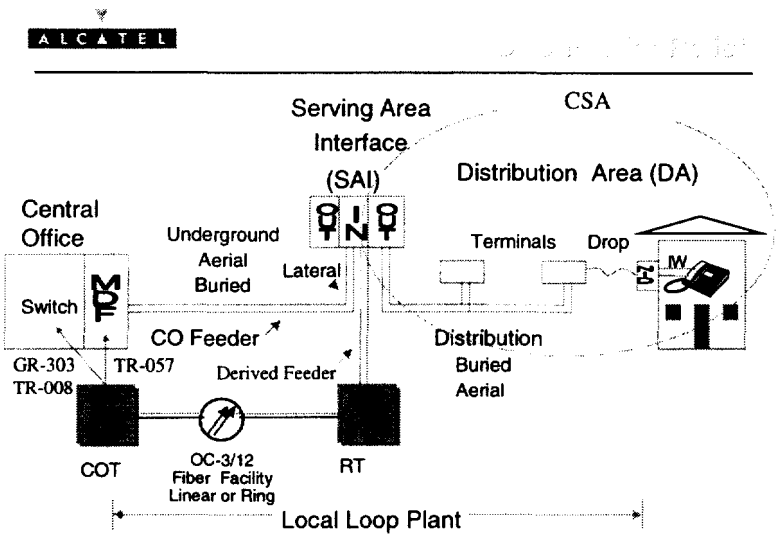

Figure 1

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).

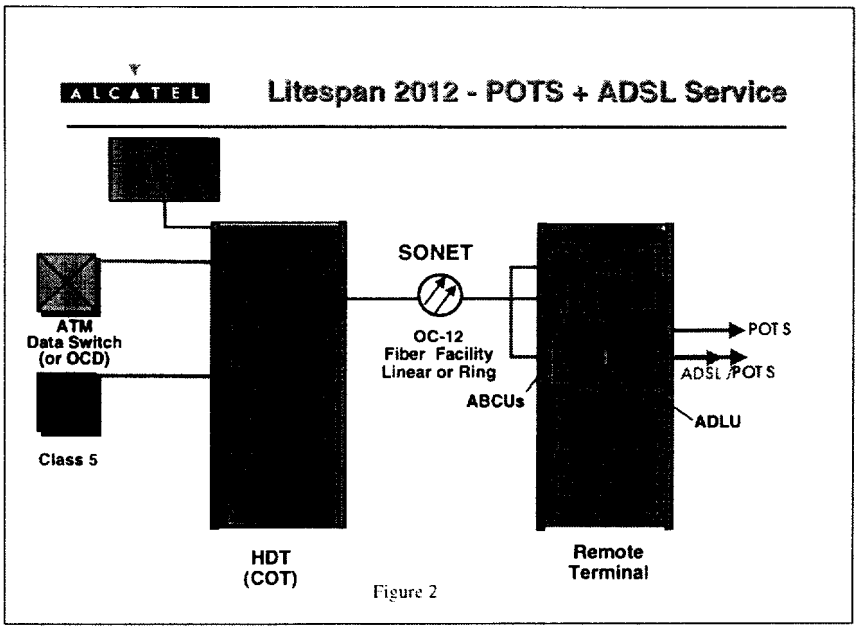

Figure 2

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

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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

13. NGDLC Features and Functions

"We also invite manufacturers of NGDLC systems and other 'next generation' equipment to describe the features, functions, and capabilities of their products, and to indicate whether their products are designed with open or proprietary interfaces." [59]

Alcatel provided system descriptions for its access network equipment above and in attached **Exhibits,** which include descriptions of our Litespan® NGDLC systems.

These systems have both open and proprietary interfaces. The open interfaces include those supporting derived services and facilities at the CO and RTs. The proprietary interfaces are internal system interfaces. They include interfaces supported with the integrated SONET transport modules, inter-shelf cabling, individual shelves, slots and line cards, as well as the system software and element management system access.

14. Subloop Transmission Capacity

"We invite comment on manufacturers' plans to build NGDLC systems and other equipment to maximize the transmission capacity of the subloop."

As noted above, Alcatel currently makes NGDLC equipment with OC-3 and OC-12 transport capacities. There are presently no plans to expand this capacity in the existing systems. However, there are other options for adding transport capacity at remote collocation sites, some of which are noted in the *FNPRM*. These include the use of separate transport facilities, such as paralleling fiber optics and/or wireless equipment, as well as increasing the capacity of the existing fiber external to the remote systems. Options for the latter, include inserting Litespan®-2012 systems or higher speed SONET ADMs to sub-tend the existing NGDLC system and new collocation equipment. Another option is to insert WDM on the existing fiber feed.[60] A third option would use a combination of WDM and ADMs to serve the existing and new equipment. The options may vary significantly in cost in individual cases. In addition, their feasibility depends on available space and enclosure configurations.

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[59] *Ibid.*

[60] As noted in response to the first question, dual-wavelength WDM is currently an option for adding an OC-3c interface at a Litespan®-2000 RT to carry ATM traffic (reserving the existing OC-3 capacity for TDM).

15. Remote Terminal Access

"[I]s it technically feasible for carriers to access the subloop by interconnecting at the remote terminal?"[61]

It is not possible to provide external access to the internal NGDLC components or software, either at CO or at RT locations. The internal components include (but are not limited to) the integrated transport facilities, system controller and channel bank shelves and individual facility and service line cards. The inaccessible software includes the system software as well as direct access to the EMS. The derived services and facilities supported by these systems are accessible, however, as are the copper facilities extending beyond RTs.

Viable options exist for accessing the copper facilities extending beyond RTs. As we have noted elsewhere,[62] the *Line Sharing Order* discussed the use of RTs as accessibility points where they have feeder distribution interfaces ("FDIs"). However, the availability of such interfaces was not included as a condition for such treatment in the actual orders (*see* Appendix C of that document).

The addition of FDIs at RT sites in CSA arrangements, where there would be SAIs in tandem, would jeopardize service reliability with additional activity points that are known sources of failure. In addition, such interfaces would have to terminate all of the pairs extending away from the site, the derived pairs hardwired to the system shelves and the pairs in the initial and future collocation cables. Such interfaces, if they could be developed, would be enormous and would not likely fit in existing (or even conceived) enclosures. Electronic alternatives would be cost prohibitive. Further, it would not be possible to retrofit existing sites with such interfaces without disrupting service and there would be no access security. Fortunately, other options make the addition of such interfaces unnecessary.

In both the *Line Sharing Order* and the *Local Competition Third Reconsideration Order*[63] the Commission includes FDIs and other accessible terminals as options for interconnection. To the extent such terminals exist, and are accessible, there is no need for RT sites to be modified

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61 FNPRM at ¶ 133

62 CC Docket No. 98-141 – Ownership of Plugs/Cards and OCDs

63 Paragraph 218. Note that it refers to "any accessible terminal," not "all" or "every." This suggests that accessibility options at other locations should legitimately be considered before modifications at any one particular location, such as a remote terminal, could be considered "necessary" to gain access to subloop elements.

for additional accessibility or capacity. An example of a widely used location is the "main BT" at major office and multi-dwelling residential buildings. Although there are significant issues with the use of this space, BT closets often have more space available and options for expansion than RTs (especially cabinets) and FDIs. They also have controlled environments, power supplies, and direct access to the building wiring. This makes them preferable in several aspects to RT collocation.[64]

Since distribution pairs terminate directly on FDIs/SAIs, similar to inside wiring at BTs, they would seem to be the next most favorable point of interconnection. Although FDIs/SAIs were not designed for electronic equipment additions,[65] they are ideal points of interconnection in cases where CLECs can install their own NGDLC or DSLAM equipment in adjacent cabinets. Cables can be placed to new terminal blocks (if there is space) or spliced to spare binder groups that are (or can be) connected to unused terminal blocks. Even if an FDI/SAI cabinet has to be enlarged to accommodate more terminal blocks, such a modification that may be preferable to expanding or otherwise modifying RT enclosures.

Alcatel has become aware that some CLECs are concerned that FDI/SAI sites may not have nearby power or fiber facilities. Those cases further support the approach of placing the equipment in separate enclosures, where such access is available, and extending copper feeder cables to the FDI/SAI locations.

However, there can be significant service differentiation advantages for CLECs in placing the remote NGDLC or DSLAM terminals as close as possible to the SAIs, especially when the incumbent LEC's RT is located significantly closer to the CO. With adjacent FDI/SAI installations, higher bandwidth lines such as VDSL[66] can be delivered to most, if not all, of the customers within the associated distribution area. In contrast, less than one-third might be reached from the CSA's remote terminal site.[67]

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[64] As do other vendors, Alcatel has cabinets that are specifically designed for building terminal applications.

[65] They lack essential electronic enclosure design requirements for thermal dissipation and EMI as well as necessary components such as power feeds, rectifiers, batteries and protectors.

[66] VDSL ("Very high-speed Digital Subscribe Line") can support downstream data rates up to approximately 52 Mbps over 1,000 feet and 26 Mbps over 3,000 feet on copper. The latter fits most DA designs in suburban areas, while the former fits most DA designs in high-density urban areas. Although VDSL standards are still evolving, and demand is in its infancy, it is clear such lines can support a wider variety of voice, video and data services.

[67] As noted earlier, CSAs are normally designed to serve two to four distribution areas. They serve customers on loops up to 9 Kft on 26 gauge copper and 12 Kft on 24 and coarser gauge copper, including bridged tap, from the

Where BT and FDI options are not available, other options may exist at a RT site that preclude the need for major equipment or enclosure modifications. As the Commission declares in the *FNPRM* (*see* Footnote 272), one such proposal is access through "engineering controlled splices." With this option, cables from the CLEC's DSLAM or NGDLC equipment could be spliced directly to spare cable binder groups in the RT's derived feeder cables.

There is another option that can be employed on a limited basis. Alcatel supplies connector kits with its mini-RAMs that allow individual ADSL lines to be connected directly into the fuse slots of RT protector terminals. The connectors include splitters, so the high frequency ADSL lines can be separated from the POTS lines served by the DLC system. Since these are individual jumpers and not cables, however, they create the risk of non-standard wiring arrangements. This, in turn, could reduce service reliability and restrict access to other equipment.[68] Further, there are no access security options for the protectors.

Still, with the small size of the mini-RAMs themselves, this option is ideal for low demand applications. Of note are rural areas with traditional DLC systems that cannot be upgraded with ADSL.[69] Although "packet equipment" has generally been excluded from the unbundling rules, and may be further restricted under merger terms and conditions, Alcatel feels consideration should be given to allowing ILECs to install these systems. The incumbents could share the derived facilities on a non-discriminatory basis with CLECs (and advanced services affiliates).

IV. Conclusion

Achieving the promise of full competition necessitates open and fair collocation requirements. All service providers must be given non-discriminatory access to ILEC facilities so that they can offer their intended service.

In the *FNPRM* and in related proceedings, the Commission is carefully navigating among various competing interests in its efforts to fulfill Congress' collocation mandate. As these

RT. With this "hub" design, it is unlikely that all of the customers in even the closest DA would be within VDSL reach at the 26 or 52 Mbps rates.

[68] Although we are not aware of formal guidelines for the use of these connectors, we understand that 8 -16 lines can normally be connected without significant obstruction or service concerns. Careful consideration should be given to the long-term effects of connecting more lines in this fashion.

efforts move forward, the Commission always has been mindful of how important equipment manufacturers are to this process and it has consequently acted with their best interest in mind.

This strong commitment to equipment manufacturers must continue as decisions are made on the issues raised in the *FNPRM*. Of utmost importance is the need for the Commission to establish a "bright line" demarcation between open network interface standards, which are subject to Section 251(c)(6) of the Act, and proprietary network interface standards, which are not subject to such mandated interoperability requirements. Alcatel, herein, has provided the Commission with sufficient information to make this critical distinction.

Proprietary interface standards for line cards must be protected fully. Collocation of an outside party's line cards is not feasible. The DSLAMs and NGDLCs vital to collocation are software controlled and line cards are integral components of these systems. Only manufacturer-supplied or manufacturer-authorized line cards can be installed, supported by system hardware, and properly serviced. However, access to line cards certainly can be provided to standard service and network interfaces. Making line cards subject to collocation would retard manufacturer R&D efforts significantly because there would be no incentive to develop and then protect this technology.

Imposing such safeguards on line cards would not preclude competitive carriers from exploiting collocation fully. Numerous interface options are available. Thus, the public interest obligates the Commission to rule that line cards and related embedded system components are not subject to collocation requirements.

The Commission also wisely solicited information on current and proposed network platforms designed to facilitate collocation. Alcatel, as detailed herein, clearly leads the way in providing the equipment and support to make full collocation a reality.

Alcatel's multiplexing equipment, which includes SONET ADMs and digital and optical cross connect systems, as well as DSLAMs and NGDLCs, is both efficient and necessary for collocation to flourish.

[69] As with other DSLAMs, this application still requires case-by-case reviews of space, power and thermal and EMI limits. In addition, security and accessibility issues suggest limiting installation and operation to the DLC owners.

Installation of advanced service capabilities in NGDLC systems would expand the deployment of those services through the shared use of the systems. Other options exist for unsupported services while market driven enhancements to the cards, systems and software progress.

In addition, Alcatel has several sizes of RT systems and cabinets, as well as cabinets designed for adjacent installations. With these products, myriad options are available for accessing subloop facilities at and beyond NGDLC remote terminal sites. These options moot the need to modify or expand RT sites or to place additional requirements or restrictions on the shared use of derived services, moot the need for other, unavailable options, such as access to internal system components, including line cards.

The Commission clearly is proceeding in the right direction. Fully competitive collocation certainly would be possible with the equipment Alcatel and other manufacturers are developing, with the sensitivity to carrier needs displayed by ILECs and CLECs alike, and with adoption of the limitations on interface requirements set forth herein.

Respectfully submitted,

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Exhibit 1 -- Alcatel 1603 SMX Features

Key features of the Alcatel 1603 SMX system include the following:

- STS-1 level bandwidth management across the entire OC-48
- Payload using DS1 Grooming and drop capability
- Temperature Hardened Optics (-40+65C) for deployment flexibility
- Advanced architecture for reliability and network optimization
- Ethernet drops (up to 16 ports)
- Compact footprint and reduced power usage
- T-Mux (M13 in a card) feature -- provides DS-3 to VT-mapped STS-1 payload conversion
- Simplified network management and FTP software download functions
- Easy in-service, in-shelf upgrades from OC-3 to OC-12 to OC-48 to OC-192
- Alcatel 1301 Network Element Manager and 1320 Network Manager Support

Interfaces supported by the 1603 SMX include:

- DS1 (112)
- DS3/STS-1 (48)
- OC-3 (16), STS-3c
- OC-12 (4), STS-12c
- OC-48
- 10/100 BaseT
- T-Mux

The SMX can operate in various modes and configurations, including:

- Terminal
- Linear ADM
- 2-fiber Unidirectional Switched Path Switched Ring (USPR)
- 2-fiber Bi-directional Line Switched Ring (BLSR)
- Optical Hub

Exhibit 2 -- Alcatel ASAM 7300 Features

Key features of the Alcatel ASAM 7300 are as follows:

System capacity

- Up to 432 lines per 7 ft. rack with splitters
- Up to 648 lines per 7 ft. rack without splitters
- Up to 2,592 DSL lines per network interface
- Up to 5,000 DSL lines per network interface through subtending
- Average power consumption: 1.6 watts per ADSL line
- NEBS level 3 compliant per rack

ATM Network interface cards

- OC-12 (622 MB)
- OC-3 (155 MB)
- DS-3 (45 MB)
- 4 x DS1 IMA (4 x 2 MB)
- Up to 96 MB on-board memory
- Optional 1 + 1 redundancy (APS / EPS)

Line interface cards

- ADSL - Multi-standard auto-detect ADSL
  - ITU G.dmt, ITU G.Lite, ANSI TI.413
  - 12 lines per board
- ANSI HDSL-2, 8 lines per board
- ITU G.shdsl, 12 lines per board
- Passive splitter types: T1E1.413 Issue 2 compliant

ATM service characteristics

- Supported ATM QoS classes
  - UBR, UBR+
  - CBR
  - rt/nrt-VBR
  - GFR

Exhibit 2 (Cont'd) -- Alcatel ASAM 7300 Features

- Multi-QoS per line
- Up to 12,000 connections (PVC / SVC) per system
- Up to 16 connections (VCs) per line

Central office equipment

- 30.5 in. (18U) high x 21.5 in. wide x 12 in. deep
- Up to 12 shelves on a single network interface

Remote equipment

- Dual level multiplexing architecture via remote ASAMs
- Connection to host via 4 x DS1 IMA
- 48-line and 216-line shelves, temperature hardened
- 8-line mini-RAM for 23 in. racks

Exhibit 3 -- Litespan®-2000 & -2102 Features

Key features of the Litespan®-2000 are as follows:

- Highly reliable architecture with fully redundant protection schemes
- SONET OC-3 optical digital loop carrier
- Ring, multiple remote, point-to-point, stand-alone, and dual feeder configurations
- Compliance with TR-057, TR-008, and GR-303 switch interfaces
- Copper and fiber-to-the-curb solutions using the Starspan® and ENU platforms
- Full suite of narrowband special services
- WDM support
- Maintenance cost reduction
- High density footprint
- NEBS compliant
- SONET add/drop for distributed bandwidth
- 7-layer OSI stack for SONET data communications channel interoperability
- GUI interface for element management
- Temperature hardened
- Asynchronous/byte-synchronous HDSL
- TCP/IP or X.25 interfaces for remote operations, administration, maintenance, and provisioning ("OAM&P")
- Integrated DMT or CAP ADSL
- ADSL DMT chipset same as Alcatel's ASAM
- G.Lite support for ADSL DMT (future)

The Litespan®-2012 system has the above features along with the following:

- SONET OC-12 digital loop carrier
- SONET OC-3, OC-3c, STS-1 (future), and DS3 facility interfaces
- Utilizes 85% of existing widely deployed Litespan® common control
- Utilizes same channel bank assembly and channel units as Litespan®-2000
- STS-1 drop and continue ring support

- Overlapping virtual ring support with OC-3 for transporting ATM and TDM traffic back to the central office (eliminating the need for WDM)