FCC MAIL SECTION

Before the
Federal Communications Commission
Washington, D.C. 20554

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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

THIRD REPORT AND ORDER IN CC DOCKET NO. 98-147
FOURTH REPORT AND ORDER IN CC DOCKET NO. 96-98

Adopted: November 18, 1999 **Released: December 9, 1999**

Before the Commission: Commissioner Furchtgott-Roth concurring in part, dissenting in part, and issuing a statement.

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I. INTRODUCTION AND OVERVIEW

1. Among the fundamental goals of the Telecommunications Act of 1996 (1996 Act)[1] is the promotion of innovation, investment, and competition among all participants and for all services in the telecommunications marketplace, including advanced services.[2] The Commission has issued three orders in this proceeding to date, and has issued other decisions intended to promote competition in the advanced services market.[3] In this Third Report and Order we take additional, important steps toward implementing Congress's goals for the deployment of competitive advanced services by instituting line sharing obligations for incumbent LECs, and establishing spectrum management policies and rules.

2. Carriers are increasingly transmitting electronic communications in digital, rather than analog form, and by means of "packet switching."[4] Packet-switched transmission of

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[1] Telecommunications Act of 1996, Pub.L. 104-104, Feb. 8, 1996, 110 Stat. 56, codified at 47 U.S.C. § 151 *et seq.* (1996 Act). The 1996 Act amended the Communications Act of 1934. We refer to the Communications Act of 1934, as amended, as the "Communications Act" or the "Act."

[2] Joint Statement of Managers, S. Conf. Rep. No. 104-230, 104th Cong. 2d Sess. 1 (1996) *(Joint Explanatory Statement)*. For purposes of this order, we use the term "advanced services" to mean high speed, switched, broadband, wireline telecommunications capability that enables users to originate and receive high-quality voice, data, graphics and video telecommunications. The term "broadband" is generally used to convey sufficient capacity -- or "bandwidth" -- to transport large amounts of information. As technology evolves, the concept of "broadband" will evolve with it: we may consider today's "broadband" services to be "narrowband" services when tomorrow's technologies appear.

[3] *Deployment of Wireline Services Offering Advanced Telecommunications Capability*, CC Docket No. 98-147, Memorandum Opinion and Order and Notice of Proposed Rulemaking, 13 FCC Rcd 24012 (1998) (*Advanced Services Order and NPRM); Deployment of Wireline Services Offering Advanced Telecommunications Capability*, CC Docket No. 98-147, First Report and Order and Further Notice of Proposed Rulemaking, 14 FCC Rcd 4761 (1999) (*Advanced Services First Report and Order or Advanced Services First Report and Order and FNPRM*); *Deployment of Wireline Services Offering Advanced Telecommunications Capability*, CC Docket No. 98-147, Second Report and Order, FCC 99-330 (rel. Nov. 9, 1999) (*Advanced Services Second Report and Order*). *See also GTE Telephone Operating Companies Tariff No. 1*, Docket No. 98-79, Memorandum Opinion and Order, 13 FCC Rcd 22466 (1998); *1998 Biennial Regulatory Review – Modifications to Signal Power Limitations Contained in Part 68 of the Commission's Rules*, CC Docket No. 98-163, Notice of Proposed Rulemaking, 1998 WL 614472 (Sept. 16, 1998); *Paradyne Corporation Petition for Waiver of the Signal Power Limitations Contained in Section 68.308(e) of the Commission's Rules*, File No. NSD-L-98-93, Order, 14 FCC Rcd 4496 (Com. Car. Bur. Network Servs. Div. 1999) (*Paradyne Order*); *Petition for Waiver of the Signal Power Limitations Contained in Section 68.308(e) of the Commission's Rules*, File No. NSD-L-98-135, Order, DA 99-1350, 1999 WL 556954 (Com. Car. Bur. Network Servs. Div., rel. Jul. 30, 1999) (*Nortel Order*).

[4] *See, e.g., Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996*, CC Docket 98-146, Notice of Inquiry, 13 FCC Rcd 15280, 15287-88, paras. 20-22 (1998) (*Section 706 Report to Congress*). Digital transmission technologies have been used for some time in the network 'backbone' facilities, and now are starting to appear in the local feeder and distribution plant. Packet switching technologies segment information into small pieces, called packets, assigning each packet identifying characteristics as well as a destination address. The packets traverse the network, often following many different physical paths, until they arrive at their destination and are reassembled. *See* Newton's Telecom Dictionary, 14th Ed. 1998, at 527.

information promises a revolution in information services, communications services, and entertainment by offering businesses, residential users, schools and libraries, and other end users the ability to access and send large amounts of information quickly, reliably, and at low cost across the street or across the globe. Moreover, for wireline carriers, digital subscriber line technologies are making it possible for ordinary citizens to access various networks, such as the Internet, corporate networks, and governmental networks, at high speeds through the existing copper telephone lines that connect their residences or businesses to the incumbent local exchange carriers' (LEC's) central office. The existing infrastructure is beginning to be used in new ways that make available to average citizens a variety of new services and vast improvements to existing services. The ability of all Americans to access these high-speed, packet-switched networks will spur the growth and development of our nation.

3. Incumbent and competitive LECs are beginning to provide xDSL-based services[5] to customers in major markets nationwide.[6] These xDSL-based services provide high-speed connections between subscribers and packet switched networks, over ordinary copper telephone "loops." Because the advanced services market is still in its developmental stage, robust competition among xDSL providers is just beginning to emerge in many markets. The economic realities of providing advanced services have also caused most xDSL providers to market primarily to large business customers. Nevertheless, both incumbent and competitive carriers appear to have recently begun to make some of the technological investment necessary to compete in the provision of advanced services to residential and small business consumers.

4. In this Order we adopt measures to promote the availability of competitive broadband xDSL-based services, especially to residential and small business customers. We amend our unbundling rules to require incumbent LECs to provide unbundled access to a new network element, the high frequency portion of the local loop. This will enable competitive LECs to compete with incumbent LECs to provide to consumers xDSL-based services through telephone lines that the competitive LECs can share with incumbent LECs. The provision of xDSL-based service by a competitive LEC and voiceband service by an incumbent LEC on the same loop is frequently called "line sharing." In addition, we adopt spectrum management

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[5] Today's wireline broadband services include services that use digital subscriber line technology (commonly referred to as xDSL), including ADSL (asymmetric digital subscriber line), HDSL (high-speed digital subscriber line), UDSL (universal digital subscriber line), VDSL (very-high speed digital subscriber line), and RADSL (rate-adaptive digital subscriber line) to send signals over copper wires to packet switches. The small "x" before the letters DSL signify that we are referring to DSL as a generic transmission technology, as opposed to a specific DSL "flavor." Some versions of xDSL are compatible with simultaneous analog voice transmissions over a single copper loop.

[6] Installation of Digital Subscriber Lines (DSLs) grew 300 percent in the United States for the first half of 1999. *SeeTeleChoice, DSL Deployment Surges Well Beyond Projections,* <http://www.telechoice.com/content/pressreleases/08171999.asp> (*TeleChoice Press Release*) SBC Communications Inc. (SBC) has announced plans to invest six billion dollars over a four-year period to provide DSL service to 10 million customers by the end of 1999, and 50 million customers by the end of its four-year plan. Bell Atlantic is accelerating its DSL rollout to deploy advanced services to 21 million customers by early 2000. SBC Communications Inc. News Release, SBC Launches $6 Billion Initiative to Transform it into America's Largest Single Broadband Provider, Oct. 18, 1999, <http://www.sbc.com>. *See also* Roger O. Crockett and Catherine Young, *Industries, Telecommunications, Faster, Faster, Faster*, BUS. WK., Oct. 18, 1999.

policies and rules to facilitate the competitive deployment of advanced services.

5. The record shows that lack of access to the high frequency portion of the local loop materially diminishes the ability of competitive LECs to provide certain types of advanced services to residential and small business users, delays broad facilities-based market entry, and materially limits the scope and quality of competitor service offerings. The record reveals no evidence of substantial technical, economic, operational, or practical barriers to incumbent LEC line sharing with competitors. We believe that line sharing is vital to the development of competition in the advanced services market, especially for residential and small business consumers. We believe that unbundled access to the high frequency portion of the loop can be implemented rapidly and in an equitable manner that balances the needs of both potential competitors and incumbent LECs.

6. In addition, we adopt rules in this Order that apply to spectrum compatibility and management. These rules will significantly benefit the rapid and efficient deployment of xDSL-based technologies. Specifically, we seek to encourage the voluntary development of industry standards while limiting the ability of any one class of carriers to impose unilateral and potentially anti-competitive spectrum management or compatibility rules on other xDSL providers. We believe that the spectrum policies we adopt in this Order will ensure the compatibility of technologies and minimize the risk of harmful spectrum interference among transmission services. As such, these policies will ensure that American consumers will not face undue delay in receiving the benefits of technological innovation.[7]

II. EXECUTIVE SUMMARY

LINE SHARING

- Unbundling Analysis. The high frequency portion of the loop meets the statutory definition of a network element and must be unbundled pursuant to sections 251(d)(2) and (c)(3). An incumbent LEC's failure to provide such access impairs the ability of a competitive LEC to offer certain forms of xDSL-based services. The record shows that lack of access would materially raise the cost for competitive LECs to provide advanced services to residential and small business users, delay broad facilities-based market entry, and materially limit the scope and quality of competitor service offerings. Our decision to unbundle the high frequency portion of the loop is consistent with the 1996 Act's goals of rapidly introducing competition and promoting facilities-based entry. This will promote the rapid deployment of advanced services to all Americans as mandated by section 706 of the 1996 Act.

[7] In this proceeding, we emphasize that we are only addressing line sharing on the network side of the demarcation point; and spectrum management policy pertaining only to the network side of the demarcation point. We clarify that equipment and lines located on the customer side of the demarcation point are subject to Part 68 of our rules. In a separate proceeding, CC Docket No. 99-216, we have held fora and solicited comment on changes to our customer premises equipment (CPE) connection rules under Part 68. *See Common Carrier Bureau Will Hold Fora on Deregulation/Privatization of Equipment Registration and Telephone Network Connection Rules*, Public Notice, CC Docket No. 99-216, DA 99-1108 (rel. June 10, 1999) (*Part 68 Notice*). Thus, the policies and rules promulgated herein do not apply to, and will not affect, CPE.

- Line Sharing Requirements.
  - 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. As additional xDSL-based technologies that can co-exist on the same loop as analog voice service are demonstrated to meet that presumption, incumbents must permit requesting carriers to deploy those technologies as well.
  - Incumbent LECs must provide unbundled access to the high frequency portion of the loop to only a single requesting carrier, for use at the same customer address as the analog voice service provided by the incumbent.
  - Incumbents are not required to provide unbundled access to the high frequency portion of the loop if they are not currently providing analog voice service to the customer.
  - Subject to certain obligations, incumbent LECs may maintain control over the loop and splitter equipment and functions.
- Loop Conditioning. Incumbent LECs must condition loops to enable requesting carriers to provide acceptable forms of xDSL-based services over the high frequency portion of the loop unless such conditioning would significantly degrade the incumbent's analog voice service. We conclude that it would be unreasonable for incumbents to refuse to condition loops under 18,000 feet. For loops over 18,000 feet, an incumbent LEC must make an affirmative showing to the relevant state commission that such degradation will occur.
- Subloops. Incumbent LECs must unbundle the high frequency portion of the loop even where the incumbent LEC's voice customer is served by digital loop carrier (DLC) facilities.
- Operational Issues. The record shows that incumbents should be able to resolve operational issues associated with implementation of line sharing, including modifications to operations support systems, within six months. The record shows that incumbents have a number of process alternatives available and we will allow them the flexibility to choose the best and most economically feasible of them.
- Timing of Implementation. The rules advanced in this Order will go into effect 30 days from the date of publication in the Federal Register. We encourage parties to amend their interconnection agreements to provide for line sharing as soon as possible.
- State Authority. States may, at their discretion, impose additional or modified requirements for access to this unbundled network element, consistent with our national policy framework

SPECTRUM MANAGEMENT

- Standards-Setting. The charter of the Network Reliability and Interoperability Council (NRIC) will be amended to charge NRIC with advising the Commission on spectrum compatibility and management of xDSL-based and other advanced services. In this capacity, NRIC will receive input from industry standards bodies, such as T1E1.4, and monitor developments within them. The NRIC will report periodically to the Commission and prepare recommendations for it.

- Spectrum Compatibility. We decline to adopt a federal rule on specific methods of achieving spectrum compatibility and instead will defer to the conclusions to be reached by industry standards setting bodies on this issue. As a general matter, however, the use of generic power spectral density (PSD) masks and/or a calculation-based approach appears to be the best means to address spectrum compatibility. Taken together, these two mechanisms should protect network integrity while maximizing deployment of new competing technologies.

- Presumption of Acceptability for Deployment. We codify as permanent rules the rules we previously adopted on an interim basis that will govern when a loop technology is presumed acceptable for deployment. The circumstances include when the technology: (1) complies with existing industry standards; (2) has been approved by an industry standards body, the Commission, or any state commission; or (3) has been successfully deployed by any carrier without significantly degrading the performance of other services. We rely upon the states to determine whether a particular technology has significantly degraded the performance of other services.

- Degradation of Signals. Although we recognize the value of objective criteria to measure significant degradation, we do not have a basis in the record before us to adopt specific, objective criteria. We encourage industry standards bodies to continue addressing this issue. Based on the record before us, we believe that an objective measurement of what constitutes significant degradation should account for reductions in a service's distance (reach) and/or speed (rate), among other factors. Until industry standards bodies adopt an objective standard, carriers must apply the subjective standard we previously enunciated in the *Advanced Services First Report and Order*, namely, that significant degradation is an action that noticeably impairs a service from a user's perspective.

- We reaffirm our conclusions from the *Advanced Services First Report and Order* regarding resolution of interference disputes. In the event that a LEC demonstrates to the relevant state commission that a deployed technology is significantly degrading the performance of other advanced services or traditional voice band services, the carrier deploying the technology shall discontinue deployment of that technology and migrate its customers to technologies that will not significantly degrade the performance of other services. We now adopt an exception to this rule: where the only service experiencing interference is itself a known disturber, that service shall not prevail against the newly deployed technology. We conclude that analog T1 service is a known disturber.

- Interfering Technologies. The only permissible forms of binder group management are the

segregation of known disturbers and the use of the spectrum compatibility (interference protection) techniques described above. The states should determine disposition of known interfering technologies. The states may select one or more of several approaches towards disposition of known disturbers, including segregation or sunsetting of known disturbers, consistent with the national policy framework adopted in this Order.

III. BACKGROUND

A. DSL Technology

7. The circuit–switched public telecommunications network (PSTN), which interconnects virtually every home and business, was designed to provide superior voice telephony. Until recently, carriers did not consider the PSTN's architecture well suited for the provision of interactive video or high-speed data communications. Specifically, the PSTN is predominately "circuit-switched," maintaining an end-to-end channel of communication for the duration of each telephone call. Although this is an efficient technique for transmitting ordinary voice telephony, it is not efficient for transmitting digital information. In addition, carriers did not generally consider the copper "local loop," the telephone wire running the "last mile" to each home, capable of carrying more than a relatively modest stream of information.

8. In the near future, xDSL-based technology and packet-switched networks may account for a large portion of the telecommunications facility.[8] xDSL-based technology permits the transmission of data over the copper loop at significantly higher speeds than can be achieved by current "dial-up" analog data transmission systems and circuit-switched network systems.[9] xDSL transmission systems consist of an xDSL terminating device attached to each end of an unmodified copper wire local loop. Combining xDSL-based technology with packet switching is more efficient than circuit-switched networks for the transmission of packetized data.[10]

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[8] Current projections indicate the following expected total xDSL line deployment levels: 575,000 by the end of 1999, 2,107,000 by the end of 2000, 5,103,000 lines by the end of 2001, and 7,655,000 lines by the end of 2002. Note that these numbers combine incumbent and competitive LEC-deployed lines, but excludes HDSL lines. *TeleChoice xDSL Deployment Tracking Survey*, End of Third Quarter 1999, <http://www.xdsl.com/content/resources/deployment_info.asp>. *See also* Robert Rosenberg, *Hard to Beat ATM is the Carrier's Silver Bullet*, America's Network, May 15, 1998, <http://www.americasnetwork.com/issues/98issues/980515/980515_insight.html>.

[9] In the United States, an ordinary voice channel generally allows transmission of digital information at the rate of up to 56,000 bits per second. By contrast, the most widely deployed xDSL service (known as ADSL) allows data to be transmitted to the home or residence at up to several million bits per second, depending on loop length, loop design, and the technology deployed. Provision of xDSL service is subject to a variety of important technical constraints. One is the length of the subscriber loop: ADSL, the most widely deployed xDSL-based service, generally requires loops of less than 18,000 feet using current technology. Another is the quality of the loop, which must be free of excessive bridged taps, loading coils, and other devices commonly used to aid in the provision of analog voice and data transmission, but which interfere with the provision of xDSL services. "Conditioning" loops to remove those impediments, or constructing fiber-based digital loop carrier systems to overcome loop length difficulties, can be expensive.

[10] K.G. Coffman and Andrew Odlyzko, *The Size and Growth Rate of the Internet*, First Monday, Issue 3_10, <http://www.firstmonday.dk/issues/issue3_10/coffman/index.html>.

9. In circumstances in which the xDSL-equipped line carries both POTS ("plain old telephone service") and data channels, the carrier must separate those two streams when they reach the telephone company's central office. Generally, this is done by two pieces of transmission equipment, a Digital Subscriber Line Access Multiplexer (DSLAM) and a splitter.[11] The DSLAM sends the customer's voice traffic to the public, circuit-switched telephone network and the customer's data traffic (combined with that of other xDSL users) to a packet-switched data network. Once on the packet-switched network, the data traffic is routed to the location selected by the customer, for example, a corporate local area network or an Internet service provider. That location may itself be a gateway to a new packet-switched network or set of networks, like the Internet.

B. History of the Proceeding

10. In March 1999, we released the *Advanced Services First Report and Order*, in which we adopted several measures to promote competition in the advanced services market.[12] Specifically, we strengthened our collocation rules and implemented certain spectrum compatibility rules. In the accompanying *Further Notice of Proposed Rulemaking* (*FNPRM*), we solicited comments to guide the further development of spectrum compatibility and management requirements and proposed line sharing requirements to enable competitors to offer advanced services to end-users using the same telephone line the LEC uses to offer voice services. We proposed these measures to enable advanced services providers to develop and deploy more rapidly new technologies and innovative services, benefiting consumers through lower prices and increased product choice.[13]

11. We are aware, however, that US WEST has sought judicial review of the Commission's decision that advanced services, including those utilizing xDSL-based technologies, are either exchange access or telephone exchange services. US WEST further argues that the requirements of section 251(b) and (c) do not apply to its provision of advanced services.[14] We note that the Commission has requested, and has received, a remand from the United States Court of Appeals for the District of Columbia Circuit to address US WEST's argument that the Commission is without statutory authority to require incumbent LECs to

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[11] The splitter's primary function is to separate the high frequency, xDSL signals, from low frequency (voiceband) analog signals traversing the copper loop. In some circumstances, the DSLAM and the splitter are combined in the same piece of equipment.

[12] We initiated this proceeding in August 1998, in response to six petitions suggesting actions we should take to speed the deployment of advanced services by wireline carriers. *See Advanced Services Order and NPRM*, 13 FCC Rcd at 24023, 24035, paras. 21, 47-48 (noting Congress' intent to open local markets to competition by reducing inherent economic and operational advantages possessed by incumbents, particularly with respect to interconnection, access to unbundled network elements, and collocation). *See also Advanced Services First Report and Order and FNPRM*, 14 FCC Rcd 4784-85, at para. 42 nn.100 & 102.

[13] A list of parties that filed comments and replies in response to the *Advanced Services FNPRM* is provided in Appendix A.

[14] US WEST Comments at 56 n.122.

provide access to unbundled elements used in the provision of advanced services.[15] We further note that the Commission has received a more complete administrative record on this matter and we intend to fully address US WEST's arguments in the *Advanced Services Memorandum Opinion and Order and NPRM* remand proceeding.[16] The Commission must address the issues raised by US WEST within 120 days from the date of the D.C. Circuit Court's Order.

12. In remanding back to the agency, the court declined to vacate portions of the *Advanced Services Memorandum Opinion and Order and NPRM* challenged by US WEST. Accordingly, our decision in that Order that xDSL-based services are "either" telephone exchange service or exchange access service remains in effect during the pendency of the *Advanced Services Memorandum Opinion and Order and NPRM* remand proceeding.[17] We therefore have the authority to consider whether unbundling the high frequency portion of the loop meets the impairment standard established in the *Local Competition Third Report and Order*.

IV. LINE SHARING

13. In this section, we adopt a requirement that incumbent LECs unbundle the high frequency portion of the loop to permit competitive LECs to provide xDSL-based services by sharing lines with the incumbent's voiceband services.[18] We find that unbundling this network element is technically feasible, presents no substantial operational issues, is legally justified, and serves the public interest. We also find that line sharing promises to bring broadband access to residential and small business consumers, and conclude that incumbents should be able to provide line sharing within 180 days of release of this Order.[19] Our decisions herein should ensure that residential and small business consumers receive the benefits of competition and innovation promised in the Act.

14. The rules and standards we adopt in this Order build on industry development and technological advances that have occurred in the telecommunications marketplace since the advent of the 1996 Act. Both incumbent LECs and requesting carriers are beginning to deploy innovative technologies to meet the demand for high-speed, high-capacity advanced services. To encourage competition, the market for these services must be conducive to investment and

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[15] *See US WEST v. Federal Communications Commission*, Order No. 98-1410 (D.C. Cir. Aug. 25, 1999).

[16] *See Comments Requested in Connection with Court Remand of August 1998 Advanced Services Order*, Public Notice, CC Docket Nos. 98-11, 98-26, 98-32, 98-78, 98-91, 98-147, Notice, DA No.99-1853 (rel. Sept. 9, 1999).

[17] *Advanced Services Order and NPRM*, 13 FCC Rcd at 24032, para. 40.

[18] Voiceband services, such as POTS, are analog telecommunications services that utilize the lower frequency portion of the local loop spectrum, from 300 Hertz to at least 3000 Hertz, and potentially up to 3400 Hertz, depending on equipment and facilities.

[19] Although, in many areas, incumbent LECs are already providing both voice and xDSL services on the same loop, we believe that incumbents require approximately six months to adapt their "back office" systems to comply with the two-carrier line sharing requirements set out in this Order. *See infra* Sections IV.C.2. and IV.D.4).

innovation, and responsive to the needs of consumers. The requirements we adopt in this Order for access to the unbundled high frequency portion of the local loop are designed to fulfill these criteria, and to be administratively practical and responsive to business needs.

A. Commission Authority to Require Incumbent LECs to Unbundle the High Frequency Portion of the Loop

1. Background

15. In the *FNPRM*, we tentatively concluded that we have authority to require line sharing and sought comment on that tentative conclusion.[20] Competitive LECs, advocacy organizations, and state and federal agencies generally agree that we have authority to mandate line sharing as an unbundled network element (UNE) pursuant to section 251(d)(2) of the Act.[21] Several commenters also argue that we have authority to mandate line sharing as an interstate special access service under sections 201 and 202 of the Act.[22] Incumbent LECs, however, argue that we lack authority to mandate line sharing either as an UNE or as an interstate special access service. Specifically, these commenters claim that the high frequency portion of the loop cannot be considered a network element, that such consideration is premature, and that, regardless of such consideration, access to that portion of the loop is not necessary for advanced service deployment under section 706 of the 1996 Act.[23]

2. Discussion

16. We conclude that we have authority to require incumbent LECs to provide unbundled access to the high frequency spectrum of a local loop pursuant to our authority to identify a minimum list of network elements that must be unbundled on a nationwide basis.[24] Section 251(c)(3) imposes a duty on all incumbent LECs to provide to competitors access to network elements on an unbundled basis.[25] Section 251(d)(2) provides that, in determining which network elements should be unbundled under section 251(c)(3), the Commission shall consider, "at a minimum, whether -- (A) access to such network elements as are proprietary in

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[20] *Advanced Services First Report and Order and FNPRM,* 14 FCC Rcd at 4808, para. 98.

[21] California PUC Comments at 4-5; Oklahoma CC Comments at 17; ALTS Comments at 8; Primary Comments at 5; @link Comments at 5; Prism Comments at 12; NAS Comments at 8-9; NorthPoint Comments at 23, Rhythms Comments at 3-5, Rhythms Reply Comments at 5; Covad Comments at 14; Covad Reply Comments at 4.

[22] ALTS Comments at 4, 14; MCI Comments at 10; Covad Comments at 14-17, 20-23; Intermedia Comments at 2 NAS Comments at 12; NEXTLINK Comments at 1-4, 11; NEXTLINK Reply Comments at 2; NorthPoint Comments at 23.

[23] GTE Comments at 4, 18; RTC Comments at 6-8, 10; US WEST Comments at 17-19.

[24] The Supreme Court decision in Iowa Utils. Bd. supports our authority to develop a national list of unbundled elements. *AT&T v. Iowa Utils. Bd.*, 119 S. Ct. 721, 733 (1999) (*Iowa Utils. Bd.*).

[25] Certain rural telephone companies may be exempt from the unbundling provisions of section 251. *See* 47 U.S.C. § 251(f).

nature is necessary; and (B) the failure to provide access to such network element would impair the ability of the telecommunications carrier seeking access to provide the services that it seeks to offer."[26] As discussed below, we conclude that the high frequency portion of the loop is a network element that must be unbundled pursuant to section 251(c)(3) and section 251(d)(2).

17. Line sharing generally describes the ability of two different service providers to offer two services over the same line, with each provider employing different frequencies to transport voice or data over that line.[27] Section 3(29) of the Act defines a network element as "a facility or equipment used in the provision of telecommunications services" including "features, functions, and capabilities, that are provided by means of such facility or equipment."[28] As discussed in detail below, the frequencies above those used for analog voice services on any loop are a capability of that loop.[29] Therefore, those otherwise unused frequencies that can be used for xDSL or other applications meet the definition of a "network element."

18. Specifically, sections 51.307(d) and 51.309(c) of our rules address the requesting carrier's right to loop access. These rules provide, respectively, that an incumbent LEC must provide competitors with "access to the facility or functionality of a requested network element separate from access to the facility or functionality of other network elements." The rules also state that a requesting carrier is "entitled to exclusive use" of an "unbundled network facility."[30] Consequently, although we conclude that to the extent section 251(d) is satisfied requesting carriers may access unbundled loop functionalities, such as non-voiceband transmission frequencies, separate from other loop functions, they are also "entitled," at their option, to

[26] 47 U.S.C. § 251(d)(2).

[27] *Advanced Services First Report and Order and FNPRM,* 14 FCC Rcd at 4805-06, para. 92. *See* GSA Comments at 5-6; Covad Comments at 4-5 and Affidavit of Anjali Joshi at 2 (Covad Joshi Aff.). Line sharing through the simultaneous use of discrete electromagnetic frequencies on a single wire pair to provide separate communications services, is the only form of line sharing considered in this Order, and is only possible on metallic loops. Thus, fiber-based transmission systems are not considered in this Order, except if specifically noted otherwise.

[28] 47 U.S.C. § 153(29).

[29] This reasoning is consistent with our treatment of other unbundled network elements. For instance, in the *Local Competition Third Report and Order*, we affirmed that switch capabilities, e.g, call waiting, are part of the switching network element because a competitor's ability to access such capabilities are contingent upon access to switching. In the same order, however, we identify sub-loops and Network Interface Devices (NIDs) as separate network elements, even though the loop network element includes sub-loops and NIDs, because a competitor's sub-loop or NID access is not contingent upon its access to the entire loop. *See Implementation of the Local Competition Provisions of the Telecommunications Act of 1996,* CC Docket No. 96-98, Third Report and Order and Fourth Further Notice of Proposed Rulemaking, FCC 99-238, at paras. 163-318 (rel. Nov. 5, 1999) (*Local Competition Third Report and Order*). *See also Iowa Utils. Bd.*, 119 S. Ct. at 734 (discussing the breadth of the network element definition in section 153(29) and the reasonableness of our earlier decisions). In this Order, we identify the high frequency portion of the loop as a separate network element because a competitor need not access the entire loop to utilize only the high frequency portion.

[30] 47 C.F.R. §§ 51.307(d)), 51.309(c).

exclusive use of the entire unbundled loop facility.[31]

19. Under the interpretation of section 251 that underlies these rules, we conclude that we have authority pursuant to section 251 to require unbundled access to the high frequency spectrum of a local loop so that carriers may use those frequencies to provide xDSL-based services while the incumbent LEC uses the voiceband frequencies for analog voice service. In light of our conclusion below to designate the high frequency spectrum as an unbundled network element, we need not and do not address the arguments of some parties that we have authority to order line sharing as a special access service.[32]

B. Designation of High Frequency Loop Spectrum as an Unbundled Network Element

1. Background

20. In the *Advanced Services FNPRM*, we tentatively concluded that incumbent LECs must provide requesting carriers with access to "the transmission frequencies above that used for analog voice service on any lines that LECs use to provide exchange service."[33] We observed that without line sharing, a competitive LEC's ability to competitively provide advanced services is impaired because the competitive LEC must obtain a new unbundled loop from the incumbent LEC to provide advanced services, while the incumbent LEC can provide advanced services, at little additional expense, by using the existing local exchange service line. We also noted that line sharing would enrich consumer choice by enabling customers to keep their analog voice service with the incumbent local exchange company, while choosing a competitive LEC to provide high-speed digital services over the same line without incurring the additional expense of a second line.[34]

21. Additionally, we sought comment on whether we should more precisely define the network element that would permit shared line access, so that it is clear to all parties what the incumbent must unbundle to satisfy our line sharing requirements.[35] In particular, we asked commenters to evaluate the possibility of setting a specific dividing line between a low frequency channel and a high frequency channel on the loop. We were concerned, however, that doing so would arbitrarily freeze technological development and deny carriers opportunities to use the loop to provision services that use different frequency bands.[36] We tentatively concluded that our line sharing requirements should not mandate a particular technological approach to the use of a

[31] Covad Comments at 19, n.34. *See also* ALTS Comments at 15.

[32] *See, e.g.*, Covad Comments at 14-18; NEXTLINK Comments at 4.

[33] *Advanced Services First Report and Order and FNPRM*, 14 FCC Rcd at 4808, para. 99.

[34] *Id.*, 14 FCC Rcd at 4806-07, para. 96.

[35] *Id.*, 14 FCC Rcd at 4809, para. 100.

[36] *Id.*

line for multiple services.[37]

22. We recently set forth our framework for determining which elements should be unbundled pursuant to sections 251(c)(3) and 251(d)(2).[38] We look first to what is happening in the marketplace to determine whether and to what extent alternatives to the incumbent's facilities are available. In the *Local Competition Third Report and Order*, we concluded that the incumbent LEC's failure to provide a non-proprietary element "impairs" a requesting carrier if, considering the availability of alternative elements outside the incumbent's network, lack of access to that element materially diminishes the requesting carrier's ability to provide the services it seeks to offer.[39] In determining whether alternative sources of network elements are actually available as a practical, economic, and operational matter, we look at specific factors including cost, ubiquity, quality, timeliness, and operational impediments.[40]

23. In the *Local Competition Third Report and Order*, we stated that in addition to the "necessary" and "impair" standards set out in section 251(d)(2), the language of section 251(d)(2) and the Supreme Court decision suggest we should consider whether unbundling is consistent with the overall goals of the Act. We thus consider whether creating an unbundling obligation would (1) encourage competitors to rapidly enter the local market to serve the broadest number of consumers; (2) advance the development of facilities-based competition, while encouraging investment and innovation in new technologies and services; (3) reduce regulation where warranted; (4) provide market certainty to facilitate the creation and execution of viable new business plans; and (5) be administratively practical to apply.[41] We refrained, however, from assigning any particular weight to the individual factors, but stated that we would consider the relationship among various factors when determining whether a particular network element should be unbundled.[42]

24. In the *Local Competition Third Report and Order*, we applied the necessary and impair standards and weighed the above factors to establish a list of network elements that must be unbundled on a national basis.[43] In addition, several parties to that proceeding requested that

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[37] *Id.*, 14 FCC Rcd at 4809, para. 101.

[38] *Local Competition Third Report and Order*, at paras. 21-116.

[39] *Id.*, at para. 51.

[40] *Id.*, at paras. 62-100.

[41] *Id.*, at paras. 101-116.

[42] *Id.*, at para. 106.

[43] The national list of unbundled network elements adopted in the *Local Competition Third Report and Order* include: (1) local loops, including dark fiber and high-capacity loops; (2) subloops; (3) network interface devices; (4) local switching, except under certain conditions; (5) interoffice transport; (6) signaling and call-related databases; (7) operations support systems; and (8) in very limited situations, packet switching. 47 C.F.R. § 51.319; *Local Competition Third Report and Order*, at paras. 163-465.

we identify access to the high frequency spectrum of a local loop as a network element that must be unbundled.[44] We declined to address unbundled access to the high frequency spectrum of a local loop in the *Local Competition* proceeding, however, because the record in the instant proceeding more fully addresses this matter.

2. Discussion

25. As discussed below, we conclude that access to the high frequency spectrum of a local loop meets the statutory definition of a network element and satisfies the requirements of sections 251(d)(2) and (c)(3). It is technically feasible for an incumbent LEC to provide a competitive LEC with access to the high frequency portion of the local loop as an unbundled network element.[45] An incumbent LEC's failure to provide access impairs the ability of a competitive LEC to offer, on a competitive basis, certain forms of xDSL-based service that are capable of line sharing with voice services. The record shows that lack of access to the high frequency portion of the local loop would materially raise competitive LECs' cost of providing xDSL-based service to residential and small business users, delaying broad facilities-based market entry, and materially limiting the scope and quality of competitors' service offerings.[46] Moreover, access to the high frequency portion of the loop encourages the deployment of advanced telecommunications capability to all Americans as mandated by section 706 of the 1996 Act. Because some residential and small business markets may lack the economic characteristics that would support competitive entry in the absence of access to the high frequency spectrum of a local loop, it is clear that spectrum unbundling is crucial for the deployment of broadband services to the mass consumer market.

a) Definition

26. We define the high frequency spectrum network element to be the frequency range above the voiceband on a copper loop facility used to carry analog circuit-switched voiceband transmissions.[47] We affirm our tentative conclusion that any rules we adopt should not mandate a particular technological approach to the use of a line for multiple services.[48] As

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[44] A list of parties that filed comments relating to spectrum unbundling in response to *Implementation of the Local Competition Provisions of the Telecommunications Act of 1996*, CC Docket No. 96-98, Second Further Notice of Proposed Rulemaking, FCC No. 99-70 (rel. Apr. 16, 1999) (*Local Competition Second FNPRM*) is provided in Appendix A.

[45] *See infra* Section IV.C.2.

[46] California PUC Comments at 5; Oklahoma CC Comments at 4, 11; ALTS Comments at 6-7, 12; @link Comments at 4; CIX Comments at 2, 10; Covad Comments at 2, 18-22, 36-38; Inline Comments at 3; NAS Comments at 3-5, 10; NorthPoint Comments at 9-15; Primary Comments at 6; Prism Comments at 12; Rhythms Comments at 6.

[47] *See infra* Section IV.C.2. for a technical description of voiceband and non-voiceband copper loop transmission frequencies. We note that the issue of whether the voiceband meets the definition of a network element that must be unbundled pursuant to sections 251(d)(2) and (c)(3) is not before the Commission in this proceeding.

[48] *Advanced Services First Report and Order and FNPRM,* 14 FCC Rcd at 4809, para. 101.

we acknowledged in the *Advanced Services First Report and Order and FNRPM*, line sharing relies on rapidly evolving technology and our requirement that incumbent LECs provide the high frequency spectrum of a local loop as an unbundled network element should stimulate technological innovation.[49] We seek to ensure that, in the future, carriers are not denied the opportunity to provision services that rely on different frequency bands within the loop. Consequently, we do not set a specific dividing line between the low frequency channel and a high frequency channel on the loop.[50]

27. As we discuss in detail in section IV.D.1.b) below, we support the use of any transmission technology that is presumed acceptable for shared-line deployment with analog voice service according to the criteria already identified in the *Advanced Services First Report and Order and NPRM* and codified herein.[51] We note that industry standards are constantly evolving, and are supported by carriers that share mutual interest in avoiding service quality degradation. We believe that compliance with the criteria supporting a presumption of technical acceptability that we identify in section V.B.3 of this Order will facilitate the development and deployment of new technologies that utilize the high frequency spectrum of the local loop to provide consumer services, while ensuring the integrity of the PSTN and legacy services.

b) Proprietary Concerns Associated with Requiring Access to the High Frequency Spectrum of the Local Loop

28. The record indicates that there are no proprietary concerns associated with unbundled access to the high frequency spectrum of the local loop.[52] No commenters argue that

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[49] *Id.*

[50] This "dividing line" is generally referred to as the "guard band." We do not define specifically the frequency ranges for voiceband, guard band, and advanced services transmissions. We believe that doing so may risk arbitrarily freezing technological development, and our intention in this order is to ensure that the high frequency spectrum network element definition will apply to new, as well as current, technologies that do not interfere with the provision of analog voice service. Instead, we rely on a presumption of acceptability for deployment. *See infra* Section V.B.3.

[51] *Advanced Services First Report and Order and FNPRM,* 14 FCC Rcd at 4802-05, paras. 80-91. A loop technology is presumed acceptable for deployment when the technology meets any one of the following circumstances: (1) it complies with existing industry standards; (2) it is approved by an industry standards body, the Commission, or any state commission; or (3) it has been successfully deployed by any carrier without "significantly degrading" the performance of other services. *See infra* Section V.B.3. Some xDSL technologies can "share lines" with voice service, because they do not use the frequencies in or immediately above the voiceband, thus ensuring compatibility with concurrent voiceband traffic. Not every xDSL technology, however, can be used for line sharing. HDSL and SDSL, for example, utilize voiceband frequencies, and thus are not acceptable for deployment on a shared line. *See* Covad Comments at 5.

[52] *See* ALTS Comments at 11-13; NAS Comments at 8-9; NorthPoint Comments at 26-27; Rhythms Reply Comments at 8. In the *Local Competition Third Report and Order*, we stated that section 251(d)(2) establishes separate standards that apply to proprietary and non-proprietary network elements. Specifically, we stated that the "necessary" standard in section 251(d)(2)(A) is a higher standard that applies to proprietary elements or to proprietary functions within an element, and that the "impair" standard in section 251(d)(2)(B) applies to non-proprietary elements. In that order, we adopted a limited definition of "proprietary" that generally tracks the intellectual property categories of patent, copyright, and trade secrets. A proprietary network element is

loop spectrum is proprietary under section 251(d)(2)(B). We do not discern any copyright, patent, or trade secrecy implications to unbundled access to the high frequency spectrum UNE. Carriers do not generally rely upon loop spectrum to differentiate themselves from their competitors. Thus, the high frequency spectrum is not proprietary, and we need not analyze requiring access to this unbundled loop spectrum according to the "necessary" standard. We therefore apply the "impair" standard of section 251(d)(2), to determine whether the high frequency portion of the loop is subject to the Act's unbundling obligations.

c) Analysis for Unbundled Access to the High Frequency Spectrum of a Local Loop Network Element

29. Applying the standard we announced in the *Local Competition Third Report and Order*, we conclude that a lack of access to high frequency spectrum of a local loop impairs a competitive carrier's ability to offer certain forms of xDSL-based service. As described below, just as the loop itself remains a facility available only from an incumbent LEC, so too is a competitor seeking to offer certain xDSL-based services impaired if it does not have access to the high frequency spectrum of the local loop available from an incumbent LEC.[53]

30. We recognize that in the *Local Competition Third Report and Order*, the Commission concluded that cable companies and competitive LECs are actively deploying xDSL-based advanced services.[54] We held there that competitors are not impaired in their ability to provide advanced services to medium and large business users without access to the incumbents' packet switching, a component of xDSL based advanced services. We found that requesting carriers may be impaired in their ability to offer xDSL-based services to residential and small business customers without packet switching capability, but declined to order unbundling of incumbent LEC packet switching capability because of the nascent nature of the advanced services market.[55] However, we also specifically stated that impairment with regard to residential and small business segments may be due "in part, to the cost and delay of obtaining collocation in every central office where the requesting carrer provides service using unbundled loops."[56] Thus, our impairment analysis for packet switching rests in part on the assumption that the impairment results from the intermediate step of getting to the loop, not from use of the loop.

"necessary" within the meaning of section 251(d)(2)(A) if, taking into consideration the availability of alternative elements outside the incumbent's network, including self-provisioning by a requesting carrier or acquiring an alternative from a third party supplier, lack of access to that element would, as a practical, economic, and operational matter, preclude a requesting carrier from providing the services it seeks to offer. *Local Competition Third Report and Order*, at paras. 34-40.

[53] We note that the 1996 Act does not permit the leveraging of a historic monopoly into a nascent industry or market. *See generally*, 47 U.S.C. § 251. Section 706 of the Act, however, encourages us to facilitate consumer access to low cost, high speed advanced services. Line sharing supports both of these mandates. *See* Pub.L. 104-104, Title VII, § 706, Feb. 8, 1996, 110 Stat. 153, reproduced in the notes under 47 U.S.C. § 157.

[54] *Local Competition Third Report and Order*, at para. 307.

[55] *Id.*, at para. 306.

[56] *Local Competition Third Report and Order*, at para. 306.

Using the loop to get to the customer is fundamental to competition. The issue before us now, whether competitive LECs are impaired without access to the high frequency portion of the loop when they seek to provide various forms of xDSL-based services, is a different question than whether requesting carriers are impaired without access to unbundled packet switching.

31. Section 251 requires incumbent LECs to provide unbundled access to a network element where lack of access impairs the ability of the requesting carrier to provide the services that it seeks to offer.[57] In the *Local Competition Third Report and Order*, we found that it is appropriate to consider the specific services and customer classes a requesting carrier seeks to serve when considering whether to unbundle a network element.[58] In general, competitive LECs seeking access to the unbundled high frequency portion of the loop only seek to offer voice-compatible xDSL-based services.[59] We thus ask whether such carriers are impaired in their ability to offer such services without access to this network element.

32. As part of this analysis, we need to consider actual market activity. As we stated in the *Local Competition Third Report and Order,* what is occurring in the marketplace is relevant to our analysis of whether the cost of self-provisioning an element or obtaining it from a third party impairs the ability of a requesting carrier to provide the service it seeks to offer. [60] Looking to the marketplace, we find that most xDSL lines have been deployed to residential or small business consumers, and incumbent LECs provide service on the vast majority of these lines where their xDSL-based service shares the line with their voice service. According to one survey, incumbent LECs have gained a more than 17-1 advantage in deploying voice-compatible xDSL-based services to residential and small business subscribers. In contrast, competitive carriers are generally not providing voice-compatible xDSL-based services to residential and small business consumers. [61]

33. There is no question that incumbent LECs are offering xDSL on the same line as their voice service, and competitive LECs are at a significant disadvantage in offering xDSL-based services over the same line that is used to provide voice service. Incumbent LECs generally deploy forms of xDSL-based services that can coexist with voice service on a single line.[62] This enables incumbent LECs to utilize the full capacity of the copper local loop to

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[57] 47 U.S.C. § 251(d)(2).

[58] *See Local Competition Third Report and Order*, at para. 84.

[59] GSA Comments at 7; ALTS Comments at 12; Covad Comments at 32-35; NAS Comments at 4-5; NorthPoint Comments at 14-15.

[60] *See Local Competition Third Report and Order*, at para. 82.

[61] Specifically, at the end of the third quarter of 1999, incumbent LECs served approximately 178,000 residential and small business customers, while competitive LECs served less than 11,000. *See* Telechoice Deployment Tracking Survey at 1, <http://www.xdsl.com/content/resources/deployment_info.asp>. (*TeleChoice Survey*).

[62] For instance, Ameritech uses ADSL. *See* Ameritech SpeedPath Frequently Asked Questions for Homes, <http://www.ameritech.com/navigation/site/1,1935,233,00.htm>.

efficiently provide both voice and data service to a customer. As discussed below, competitive LECs seeking to deploy xDSL-based service to customers subscribing to the incumbent LEC's voice telephone service cannot deploy their xDSL with the same efficiency or at the same cost. Incumbent LECs currently do not permit competitive LECs to access the high frequency portion of the loop to provide xDSL-based services, even though the incumbent LECs utilize the high frequency portion of the loop to deploy their own services. As discussed below, this situation materially diminishes the competitive LEC's ability to provide the particular type of xDSL-based service that it seeks to offer.

34. In contrast, we conclude that competitors are not impaired where they seek to deploy those versions of xDSL-based services that require a dedicated local loop, such as SDSL or HDSL, because they can procure unbundled loops to deploy such service.[63] We recognize that for larger business users, competitive and incumbent LECs have to date maintained a degree of competitive parity, acquiring similar customer volumes.[64] The larger business market tends to favor robust, high-capacity, symmetrical forms of xDSL, such as SDSL. These types of xDSL are not compatible with voice service provided over the same line in a line sharing arrangement, because they utilize the whole loop frequency spectrum. Thus, both incumbent and competitive LECs must deploy these forms of xDSL over dedicated loops. We believe that the comparable levels of market penetration between incumbent and competitive LECs indicates that competitive LECs are not impaired where they can procure unbundled loops to provide these services.[65] Moreover, the record does not indicate otherwise.

35. As discussed below, we are convinced that line sharing will level the competitive playing field and enable requesting carriers to accelerate the provision of voice-compatible xDSL-based services to residential and small business customers who, to date, have not had the same level of access to competitive broadband services as larger businesses.[66] Therefore, because we expect residential and small business customers to demand voice-compatible xDSL-based services, we find that unbundled access to the high frequency portion of the loop offers the best opportunity to see these nascent markets evolve into competitive markets, just as early indications in the high-capacity offerings to larger business customers suggest that competition

[63] *See* 47 C.F.R. § 51.319(a).

[64] By the end of the third quarter of 1999, incumbent and competitive LECs had deployed approximately 41,000 business xDSL lines each. HDSL is not represented in these statistics, nor in the analysis below. HDSL has mostly been deployed by incumbent LECs as a substitute for analog T1 services. *See TeleChoice Survey* at 1.

[65] The TeleChoice survey reveals that competitive LECs have deployed 79 percent of their voice compatible xDSL services to business customers while incumbent LECs have deployed 19 percent of the voice compatible xDSL service to business customers. In the residential market, competitive LECs have deployed only 21 percent of their voice-compatible xDSL service to the residential market while incumbent LECs have deployed 81 percent of their voice-compatible xDSL service to the residential marketplace. The survey also points out that small business users generally choose the residential offerings of competitive and incumbent LECs. *See id.*

[66] *See generally*, NorthPoint Comments at 15 (arguing that incumbent contentions that competitive carriers are not impaired without shared line access are "nothing more than a naked attempt to extend their voice monopoly into broadband.").

will take hold.[67]

36. Alternatives in the Marketplace. When we look to alternatives in the marketplace, we consider whether the competitive LEC can provide voice compatible forms of xDSL by self provisioning its own loop, by purchasing a second loop from the incumbent, by purchasing the first loop as an unbundled network element, or by obtaining the higher frequency portion of the loop from third party sources. We examine each alternative in turn, using the framework developed in the *Local Competition Third Report and Order*. We conclude that each alternative either is significantly more costly or not available ubiquitously, or both.

37. Self-Provisioning Loops. The record is conclusive that carriers seeking to deploy voice-compatible xDSL-based services cannot self-provision loops.[68] This finding is consistent with our conclusion in the *Local Competition Third Report and Order*, wherein we found that self-provisioning entire loops is not a viable alternative to the incumbent's unbundled loop because replicating an incumbent's vast and ubiquitous network would be prohibitively expensive and delay competitive entry.[69]

38. Second Loop. There are several reasons why purchasing or self-provisioning a second loop is not possible as a practical, operational or economic matter. First, second loops are not ubiquitously available.[70] Refusing to unbundle the high frequency portion of the loop in this situation forecloses competitive access to the segment of consumers that lack additional copper pairs to their homes or small businesses. Where a customer premises is only addressed by one copper loop, or where end users have exhausted the facilities that serve them by installing multiple phone, modem, and fax lines, end users will have no additional facilities available at

[67] Although we highlight the dramatic impact that line sharing promises with respect to residential and small business customers that are more price-sensitive and do not consume high volumes of data transport on a per-line basis, we note that requesting carriers providing voice-compatible xDSL services to medium and large business customers are also impaired without access to the unbundled high frequency portion of the loop. This impairment occurs for much the same reason that requesting carriers are impaired in their provision of voice-compatible xDSL service to residential and small business customers. The impairment suffered by a competitor that cannot access the high frequency portion of the loop to provide voice-compatible xDSL service occurs on a line-by-line basis, in that the incumbent with access to the high frequency portion of a loop will always have an advantage over the competitor lacking such access, regardless of the nature of the customer. So long as the customer is best served with the provision of a voice-compatible line sharing technology, no amount of loop density in a geographic region will alleviate the impairment that the competitor suffers on a per-line basis.

[68] ALTS Comments at 11-12; @link Comments at 5; Covad Comments at 19; Inline Comments at 3; NorthPoint Comments at 7, 27; Rhythms Reply Comments at 4-5; Letter from A. Richard Metzger, Jr., to Lawrence Strickling, Chief, Common Carrier Bureau, Federal Communications Commission, CC Docket No. 98-147, at 2 (filed Nov. 9, 1999) (NorthPoint Nov. 9 *Ex Parte*).

[69] *Local Competition Third Report and Order*, at paras. 188-89.

[70] *Id.* at para. 182. Letter from Florence Grasso, Policy and Program Planning Division, Common Carrier Bureau, Federal Communications Commission, to Magalie Roman Salas, Secretary, Federal Communications Commission, CC Docket No. 98-147, audio tape (filed Sept. 22, 1999) (*Aug. 31 Technical Forum*).

their premises which a competitive xDSL service provider could use to provide service.[71] In those situations, competitive xDSL service providers are precluded from providing the services they seek to offer, and consumers are deprived of the benefits of competition. This is particularly a problem in rural areas, where spare copper facilities are less common.[72] Without a requirement that the incumbent LEC must provide competitors with access to the high frequency portion of these loops, only the voice service provider that already controls the entire loop can provide xDSL-based service to that customer. In virtually all cases, this provider will be the incumbent LEC.[73] Thus, lack of access to the high frequency portion of the loop reduces the efficient use of existing loop plant and diminishes the scope of potential customers to whom competitive LECs can market xDSL-based service, thereby limiting the competitive choices available to consumers for whom additional copper loops are not available.[74] In addition, such lack of access can accelerate the depletion of copper loops in entire communities, necessitating inefficient capital expenditures that will increase costs imposed on consumers and competitors alike. Even if there are spare pairs in the "drop" to a home or business, there are not corresponding pairs in the feeder plant connecting the neighborhood to the central office.

39. Second, if competitive LECs were to purchase or self-provision a second unbundled loop to provide voice-compatible xDSL-based services, their provisioning of service would be materially more costly, and coincidentally less efficient, than purchasing the unbundled high-frequency portion of the loop.[75] The inability of competing carriers to provide xDSL-based services over the same loop facilities that the incumbents use to provide local exchange service makes the provision of competitive xDSL-based services to customers that want a single line for both voice and data applications -- typically small businesses and mass market residential consumers -- not just marginally more expensive, but so prohibitively expensive that competitive LECs will not be able to provide such services on a sustained economic basis.[76] Accordingly, a requesting carrier providing voice-compatible xDSL-based services is impaired without access to the unbundled high frequency portion of the loop.

40. Specifically, incumbent LECs refuse to permit competitive LECs to deploy xDSL-based service to their customers on the same customer loops through which incumbents provide voice services, although incumbents regularly deploy both services on the same loop.[77]

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[71] *See* Oklahoma CC Comments at 12-14; Rhythms Reply Comments at 4; CompTel Reply Comments at 5; NorthPoint Nov. 9 *Ex Parte* at 1.

[72] *See, e.g.,* RTC Comments at 13-16.

[73] *Aug. 31 Technical Forum*; Covad Comments at 22; Rhythms Reply Comments at 4.

[74] NorthPoint Nov. 9 *Ex Parte* at 2; Rhythms Reply Comments at 4-5.

[75] NorthPoint Nov. 9 *Ex Parte* at 1. *See* Rhythms Reply Comments at 4-5; MCI WorldCom Reply Comments at 15. *See also infra* Section IV.E.2.

[76] *See* Covad Comments at 8, 19; NorthPoint Comments at 27.

[77] *See, e.g.,* Oklahoma CC Comments at 11 ("the OCC is convinced that line sharing, if it is to be accomplished, must be mandated by the FCC").

As a result, a competitive LEC providing xDSL to a customer subscribing to an incumbent LEC's voice service must provide a second customer loop for the customer's xDSL service, effectively doubling the line access charges for that customer's voice and xDSL services, and providing a distinct cost advantage to incumbent LEC-provided xDSL products.[78] The record shows that the combined collocation and unbundled loop costs, exclusive of incremental and fixed network, equipment, and overhead costs, incurred by a competitive LEC seeking to deploy xDSL service can exceed 100% of the retail price for the comparable shared-line xDSL that the incumbent offers to the same customer that the competitor is vying for.[79] The record also shows that incumbents charge requesting carriers almost as much or more, on a monthly basis, for an unbundled, conditioned loop, as the incumbent charges its retail customers for xDSL service.[80] This price discrepancy between what an incumbent can charge its customer for its own shared-line xDSL and what a competitor must pay to the incumbent just to gain access to that customer materially diminishes the ability of the competitive carrier to offer voice-compatible xDSL-based services in competition with incumbent LEC.

41. It is not economical for competitive LECs to self-provision or purchase the entire loop as a second line just to obtain access to the high frequency portion of the loop.[81] The record indicates that incumbent LECs generally allocate virtually all loop costs to their voice services, then deploy a voice-compatible xDSL service such as ADSL on the same loop, allocating little or no incremental loop costs to the new resulting service.[82] In contrast, when the competitive LEC

[78] *GTE Telephone Operating Cos. GTOC Tariff No. 1 GTOC Transmittal No. 1148*, CC Docket No. 98-79, Memorandum Opinion and Order, 13 FCC Rcd 22466 (1998) (*GTE DSL Tariff Order*). *See* also NorthPoint Nov. 9 Ex Parte.

[79] For example, in the San Francisco Bay area, NorthPoint's wholesale loop and collocation costs are 116% of Pacific Bell's total retail, residential, shared-line xDSL product price, before NorthPoint begins to recover the incremental and fixed costs of network, equipment, or overhead. NorthPoint Comments at 8.

[80] For example, Bell Atlantic charges $29.95 per month, with volume and term discount, as per Bell Atlantic Trans. No. 1138 for its ADSL service. In Virginia, Bell Atlantic will charge from $19.87 to $41.26 per month for an unbundled, conditioned loop. In Maryland, Bell Atlantic charges from $13.63 to $27.40. In New York, the rates are $21.02 and $28.26. In New Jersey, Bell Atlantic charges from $15.02 to $25.12. In Massachusetts, Bell Atlantic charges from $19.87 to $32.84. In Pennsylvania, the rates range from $13.16 to 27.74, and in Delaware, from $11.68 to $18.21. These prices do not include non-recurring line conditioning costs. Perhaps the most sharply contrasted case is New Hampshire, where Bell Atlantic charges $42.44 per month for an unbundled, conditioned loop, $12.49 above its retail xDSL price. *See* Covad Comments at 20; Rhythms Reply Comments at 8. *See also* 47 C.F.R. § 51.513(c)(1), Proxies for Local Loops.

[81] *See* Covad Comments at 21; NorthPoint Nov. 9 *Ex Parte* at 2 ("in cases where a separate loop is available . . . DSL competitive LECs must incur 'additional non-trivial costs' by purchasing a second loop to serve their customers, whereas an incumbent LEC may use a single copper pair to offer voice and DSL services"); Rhythms Reply Comments at 8-10. *See, e.g.,* Letter from Jonathan Askin, Vice President – Law, ALTS, to Magalie Roman Salas, Secretary, Federal Communications Commission, CC Docket No. 98-147 at 6 (filed July 29, 1999) (ALTS July 29 *Ex Parte*).

[82] *See Bell Atlantic Telephone Cos., et al*, Memorandum Opinion and Order, FCC 98-317 (rel. Nov. 30, 1998) at para. 11 (noting incumbent LEC statements that there are no loop costs to be imputed to ADSL service). *See also* NorthPoint Comments at 7-8 (describing NorthPoint's wholesale loop and collocation costs ranging from 115% to 230% of the incumbent LECs' retail price for residential xDSL services).

procures a second loop, it must pay the incumbent LEC the full price of that unbundled loop as an unbundled network element. The cost of that additional loop often accounts for 30 to 50% of the competitor's total cost of providing service.[83] Thus, the incumbent LEC's voice-compatible xDSL service enjoys substantial cost advantages over a competitive LEC's xDSL offerings.[84]

42. Third, a competitive carrier faces a competitive disadvantage in providing xDSL over a second line when competing against the incumbent's single line offering. The incumbent is able to market its own service to customers as a quick and convenient add-on service, while the competitive carrier must persuade the customer to purchase a second line.[85] For example, Bell Atlantic, BellSouth, and US WEST emphasize in their advertising that consumers can subscribe to their xDSL-based products without incurring the installation and additional monthly expense of acquiring an additional telephone line.[86] In comparison, consumers that desire to obtain xDSL service from competitive LECs must encounter complications and expenses, including the need to arrange for a technician to install service, that do not arise if they procure the exact same service from the incumbent LEC. Providing competitive LECs with access to the high frequency portion of the loop would remove that additional burden from consumers that prefer to obtain xDSL service from competitors.

43. Finally, we disagree with CoreComm that a decision to unbundle the high frequency portion of the loop should be no different than the Commission's analysis of DSLAMs and packet switches, which the Commission decided not to unbundle.[87] CoreComm argues that the same reasons which led the Commission to decline to unbundle packet switching should lead to a Commission decision to refrain from creating a high-frequency portion of the loop UNE. We disagree. Self-provisioning switches is vastly easier, less expensive, less time consuming, less complicated, and less risky than self-provisioning the outside plant that constitutes the ubiquitous loop network. Moreover, when we considered the impairment issue with regard to

[83] *See* Letter from Rodney L. Joyce, Counsel for Network Access Solutions Corp., to Magalie Roman Salas, Secretary, Federal Communications Commission, CC Docket 98-147, at 1 (filed Oct. 13, 1999) (NAS Oct. 13 *Ex Parte*). *See also* Letter from Florence M. Grasso, Covad Communications, to Magalie Roman Salas, Secretary, Federal Communications Commission, CC Docket 98-147, Attachments (filed Oct. 5, 1999) (Covad Oct. 5 *Ex Parte*).

[84] *See* NorthPoint Nov. 9 *Ex Parte*; *See also* Letter from Jason Oxman, Senior Government Affairs Counsel, Covad, to Carol Mattey, Chief, Policy and Program Planning Division, Common Carrier Bureau, Federal Communications Commission, CC Docket No. 98-147 (filed Oct. 13, 1999) (Covad Oct. 13 *Ex Parte*).

[85] Rhythms Reply Comments at 9; Sprint Reply Comments at 5-6; CompTel Reply Comments at 14.

[86] *See* Bell Atlantic Infospeed DSL advertisement, <http://www.bellatlantic.net/home/dsl>; BellSouth FastAccess Service advertisement, <http://services.bellsouth.net/external/adsl>; US WEST MegaBit Services advertisement, <http://www.uswest.com/features/megabit> (stating that MegaBit installation is easy. "We provide the step-by-step instructions, plus a toll free number," indicating that customers can install their own shared-line MegaBit xDSL service. Connecting an additional line requires a technician to visit the customer's premises, adding to installation difficulties and expenses). *See also* Rhythms Reply Comments at 17.

[87] *See* Letter from James J. Valentino, Attorney for CoreComm, to Magalie Roman Salas, Secretary, Federal Communications Commission, CC Docket No. 98-147 (filed Nov. 10, 1999) (CoreComm Nov. 10 *Ex Parte*).

packet switches in the *Local Competition Third Report and Order*, we held that the presence of "multiple requesting carriers providing service with their own packet switches is probative of whether they are impaired without access to unbundled packet switching."[88] To follow CoreComm's line of reasoning in the situation before us, we would be looking at whether competitive LECs have self-provisioned loops, or more precisely, have self-provisioned the high frequency portion of the loop in order to provide xDSL-based services. There can be little dispute that requesting carriers have not duplicated the incumbent LEC's ubiquitous loop plant and generally are not providing service with competitive loop facilities. Thus, we disagree with CoreComm that we should consider loops and packet switches as identical and therefore must be treated similarly for unbundling purposes.[89]

44. Purchasing the First Loop. We believe that if competitive LECs were to provide voice service in addition to xDSL-based service, they would be impaired in their ability to provide the data services they seek to offer. First, concluding that competitive LECs should be able to provide voice service on the customer's first line would impose on requesting carriers all of the cost and operational issues associated with providing circuit-switched voice services. To the extent the competitive carrier invests in its own switching facilities, it would face the same cost and operational impairments associated with collocation and the coordinated cutover process that we found in *the Local Competition Third Report and Order*.[90] Competitive carriers providing voice service would also incur the costs of providing E911 service and number portability.

45. Furthermore, requiring competitive LECs to provide voice services could require large investments in circuit switching network architectures that may have little to do with a requesting carrier's intention to offer advanced data services. Investments in circuit switched networks may only be justified by carriers that have attained sufficient scale and scope economies to justify deploying large-scale circuit switched networks.[91] For other entrants, requiring this investment diverts financial resources and management focus away from competitive LECs' ability to offer advanced services and frustrates a requesting carrier's plan to migrate telecommunication services from circuit switched to packet switched networks.[92] We find that frustrating the development of packet switched networks capable of bringing advanced telecommunications capability to all Americans is wholly inconsistent with the goals of section 706 of the 1996 Act and the deployment of efficient networks.

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[88] *Local Competition Third Report and Order*, at para 306.

[89] *See* CoreComm Nov. 10 *Ex Parte* at 4.

[90] *Local Competition Third Report and Order*, at para. 266. We note that pursuant to our line sharing requirements, requesting carriers may provide data services without the incumbent LEC having to take the voice customer out of service through the coordinated cutover process.

[91] NEXTLINK Comments at 6.

[92] Covad Comments at 34-35; NEXTLINK Comments at 6; Rhythms Reply Comments at 10.

46. In the *Local Competition Third Report and Order*, we stated with regard to subloops, if competing carriers that need only a portion of the loop must either pay for the entire loop or forego access to that loop altogether, many consumers will be denied the benefits of competition.[93] That reasoning applies with equal force here.

47. Incumbents argue that competitors have the same competitive options as incumbents, that they are free to provide both analog voice and data services in combination, using unbundled network elements, and that as a result, competitors are not impaired without access to the high frequency portion of the loop.[94] We acknowledge that self-provisioning a circuit-switched network is not the sole means of providing voice service. In particular, requesting carriers could obtain combinations of network elements and use those elements to provide circuit-switched voice service as well data services.[95] This would relieve a competitive carrier from the need to make significant investments in switching technology that may soon become obsolete.

48. We find, however, that despite its ability to purchase transmission facilities from the incumbent to provide voice service, a competitor is still impaired if it must provide analog voice service in order to enter the market for voice-compatible xDSL services. There are additional costs associated with being a provider of voice service than the cost of the circuit switches. In particular, a competitive carrier would need to develop marketing, billing, and customer care *infra*structure designed to service the needs of its voice customers. In addition, competitive LECs seeking to enter the traditional voice services market must deploy sales and marketing forces, and invest in creating a recognizable brand. To compete against incumbent LECs that have a long history providing voice services, competitors must overcome the substantial goodwill, experience and market power of the incumbent LECs. These factors make it a considerable challenge for competitive LECs to motivate a consumer to adopt a new local exchange provider that offers much the same service that the consumer already receives from the incumbent LEC.[96]

49. We are confident that competitors can rise to this challenge. At this time however, we find that competitive LECs would be impaired even if they attempted to provide multi-service offerings including voice-compatible xDSL services. In addition, we note that it is likely that competitive market entry would take longer to accomplish because competitors would need to develop all of these additional capabilities. To be sure, competitive LECs may well decide to

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[93] *Local Competition Third Report and Order*, at para. 211.

[94] Bell Atlantic Comments at 5-6; GTE Comments at 24, 26; USTA Comments at 5.

[95] In this scenario, a requesting carrier would essentially share the line with itself by attaching a splitter to the loop at a technically feasible point and separating the voiceband from the high frequency portion of the loop to provide both voice and xDSL services.

[96] One means by which the competitor can entice the consumer to switch is to provide analog voice services at a lower price. Local voice service, however, is priced in response to a number of historical, public policy, and regulatory factors, such as Universal Service obligations, and various state and local regulations. Carl Shapiro and Hal R. Varian, *Information Rules*, HARV. BUS. SCH. PRESS, 1999, at 212-214.

diversify their offerings at some point in the future. But such action should occur in response to marketplace forces, not regulatory fiat. To conclude otherwise would be to ignore the statutory directive in section 251(d)(2) that requires the Commission to consider whether a requesting carrier is impaired "to provide the services that it seeks to offer."[97]

50. Our unbundling analysis acknowledges that requesting carriers may address the impairment they face in the absence of line sharing by capturing their own efficiencies and offering integrated or innovative product offerings to customers.[98] For example, in the absence of line sharing, requesting carriers could offer multiple services, such as voice and data, over a single loop to capture the additional revenues associated with local and long distance voice services. Alternatively, requesting carriers could offer innovative bundles of services to customers to counter an incumbent LEC who provides voice and data services on a single loop.[99]

51. As discussed above, however, our unbundling analysis favors an analytical approach that considers the totality of the circumstances a requesting carrier will face, rather than a specific business case analysis, to determine whether lack of access to particular network elements materially diminishes a requesting carrier's ability to provide the services it seeks to offer. We do not rely upon the presence of a particular innovative business plan as a response to whether a requesting carrier is impaired because of the variety and difficulty of predicting the success of such a plan. We held in the *Local Competition Third Report and Order* that "such an approach would require the Commission to make specific assumptions regarding the competitor's business model, including which technology a competitor would choose to deploy, which market a competitor would choose to enter (e.g., business and/or residential), and what services a competitor would choose to offer."[100] We find no evidence in the record to support the conclusion that a requesting carrier's ability to spread the costs of a loop between multiple services fully addresses a requesting carrier's impairment without access to line sharing. Accordingly, we disagree with parties who contend that a requesting carrier can adopt a business plan that requires it to provide voice services to address the impairment associated with the lack of access to line sharing.[101]

52. Nothing in our decision to require incumbent LECs to implement line sharing pursuant to specific rules adversely affects a requesting carrier's ability to provide new services or execute innovative business plans. To the contrary, there is evidence that requesting carriers

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[97] 47 U.S.C. § 251(d)(2).

[98] *See Local Competition Third Report and Order*, at para. 258. ("We find however, that facilities-based competitors need not deploy switches in exactly the same network configuration as an incumbent, thus allowing competitors to achieve their own unique and competitive efficiencies by deploying their own switches.")

[99] *See* Letter from A Richard Metzger, Jr., Counsel for NorthPoint, to Magalie Roman Salas, Secretary, Federal Communications Commission (filed Nov. 4, 1999) (NorthPoint and Tandy Nov. 4 *Ex Parte*).

[100] *Local Competition Third Report and Order*, at para. 257.

[101] *See* Ameritech Comments at 3-6; Bell Atlantic Comments at 2-7; BellSouth Comments at 12-13; SBC Comments at 14-16; US WEST Comments at 20-22; CoreComm Nov. 10 *Ex Parte* at 3-4.

have premised innovative marketing arrangements upon the presence of a line sharing requirement.[102] Requesting carriers providing only voice compatible xDSL services also propose to offer innovative voice over xDSL services when commercially practicable.[103] By requiring line sharing, requesting carriers are able to begin to build a base of data customers and focus their innovation efforts upon providing packet-switched services which may substitute for traditional voice services over time. We find that requiring incumbent LECs to provide line sharing therefore, does not harm innovation. Conversely, requiring requesting carriers to provide voice services would divert a requesting carrier's resources away from innovative packet-switched services, such as voice over xDSL, that requesting carriers seek to provide.

53. Third Party Sources: Finally, the record also shows that requesting carriers are not presently obtaining the high frequency portion of the loop from third-party sources rather than from an incumbent LEC under the section 251(c) unbundling obligation. At this time, there is no evidence of such alternatives in the record, nor are we aware of competitive LECs that provide analog voice services offering to partner with competitive LECs offering data services to share unbundled loops obtained from incumbent LECs, although such partnerships could develop in the future. CoreComm notes that some competitive LECs are beginning to form alliances with the intention of offering combined data and voice-over-DSL and integrated voice and data transmission packages.[104] We support this type of cooperation, but distinguish voice-over-DSL and other forms of packetized voice transmission from the analog voiceband transmission that is fundamental to the line sharing we consider in this Order. Packet-based voice services are not yet a market substitute for traditional analog voice service. Packet-based services do not provide lifeline services during emergency situations such as power outages and do not generally offer E-911 functionality.[105] As we held in the *Local Competition Third Report and Order*, our unbundling analysis looks to what is occurring in the marketplace today, not hypothetical business cases.[106]

54. Goals of the Act: Our decision to unbundle the high frequency portion of the loop is consistent with the 1996 Act's goals of rapid introduction of competition and the promotion of facilities-based entry. Moreover, our decision to require spectrum unbundling is consistent with Congress's mandate that the Commission encourage the deployment of advanced telecommunications capability in section 706 of the 1996 Act.[107] We are convinced that line

[102] *See* NorthPoint and Tandy Nov. 4 *Ex Parte*.

[103] CIX Comments at 11; Oklahoma CC Comments at 21; NEXTLINK Comments at 6-7; Sprint Reply Comments at 11.

[104] CoreComm Nov. 10 *Ex Parte*.

[105] E-911 functionality requires that the voice-over-DSL service terminate on a circuit switch, creating the same sort of difficulties and impairments that competitive LECs face when trying to deploy circuit-switched analog voice services.

[106] *Local Competition Third Report and Order*, at para. 257.

[107] The principle section of the 1996 Act concerning advanced telecommunications services is Section 706, Pub.L. 104-104, Title VII § 706, Feb. 8, 1996, 110 Stat. 153, reproduced in the notes under 47 U.S.C. § 157. *See also* CIX

sharing will enable requesting carriers to accelerate the provision of xDSL-based service to residential and small business customers who, to date, have not had the same level access to competitive broadband services as larger businesses.[108]

55. Because line sharing ensures the deployment of xDSL technologies and ensures that consumers will have at least a single choice in xDSL providers, even where only one loop is available, it also benefits the residents of rural areas. For example, because of the increasing constraints on the availability of second, stand-alone loops and the high cost of provisioning data services on such loops, failure to unbundle the high frequency spectrum of the local loop would cause residential and small business customers to forego competitive alternatives or the ability to receive xDSL-based service at all, particularly in rural areas. In instances where only one loop is available, a requesting carrier cannot obtain line sharing, and if the incumbent LEC chooses not to offer xDSL-based services, a consumer will not be able to obtain x-DSL based services. In instances where two loops are available and the incumbent LEC chooses to offer xDSL-based services, absent line sharing, a competitive LEC seeking to offer xDSL-based service would likely encounter a Hobson's choice between providing xDSL-based service at a significantly higher price than the incumbents, or take a significant economic loss in order to compete against the incumbent's price. The incumbent's price, however, is significantly lower because the incumbent deploys its voice-compatible xDSL service at little or no incremental cost by utilizing the same loop that it uses for local exchange service.[109] Should the competitive LEC choose to bypass a rural area because of this situation, rural customers are then afforded only the option of subscribing to the incumbent LEC's xDSL service. It is an important goal of this Commission that competitive providers of xDSL and other broadband services do not bypass rural areas as competition brings more choices to consumers, in terms of price, quality, and types of services.

56. Some commenters argue that unbundling the high frequency portion of the loop will dampen investment by competitive LECs that offer voice services.[110] We do not believe that facilitating competition in xDSL services will necessarily diminish the competitive opportunity in the provision of voice services. Certainly, offering voice service is not a technical prerequisite

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Comments at 8.

[108] Rhythms Reply Comments at 5.

[109] *See* Covad Comments at 21. For the purposes of this discussion, we assume that the competitor's retail price includes the cost of the extra customer access line, regardless of whether that line is purchased by the customer from the incumbent, or by the competitor as an unbundled network element. Thus, where the competitive carrier relies on the customer to procure the second line, and the incumbent and the competitor's xDSL offerings are, for example, retail priced at $29.95 per month, the apparent cost, from the customer's perspective, of the competitor's service, is higher than that of the incumbents by the amount that the incumbent charges for the second line, since a second line is not required for the incumbent's product. Where the competitor procures the second line as an unbundled network element, the competitor's cost for that line constitutes a large cost element (and a revenue stream for the incumbent) that the incumbent does not incur in its retail xDSL offering. *See* NEXTLINK Comments at 6-7; Rhythms Reply Comments at 7-9.

[110] Bell Atlantic Comments at 4; GTE Comments at 1-2; RTC Comments at 5; USTA Comments at 4, 7; CoreComm Nov. 10 *Ex Parte* at 3.

to the provision of xDSL service on a particular loop. Rather, it is the fact that the incumbent is already providing voice service on a loop that makes the preservation of competitive access to the high frequency portion of that loop so vital. Without line sharing, competitors would face substantial barriers to market entry, such as additional required investment for voiceband equipment and facilities, and the difficulties of competing against an entrenched, market-dominant competitor.[111] Requiring that competitors provide both voice and xDSL services, or none at all, effectively binds together two distinct services that are otherwise technologically and operationally distinct. Such bundling, whether through self-provisioning or through partnerships, will not drive additional investment dollars toward voice, because it does not make voice more lucrative, but will drive investment away from the provision of advanced services, such as xDSL-based services, undermining the Congressional intention articulated in section 706 of the 1996 Act.[112] In addition, without line sharing consumers would need to forego their current voice service provider, virtually always an incumbent LEC, in order to subscribe to a competitive LEC's xDSL service, which robs consumers of market choices.[113]

57. Moreover, the availability of shared-line access will encourage data carriers to continue investing in network facilities such as DSLAMs, interoffice networks, and backbone facilities, and should promote further innovation in xDSL technologies.[114] We conclude that unbundling the high frequency portion of the loop will not deter investment by facilities-based competitive LECs that plan to offer a full range of services to consumers, including both voice and data services.[115] We expect that such carriers will be able to differentiate themselves from competitive LECs offering only data services by offering consumers the benefits of one-stop shopping, or by providing access to superior facilities or technology. In addition, we do not agree that providing competitors with the option to deliver data services will permit incumbent LECs to become entrenched in the provision of voice service. We believe that product integration and technological innovation will, over time, enable competitive LECs continue to

[111] Covad Comments at 32-35; NorthPoint Comments at 13-15.

[112] NorthPoint Reply Comments at 8; Rhythms Reply Comments at 4.

[113] NorthPoint Reply Comments at 9.

[114] *See* Covad Comments; Letter from Thomas M. Koutsky, Assistant General Counsel, Covad, to Magalie Roman Salas, Secretary, Federal Communications Commission, CC Docket No. 98-147 at 3 (filed Sept.1, 1999) (Covad Sept. 1 *Ex Parte*) (arguing that the availability of competitive advanced services will drive investment and innovation such as fiber transport to suburban and low-density areas, and the implementation of next-generation remote-terminal technology). *See also* Oklahoma CC Comments at 21-22; ALTS Comments at 7; Sprint Comments at 15; Rhythms Reply Comments at 4.

[115] *See* CoreComm Nov. 10 *Ex Parte*, at 1-2, 4. ("It is difficult to see why the Commission would expect [competitive LECs] to construct their own loop facilities or to procure unbundled [incumbent LEC] loops if a rival can offer both voice and high-speed data services over the same loop but without having to pay the full TELRIC price of that loop.") *See also infra* Section IV.D.1) (discussing requirement that competitive LEC may only access the high frequency portion of the loop where an incumbent LEC is already providing analog voiceband service on that loop). We note that this arrangement presupposes that the incumbent LEC will be charging the customer the line access charge, which exceeds the TELRIC price for an unbundled loop.

compete with incumbents for the provision of a full range of services.[116]

58. We also disagree with US WEST's argument that the *Advanced Services FNPRM* fails to recognize the Commission's "hands-off treatment of the dominant providers of advanced services – cable operators – and its heavy regulation of incumbent LECs."[117] US WEST states that the requirement that incumbent LECs unbundle the high frequency loop spectrum network element to permit competitive LECs to provide xDSL services "violates principles of competitive neutrality" in the advanced services market.[118] US WEST contends that, contrary to its treatment of incumbent LECs, the Commission has refrained from imposing any unbundling obligations on cable operators.[119]

59. We note that the Act explicitly makes distinctions based on a common carrier's prior monopoly status.[120] Therefore, US WEST's argument is inapposite to the issue at hand. We have not yet determined whether the provision of Internet access through a cable modem is a cable service,[121] telecommunications service,[122] or information service,[123] and therefore potentially subject to Title VI or Title II of the Communications Act.[124] We have determined, however, that lack of access to the high frequency portion of the incumbent's local loop impairs a competitive carrier's ability to offer advanced services, and that unbundling this network

[116] NEXTLINK Comments at 6.

[117] US WEST Comments at 3. *See* SBC Reply Comments at 9.

[118] US WEST Reply Comments at 32–33. *See* Bell Atlantic Comments at 6–7; BellSouth Comments at 12–13.

[119] US WEST Reply Comments at 33.

[120] Compare, for example, section 251(b), which describes the interconnection obligations placed on all LECs, to section 251(c), which places additional obligations on incumbent LECs.

[121] The term "cable service" means "(A) the one-way transmission of (i) video programming, or (ii) other programming service, and (B) subscriber interaction, if any, which is required for the selection or use of such video programming or other programming service." 47 U.S.C. § 602(6).

[122] A "telecommunications service" is defined as "the offering of telecommunications for a fee directly to the public, or to such classes of users as to be effectively available directly to the public, regardless of facilities used." 47 U.S.C. § 3(46).

[123] An "information service" is defined as "the offering of a capability for generating, acquiring, storing, transforming, processing, retrieving, utilizing, or making available information via telecommunications, and includes electronic publishing, but does not include any use of any such capability for the management, control, or operation of a telecommunications system or the management of a telecommunications service. 47 U.S.C. § 3(20).

[124] The Commission's Cable Services Bureau recently stated that it "is not persuaded that consumers are at risk of cable establishing a bottleneck monopoly in broadband services in the absence of immediate regulatory action." *Broadband Today, A Staff Report to William E. Kennard, Chairman, Federal Communications Commission*, at 42, Oct. 1999, <http://www.fcc.gov/csb/>.

element furthers the goals of the Act.[125] Therefore, we conclude that it is appropriate to unbundle access to the high frequency portion of the local loop, regardless of the regulatory status of cable modem Internet access.

60. While we cannot predict the impact that technological developments will have upon the ongoing need for the line sharing rules that we establish in this Order, our actions at this time need only respond to, and are well justified by, current market, technology, and industry conditions. Given the rapid changes in technology, competition, and the economic conditions of the telecommunications market, however, we expect that the conditions justifying our line sharing requirements will change over time. We therefore expect to reevaluate the applicability of unbundling obligations to the high frequency spectrum of the local loop in the course of our periodic review of the national rules for unbundled network elements.[126]

61. Specifically, we expect to reexamine our national list of network elements that are subject to the unbundling obligations of the Act every three years.[127] As we stated in the *Local Competition Third Report and Order*, we believe that revisiting our national network element unbundling rules in three years will provide carriers and capital markets the time and regulatory certainty they need to implement business plans.[128] Thus, combining the review of our line sharing rules with our review of our other national rules for unbundled network elements will facilitate a more comprehensive and technologically neutral approach.

C. Technical Feasibility of Spectrum Unbundling

1. Background

62. In the *Advanced Services FNPRM*, based on the record as it existed at that time, we tentatively concluded that line sharing is technically feasible and sought comment on that tentative conclusion.[129] We also observed that incumbent LECs already provide both voice and advanced services though a single line, and may also share lines with other service providers.[130]

2. Discussion

63. We adopt our tentative conclusion that there exists no *bona fide* issue of technical feasibility with regard to line sharing. In fact, individual LECs commenting in this proceeding

[125] *See supra* Section IV.B.

[126] *See Local Competition Third Report and Order*, at para. 146. *See also* 47 U.S.C. §§ 251(d)(1) - (2).

[127] *Id.*, at para. 149.

[128] *Id.*

[129] *Advanced Services First Report and Order and FNPRM*, 14 FCC Rcd at 4809, para. 103.

[130] *Id.*, 14 FCC Rcd at 4809-10, para. 103.

no longer dispute whether line sharing can be provided to requesting carriers as a technical matter.[131] It is clear from the record that incumbent LECs already provide both analog voice and high-speed data services over one loop by connecting the local loop facility to their DSLAM to utilize the loop's non-voiceband frequency data transmission capability for their own xDSL services.[132] We conclude that two-carrier line sharing, where the incumbent LEC's analog voice service shares the line with a competitive LEC's data service, can be accomplished in the same manner.[133]

64. The local loop can support transmissions on a wide range of frequencies. Analog voice service occurs on the lower "voiceband" frequency range, at least between 300 Hertz and 3,000 Hertz, and possibly up to 3,400 Hertz depending on equipment and facilities.[134] Some forms of xDSL, such as ADSL[135] use a higher frequency range, generally above 20,000 Hertz, that does not interfere with voiceband transmissions.[136] xDSL services that do not use the voiceband frequency range can "share" a copper loop with voiceband services, such as POTS, without impairing the performance of either service. Therefore, the customer purchasing the

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[131] Bell Atlantic Comments at 11; BellSouth Comments at 16; GTE Comments at 29.

[132] GSA Comments at 6; ALTS Comments at 7-8; CIX Comments at 3; Covad Comments at 2; Rhythms Reply Comments at 15-16; CompTel Reply Comments at 4.

[133] Line sharing between one carrier providing voice service and another providing data service most closely resembles current methods of shared line service deployment, comports with current industry standards, and provides a competitive market entry opportunity for carriers seeking to provide data services to small and residential businesses. While it is technically feasible for more than two carriers to share a loop, the record does not contain substantial support for requirements to facilitate such arrangements. Rhythms Reply Comments at 15. *See infra* Section IV.C.

[134] 1 Hertz is one cycle per second. Analog voice and modem transmissions up to 56 kilobits per second (kbps), generally utilize frequencies from 300 to 3000 or 3400 Hertz. *See* Covad Comments at 5, n. 7.

[135] Asynchronous Digital Subscriber Line (ADSL) is the most common "flavor" of xDSL used for residential and small business applications. Using digital coding schemes and transmitting above the voiceband frequency range, ADSL modems are capable of transmitting at up to 120 times the speed of 56 kilobits per second (kbps) dial-up modems without interrupting basic voice services. Specifically, ADSL modems are capable of receiving up to 8 megabits per second (Mbps) "downstream," and transmitting up to 1 Mbps "upstream." The nomenclature "asymmetrical" refers to the asymmetry between the maximum upstream and downstream transmission rates. Actual downstream transmission speed decreases, however, in relation to the distance and the number of line impairments between the user and the serving central office. Thus, ADSL subscribers will generally experience downstream data rates from 1.54 to 6.14 Mbps, and upstream data rates from 176 to 640 kbps.

[136] These xDSL technologies do not use the frequencies immediately above the voiceband, preserving them as a "buffer" zone to ensure the integrity of voiceband traffic. ADSL technologies, including the relatively new Universal ADSL Working Group (UAWG) "G.Lite" standard, as well as Rate-Adaptive DSL and Multiple Virtual Lines (MVL) transmission systems reserve the voiceband frequency range for non-DSL traffic. Not every xDSL technology, however, avoids use of the voiceband frequency range. HDSL and SDSL are two systems that utilize voiceband frequencies. xDSL transmission systems that use the voiceband frequency range are not generally suitable for line sharing. *See* Covad Comments at 5; Rhythms Reply Comments at 16.

xDSL service may continue to receive analog circuit-switched POTS from the incumbent LEC.[137]

65. Most voice telephone customers are connected to the PSTN though a copper local loop circuit that runs from their premises, through the outside loop plant, to the main distribution frame (MDF) in the incumbent LEC's central office.[138] All telecommunications services using the local loop are connected, directly or indirectly to the MDF.[139] For traditional voice service, the customer's loop is "bridged," or cross-connected, at the MDF to a copper wire pair that connects to the incumbent LEC's Class 5 switch.[140] The Class 5 switch passes the voice traffic to and from the circuit-switched network.

66. xDSL service can be added to a local loop that is being used for "traditional" voice service by deploying special equipment at each end of the subscribing customer's local loop. Specifically, passive signal filters, or "splitters," are installed at each end of the customer's loop to accomplish this operation.[141] One splitter is installed at the customer's premises, and another at the central office or remote terminal.[142] A splitter bifurcates the digital and voiceband signals concurrently traversing the local loop, directing the voiceband signals through a pair of copper wires to the Class 5 switch, and directing the digital traffic though another pair of copper wires to a DSLAM attached to the packet-switched network.[143]

67. The record indicates that incumbents that provide their own xDSL services on the same line that they are providing analog voice service are utilizing the single copper pair in the same manner as if the incumbent's voice service shared the line with a competitive carrier's data service.[144] Incumbent LECs have not refuted that the same architecture that an incumbent uses to provide its own shared-line xDSL services is capable of providing shared line access to requesting carriers with minimal modifications.[145] Specifically, after the xDSL traffic has passed

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[137] Covad Comments at 5 and Joshi Aff. at 2; Rhythms Reply Comments at 4-5.

[138] NorthPoint Comments at 21.

[139] *Id.*

[140] *Id.*

[141] Splitters are generally standardized products, manufactured to comply with ANSI T1.413-1998, Annex E.1, Figure E.1. Covad Comments at 5, n.11 and Joshi Aff. at 4. *Cf.* Paradyne Oct. 12 *Ex Parte* (arguing that no single POTS splitter design will accommodate all technologies).

[142] The splitter at the customer end handles one line, and the splitter at the central office can handle multiple lines simultaneously. *See* Covad Comments at 5, n.11 and Joshi Aff. at 3.

[143] Covad Comments at 6, NorthPoint Comments at 21.

[144] GSA Comments at 6; ALTS Comments at 7-8; CIX Comments at 3; Covad Comments at 2-5, NorthPoint Comments at 21; Rhythms Reply Comments at 4-5.

[145] Covad Comments at 4-6.

though the splitter and into the output copper wire pair, it may be routed to a competitive carrier's DSLAM collocated in the incumbent's central office.[146] We are persuaded that there is essentially no technical difference between sending xDSL traffic to a competitor's DSLAM and to the incumbent's DSLAM.[147] Moreover, as commenters supporting line sharing emphasize, certain types of xDSL, including ADSL, were specifically developed to utilize this sort of architectural arrangement to share loops with voiceband services without degrading the voice service or causing harm to the network.[148] The only technical limitations regarding the implementation of line sharing appear to be that the requesting carrier has collocated a DSLAM at the incumbent's central office,[149] and that the requesting carrier deploy an xDSL technology that is designed not to interfere with voiceband services.[150]

68. Accordingly, we require incumbent LECs to provide access to the high frequency portion of the loop based on the criteria for presumed acceptability for deployment that we establish below. By requiring conformance with this criteria, we ensure that competitive LECs utilize technology that does not interfere with analog voice frequencies. We believe that implementation of line sharing in compliance with the criteria for presumed acceptability for deployment will speed delivery of competitive services without impeding the development of new technologies. Moreover, spectrum unbundling based on this criteria will permit incumbents to implement line sharing promptly because they will be informed of their obligations and requirements with certainty and precision.

D. Operational Issues Associated with the Implementation of Line Sharing

1. Parameters for Line Sharing Deployment

a) Background

69. In the *FNPRM* we requested comment on several issues regarding the implementation of line sharing to help us determine exactly how incumbents might provide access to the high frequency loop spectrum network element. These issues include: whether carriers should be allowed to request only the high frequency portion of the local loop; whether carriers should be allowed to request any unused portion of a line; whether different customers should be allowed on the same physical loop; which carrier should manage the multiplexing

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[146] *Id.* at 6.

[147] *Id.* and Joshi Aff. at 3.

[148] *Id.* at 6; NorthPoint Comments at 21; Rhythms Reply Comments at 4-5; Covad Sept. 1 *Ex Parte* at 2.

[149] Virtual collocation at the incumbent's remote terminal may also permit line sharing. *See infra* Section IV.D.3 for a discussion of digital loop carrier systems.

[150] Covad Comments at 6-7. *See infra* Section V.B.3 for discussion regarding the Commission's presumption of acceptability for deployment.