BellSouth Telecommunications, Inc.
FPSC Dkt No. 990649A-TP
AT&T and MCI's 1st Set of Interrogatories
December 31, 2001
Item No. 9
Attachment One
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ATTACHMENT

PROPRIETARY

MH 3/6/07 (entire document)

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CONFIDENTIAL

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FPSC Dkt No. 990649A-TP
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Item No. 9
Attachment No. 1
20 Pages

The BellSouth Telecommunications TPI's-October 1998

Macroeconomic Assumptions - The macroeconomic forecasts of GDP and its chain price index are from BellSouth's September economic view. Those forecasts were used to determine the forecasts of the nonresidential structures price index and the PPI for capital equipment. JPC provided the forecasts of union wages, copper prices, and PVC prices.

The current expansion of the U.S. economy has entered its eighth year. While there is little immediate risk of recession, the impact of the Asian financial problem is putting downward pressure on U.S. growth rates. The economy in 1998 is expected to show a 3.3 percent rate of growth but that rate is forecast to slow to about 1.9 percent in 1999. The BellSouth forecast does not predict a recession during the forecast period and for the period 1998-2007, growth in GDP is expected to average 2.5 percent per year.

Long run population projections show population growth of about 1 percent per year into the middle of the next decade. Even with a rising percentage of people in the labor force, the modest rates of growth assumed in this forecast will keep the unemployment rate at about 5 percent for most of the forecast period unless there is a recession. Consequently, tight labor markets will tend to put upward pressure on wages. The impact of those wage increases on companies' bottom lines will be offset somewhat by slightly higher growth in labor productivity.

The increase in the GDP price index will average 2.2 percent per year during the 1998-2007 forecast period. Union wages for the U.S. overall will show an average annual increase of 3.4 percent; however, workers with more skills will receive larger than average increases. Capital equipment prices will increase on average only about 1.0 percent per year during the forecast period, substantially below the 4.4 percent average annual increase of the 1980's. That reflects both the larger impact of declining electronic goods prices, such as computers, and the dampening effect the world's over supply of auto production capacity will have on auto prices in the near term. The nonresidential structures price index will show an average 2.1 percent per year increase during the forecast period.

This forecast does not include a recession. However, the fine balance between continued growth and stable inflation may be difficult to maintain. The Federal Reserve Board has been reluctant to tighten money given the current instability of world financial markets. However, in the longer run, if tight labor markets drive up wages faster than productivity and producers try to maintain profit margins by raising prices, this Federal Reserve Board will tighten monetary policy. That might be enough to cause a mild recession.

Indexes and Weights - The actual 1997 BellSouth indexes are in the forecast tables. The equations in the model incorporate the data through 1996 in the determination of the coefficients. The 1997 indexes and the forecasts are being composited using weights that are based on BellSouth's 1996 construction expenditures.

ESS Materials - Three major factors will have a significant impact on BellSouth's digital switch account during the forecast period: (1) There will be additions and modifications to already installed digital switches, but there will not be a wholesale replacement of these switches during this forecast period. (2) The approximately 100 1AESS switches remaining in the network are scheduled to be replaced by digital switches by 2004 and (3) BellSouth will be installing packet switching technologies to handle growing demands for data services.

Almost 60 percent of BellSouth's expenditures on digital switches in 1997 were for Nortel equipment. Prices for those switches were basically unchanged from 1996. An additional 26 percent of expenditures were made on Lucent equipment. Lucent prices increased about 3.5%.

BellSouth's plans call for replacement of 15-20 large analog SPC switches per year between 1998 and 2003. Those switches will be replaced with current generation class 5 digital switches. Those purchases will be made at somewhat improved discounts over current prices. While the new discounts apply mainly to the switches being installed under the analog replacement program, those expenditures should have a large enough weight to keep the digital switch materials index on a flat to slightly declining trend in the near term.

A wholesale migration of voice to a packet-based system is not planned during this forecast period. A universal set of standards for voice over ATM has not been agreed upon and a substantial migration of voice to packet switching will not take place without those standards. The rapid growth in demand for data transport services will continue, and consequently, ATM switches or other packet options, such as IP-based technologies, will have an increasing impact on switch price trends during the latter half of the forecast period. Currently, ATM switches appear to be the switch of choice for the public networks but that equipment made up only a small percentage of BellSouth's switch expenditures in 1997. Prices for all packet switches will tend to be on a flat to downward trend as volume deployments increase during the forecast period.

Circuit - The circuit forecast is divided into analog, digital subscriber pair gain and other digital equipment. Throughout the forecast period the overall circuit account is weighted based on the relative expenditures of those three types in 1996. However, analog circuit was less than 2 percent of circuit in 1996 and has virtually no impact on the price trend during the forecast period. Based on 1996 weights slightly less than 60 percent of digital circuit expenditures were for subscriber pair gain equipment. The remaining weight is on the price trend for other, primarily interoffice, digital circuit. Actual expenditures may not match these distributions during the forecast period. Consequently, it is better to use the more detailed subaccounts than the circuit composite whenever possible.

Interoffice Circuit - Competitive pressures have prompted a rapid shift towards an optically based broadband interoffice network. Consequently, the deployment of SONET-based equipment has grown rapidly over the past few years. Prices for this equipment have been on a downward trend. In 1997, the prices paid to Lucent and Fujitsu for SONET equipment declined about 5 percent overall.

The forecast assumes a steadily growing share of SONET equipment in the other digital circuit account (primarily interoffice). SONET equipment is assumed to make up the majority of new circuit purchases during the next ten years. In addition, WDM equipment will become more prominently used in the network. DWDM equipment will begin to be deployed by BellSouth in its interoffice environment in late 1998. It will be deployed where it is more economical than placing additional fiber cable and in ATM switch locations where they will eliminate a number of SONET AD multiplexers. As prices drop, deployment of WDM equipment will expand. The demand for WDM equipment will probably put downward pressure on the prices for fiber cable and some of the SONET transmission equipment. Since BellSouth will continue to deploy a wider range of equipment types than the IXCs, this should help keep the price trend for its interoffice equipment on a downward path.

Most carriers will be progressing towards an all optically-based network platform in the next decade. However, it is unlikely that will be achieved during this forecast period. Optical cross connects and multiplexers are likely to be deployed in the network by the end of the forecast period but will not have a major impact on the price trend.

Prices for other types of interoffice equipment were mixed in 1997. Lucent's T1 equipment increased about 9 percent in price; however, it made up only about 1 percent of interoffice expenditures. Lucent's T3 carrier and crossconnect systems made up about 7 percent of expenditures and increased about 4.5 percent in price. Cisco Systems routers declined in price about 20 percent but were less than half a percent of expenditures. Pulsecom's D4 plugs made up about 4 percent of interoffice expenditures in 1997 and declined about 8 percent in price.

Digital Loop Carriers - BellSouth is phasing out conventional DLCs. The share of expenditures going towards these older technologies is assumed to decline very quickly during the forecast period, although channel units, replacement plugs, etc., will still be purchased for existing installations over the next few years. In 1997 expenditures on this older technology appears to have been only about 10 percent of total expenditures for subscriber pair gain technologies. Prices for the older technologies are also rising. Lucent's SLC96 prices, for example, rose almost 13 percent in 1997 while its SLC Series 5 equipment prices rose about 1.5 percent.

The share of expenditures going to the approved vendors for NGDLC equipment, RelTec and DSC, is assumed to increase relatively quickly. Together those vendors accounted for about 30 percent of the subscriber loop expenditures in 1997. DSC's equipment prices fell by about 5 percent in 1997 while RelTec's prices rose about 3 percent.

SONET equipment from Lucent and Fujitsu made up slightly less than 20 percent of expenditures for subscriber pair gain equipment in 1997. Those prices were either declining (Lucent's) or unchanged.

Loop deployment plans call for all new residential developments to be served with FITL network elements. With increased corporate and market emphasis for future services, fiber distribution expenditures will increase significantly. ADSL trials are underway in BellSouth. This high speed service on copper is likely to be the technology of choice over the next few years for the embedded network and its use is expected to expand. However, FTTC and FTTH technologies will become more cost effective after the turn of the century, and their deployment will be impacting the loop indexes by the end of the forecast period.

Copper and Copper Cable Prices - Due to the severe economic downturn impacting Asia, copper prices have remained at extremely low levels during most of 1998 and are not expected to recover significantly during 1999.

Asia uses about a third of all the copper consumed in the world, Japan alone accounts for about 14 percent of world copper consumption. The Japanese economy is now in recession and is expected to show little or no growth in 1999. Korea is suffering a severe recession and growth rates in most of the other Asian countries are either negative or substantially below last year's rates. This slowdown in demand combined with the increasing supplies provided by expanded mine and smelter capacity resulted in rising stock levels and the large decline in copper prices seen in 1997 - 1998. While some productive capacity may be shut down until prices begin to recover, that will be a difficult decision for most producers to make. Consequently, copper prices are not expected to show any significant recovery until growth increases in the Asian markets. That probably will not happen before late 1999 or 2000.

The steep decline in copper prices should, through escalation clauses, translate to declines in copper cable prices in 1998. Cable prices do not generally rise or fall by the same percent as raw copper prices because copper is only one of the inputs to cable production. However, since copper price declines have been substantial, this forecast calls for somewhat larger declines in cable prices in 1998 than did the previous forecast.

Fiber Optic Cable – BellSouth's fiber cable network totaled 2.3 million fiber miles in length at the end of 1997. New additions to the fiber network totaled 280 thousand fiber miles. This is down slightly from 1996's level of installation but still expanded the total network by over 10 percent. Overall the LECs and IXCs expanded their fiber networks by about 3.5 million fiber miles in 1997. The rapid increase of fiber deployment by telephone companies, Internet providers and CATV providers has pushed fiber demand up sharply in the past few years. The increased demand has prompted a significant expansion in fiber producing facilities. Corning is increasing its fiber producing capacity both by expanding its current facilities in Wilmington, NC and by building a new plant in Concord, NC. This second plant will be on stream in 1999, and combined with changes in the Wilmington plant, will more than double Corning's capacity. Alcatel and Lucent Technologies have also announced capacity expansions. BellSouth's fiber cable prices have been relatively flat but its fiber cable contracts call for 2 percent per year price declines between now and 2003.

Other Outside Plant Materials - After increasing almost 14 percent in 1995, BellSouth's conduit prices fell about 8 percent in 1996 and fell 1 percent in 1997. PVC prices, partly because of the fall in oil prices this year, have fallen steadily during 1998. While strong construction demand has partially offset those raw material cost declines, BellSouth's PVC pipe prices will probably show a decline in 1998.

Pole prices have been virtually unchanged for two years. However, environmental concerns in both the U.S. and Canada will continue to exert upward pressure on chemically-treated wood prices. Consequently, pole prices will probably increase faster than most other components of the TPI during the forecast period.

Wages - BellSouth signed a new union wage agreement in August 1998. That agreement called for wage increases of about 12.4 percent over 3 years or about 4 percent per year. While all of the details of this contract are not yet available, those base wage changes have been factored into the forecast for the 1998-2000 period.

BELLSOUTH TELECOMMUNICATIONS
HISTORICAL TELEPHONE PLANT INDEXES
ACCOUNTS ON A PART 32 USOA BASIS
1988=100

ACCOUNT NAME	ACCT #	FRC	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1/98
BUILDINGS	2121	10C	100.0	100.5	102.5	104.9	108.6	109.8	112.4	115.6	119.1	119.6	119.2
MOTOR VEHICLES	2112	40C	100.0	102.7	104.5	108.0	110.4	113.2	116.2	117.6	118.6	117.4	116.8
AIRCRAFT	2113	140C	100.0	104.1	110.3	117.7	122.9	125.8	129.6	135.4	141.0	143.6	143.7
GARAGE WORK EQ	2115	340C	100.0	105.7	112.1	118.0	122.4	124.7	128.1	131.9	135.0	136.4	137.8
OTHER WORK EQ	2116	540C	100.0	104.8	108.8	112.0	115.1	118.1	119.6	122.3	125.0	127.1	129.4
FURNITURE	2122	30C	100.0	103.9	107.4	109.7	111.2	113.1	116.5	119.3	122.1	124.2	124.5
OFFICE EQUIPMENT	2123	430,718C	100.0	99.2	94.9	99.1	102.6	102.5	103.6	103.7	105.0	105.2	104.9
OFF SUPPORT EQ	2123.1		100.0	102.3	102.3	102.6	103.7	103.7	104.0	104.2	104.7	105.1	104.9
OFF COMM EQ	2123.2		100.0	98.8	94.4	98.7	102.3	102.1	103.9	103.9	105.6	105.7	105.2
G.P. COMPUTERS	2124	530C	100.0	99.9	95.8	79.4	66.6	58.4	53.7	48.1	40.4	32.6	28.8
GEN EQ COMPOSITE			100.0	100.6	97.5	89.3	83.0	76.0	72.2	67.5	60.2	52.5	48.9
ANALOG ELECTRONICS	2211	77C	100.0	105.3	107.4	112.1	113.8	113.2	113.8	114.8	121.2	119.7	121.9
DIGITAL ELECTRONICS	2212	377C	100.0	96.6	96.7	93.8	97.2	99.9	96.6	97.4	107.6	107.3	109.3
OPERATOR SYSTEMS	2220	117C	100.0	97.2	95.3	92.1	92.7	95.3	91.3	92.0	100.5	101.0	102.8
RADIO	2231	67C	100.0	104.9	108.1	121.0	127.5	132.6	128.0	125.4	123.7	124.0	124.1
CIRCUIT COMPOSITE	2232		100.0	100.3	99.9	102.5	100.6	103.1	100.2	98.6	96.7	96.2	96.0
ANALOG		57,457C	100.0	102.4	104.8	108.9	111.0	112.7	116.6	118.2	119.3	124.3	126.8
DIGITAL SPG		257C	100.0	100.7	99.8	104.9	100.8	103.8	101.8	101.4	99.4	100.5	100.3
OTHER DIGITAL		157,357C	100.0	99.1	99.2	98.1	98.7	100.8	96.1	92.6	90.6	87.7	87.3
COE COMPOSITE			100.0	99.6	99.6	99.9	100.7	103.2	100.2	99.7	102.1	101.7	102.3
STATION APPARATUS	2311	318C	100.0	98.3	93.4	97.9	101.7	99.4	100.2	101.0	102.6	102.4	101.8
LARGE PBX	2341	258C	100.0	103.4	103.2	105.9	105.2	107.8	104.4	101.8	100.6	100.1	99.9
PUBLIC TELEPHONES	2351	198C	100.0	99.7	99.0	99.5	98.9	101.5	101.6	103.0	103.8	104.5	105.2
OTH TERM EQ	2362	558,858C	100.0	101.2	101.1	102.4	102.6	104.6	103.7	102.2	100.5	99.7	99.8
STATION COMPOSITE			100.0	100.5	100.2	101.2	101.0	103.4	102.7	102.4	101.4	101.1	101.3
INSIDE PLANT COMP.			100.0	99.6	99.6	100.0	100.7	103.2	100.3	99.8	102.1	101.7	102.3

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ACCOUNT NAME	ACCT #	FRC	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1/98
POLES	2411	1C	100.0	102.8	104.5	106.6	111.6	113.9	116.0	125.9	128.0	131.3	133.4
AERIAL CABLE	2421		100.0	111.7	110.6	113.6	104.9	104.6	99.1	107.5	109.7	111.6	114.8
COPPER		22C	100.0	113.6	112.8	116.1	105.9	106.3	101.4	111.5	114.0	116.1	120.3
OPTICAL		822C	100.0	92.0	89.8	91.1	90.2	86.1	77.2	75.4	76.2	76.8	76.1
U.G. CABLE	2422		100.0	101.8	99.1	100.5	95.8	93.2	85.2	88.9	89.9	89.9	90.4
COPPER		5C	100.0	110.3	107.9	109.8	100.2	101.3	96.2	107.3	109.0	108.8	112.5
OPTICAL		85C	100.0	90.9	88.2	89.2	87.9	82.5	72.6	70.3	70.9	71.0	70.0
BURIED CABLE	2423		100.0	108.7	108.3	112.4	105.4	103.7	102.1	107.2	109.4	112.5	114.5
COPPER		45C	100.0	110.4	110.0	114.4	106.2	105.1	104.1	110.0	112.2	115.6	118.1
OPTICAL		845C	100.0	94.5	93.7	95.4	95.7	90.6	86.2	86.6	88.4	89.7	89.7
SUBMARINE CABLE	2424		100.0	106.5	106.5	109.7	107.2	100.8	95.8	96.1	98.4	100.6	101.3
COPPER		6C	100.0	118.3	119.2	123.4	119.3	118.8	116.3	124.1	125.5	129.2	132.6
OPTICAL		86C	100.0	97.1	95.7	97.4	97.2	91.2	86.4	86.4	88.7	90.5	90.9
INBLDG NETWK CABLE	2426		100.0	114.4	113.3	116.8	103.6	105.5	99.8	107.6	110.8	108.7	110.7
COPPER		52C	100.0	114.9	113.9	117.5	103.9	106.4	101.1	109.8	113.2	110.8	113.0
OPTICAL		852C	100.0	96.2	93.8	95.1	94.1	89.3	79.1	76.6	77.8	79.1	79.0
CABLE COMPOSITE			100.0	108.7	107.7	111.1	104.0	102.6	99.2	105.0	107.0	109.4	111.5
COPPER			100.0	111.4	110.7	114.7	105.7	105.2	102.8	110.2	112.5	115.3	118.4
OPTICAL			100.0	92.6	90.7	92.0	91.4	86.5	79.3	78.4	79.4	80.2	79.6
CONDUIT SYSTEMS	2441	4C	100.0	96.8	95.6	93.9	93.9	83.9	87.9	95.7	96.6	98.7	100.5
OSP STRUCTURES			100.0	99.2	99.1	98.8	100.6	94.8	98.2	106.8	108.1	110.6	112.5
OSP COMPOSITE			100.0	107.6	106.7	109.7	103.6	101.6	99.1	105.3	107.2	109.6	111.7
TOTAL COMPOSITE			100.0	102.2	101.7	101.9	99.8	99.4	96.6	97.7	98.0	96.8	96.9

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ACCOUNTS ON A PART 32 USOA BASIS
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ACCOUNT NAME	ACCT #	FRC	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1/98
MOTOR VEHICLES	2112	40C	100.0	102.7	104.5	108.0	110.4	113.2	116.2	117.6	118.6	117.4	116.8
AIRCRAFT	2113	140C	100.0	104.1	110.3	117.7	122.9	125.8	129.6	135.7	141.0	143.6	143.7
GARAGE WORK EQ.	2115	340C	100.0	105.7	112.1	118.0	122.4	124.7	128.1	131.9	135.0	136.4	137.8
OTHER WORK EQ.	2116	540C	100.0	104.8	108.8	112.0	115.1	118.1	119.6	122.3	125.0	127.1	129.4
FURNITURE	2122	30C	100.0	103.9	107.4	109.7	111.2	113.1	116.5	119.3	122.1	124.2	124.5
OFFICE MACHINES	2123		100.0	99.2	94.9	99.1	102.6	102.5	103.7	103.7	105.0	105.2	104.9
OFFICE SUPPORT EQ.		430C	100.0	102.3	102.3	102.6	103.7	103.7	104.0	104.2	104.7	105.1	104.9
OFF. COMM EQ		718C	100.0	98.8	94.4	98.7	102.3	102.1	103.9	103.9	105.6	105.7	105.2
MATERIALS			100.0	98.3	93.4	97.9	101.7	99.4	100.2	101.0	102.6	102.4	101.8
CONTRACT LABOR			100.0	101.6	103.4	107.1	110.3	113.3	117.0	120.8	124.0	127.1	128.5
TELCO LABOR			100.0	103.3	105.8	107.3	108.8	112.0	115.7	114.2	117.5	119.7	121.6
GEN. PURPOSE COMPUTERS	2124	530C	100.0	99.9	95.8	79.4	66.6	58.4	53.7	48.1	40.4	32.6	28.8
ANALOG ELECTRONIC SW	2211	77C	100.0	105.3	107.4	112.1	113.8	113.2	113.8	114.8	121.2	119.7	121.9
MATERIAL (UNLOADED)			100.0	102.2	103.8	106.8	109.1	107.4	109.2	111.3	115.8	113.9	115.9
INSTALLATION			--	--	--	--	--	--	--	--	--	--	--
EQ SPEC			--	--	--	--	--	--	--	--	--	--	--
MATERIAL (LOADED)			100.0	105.4	107.5	112.4	114.1	113.4	113.8	114.5	121.1	119.4	121.6
TELCO LABOR COE			100.0	103.3	105.9	107.3	108.8	112.0	115.7	114.3	117.5	119.8	121.6
TELCO ENGINEERING			100.0	104.9	105.0	106.5	107.7	108.1	109.9	117.4	119.4	124.7	127.7
DIGITAL ELECTRONIC SW	2212	377C	100.0	96.6	96.7	93.8	97.2	99.9	96.6	97.4	107.7	107.3	109.3
MATERIAL (UNLOADED)			100.0	98.4	96.0	91.2	92.3	94.1	91.2	93.0	100.1	100.2	102.0
INSTALLATION			--	--	--	--	--	--	--	--	--	--	--
EQ SPEC			--	--	--	--	--	--	--	--	--	--	--
MATERIAL (LOADED)			100.0	96.1	96.0	92.9	96.4	99.1	95.5	96.1	106.6	106.1	108.1
TELCO LABOR COE			100.0	103.3	105.9	107.4	108.8	112.0	115.7	114.3	117.6	119.8	121.6
TELCO ENGINEERING			100.0	104.9	105.0	106.5	107.7	108.1	109.9	117.4	119.4	124.6	127.7
OPERATOR SYSTEMS	2220	117C	100.0	97.2	95.3	92.1	92.7	95.3	91.3	92.0	100.5	101.0	102.8
MATERIAL (UNLOADED)			100.0	98.4	96.0	91.2	92.3	94.1	91.2	93.0	100.1	100.2	102.0
LOADED MATERIAL			100.0	96.8	94.8	91.5	92.1	94.8	90.6	91.3	99.8	100.2	102.0
TELCO LABOR COE			100.0	103.3	105.8	107.3	108.7	111.9	115.6	114.2	117.4	119.7	121.5
TELCO ENGINEERING			100.0	104.9	104.9	106.5	107.8	108.2	109.9	117.5	119.4	124.7	127.8
RADIO	2231	67C	100.0	104.9	108.1	121.0	127.5	132.6	128.0	125.4	123.5	124.0	124.1
MATERIAL (UNLOADED)			100.0	106.6	109.8	121.7	129.4	133.8	129.9	127.7	123.7	123.7	123.7
INSTALLATION			--	--	--	--	--	--	--	--	--	--	--
EQ SPEC			--	--	--	--	--	--	--	--	--	--	--
MATERIAL (LOADED)			100.0	104.9	108.4	122.1	129.1	134.8	129.2	125.4	123.4	123.8	123.8
TELCO LABOR COE			100.0	103.3	105.9	107.4	108.9	112.1	115.8	114.4	117.6	119.9	121.7
TELCO ENGINEERING			100.0	104.9	105.1	106.5	107.7	108.1	109.8	117.4	119.4	124.6	127.7

BELLSOUTH TELECOMMUNICATIONS
HISTORICAL TELEPHONE PLANT INDEXES
ACCOUNTS ON A PART 32 USOA BASIS
1988=100

ACCOUNT NAME	ACCT #	FRC	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1/98
CIRCUIT-ANLG & DGTL	2232		100.0	100.3	99.9	102.5	100.6	103.1	100.2	98.6	96.7	96.2	96.0
ANALOG CIRCUIT		57C	100.0	102.4	104.8	108.9	111.0	112.7	116.6	118.2	119.3	124.3	126.8
MATERIAL (UNLOADED)			100.0	103.8	105.9	109.3	112.2	112.5	118.1	121.7	120.9	125.6	128.1
INSTALLATION			--	--	--	--	--	--	--	--	--	--	--
EQ SPEC			--	--	--	--	--	--	--	--	--	--	--
LOADED MATERIAL			100.0	102.2	104.5	109.7	111.9	113.4	117.4	119.5	120.5	125.7	128.2
TELCO LABOR COE			100.0	103.3	105.9	107.4	108.8	112.0	115.7	114.3	117.5	119.8	121.6
TELCO ENGINEERING			100.0	104.9	105.0	106.5	107.7	108.1	109.8	117.4	119.4	124.6	127.7
DIGITAL CIRCUIT X SPG		157C,357C	100.0	99.1	99.2	98.1	98.7	100.8	96.1	92.6	90.6	87.7	87.3
MATERIAL (UNLOADED)			100.0	99.2	98.8	99.4	100.0	101.2	97.8	94.4	91.4	89.7	89.2
INSTALLATION			--	--	--	--	--	--	--	--	--	--	--
EQ SPEC			--	--	--	--	--	--	--	--	--	--	--
LOADED MATERIAL			100.0	98.8	98.8	97.6	98.2	100.2	95.2	91.4	89.2	86.2	85.7
TELCO LABOR COE			100.0	103.3	105.9	107.3	108.8	112.0	115.7	114.3	117.5	119.8	121.6
TELCO ENGINEERING			100.0	104.9	105.0	106.5	107.7	108.1	109.9	117.4	119.4	124.7	127.7
CIRCUIT-DIG. SUBPAIR GAIN		257C	100.0	100.7	99.8	104.9	100.8	103.8	101.8	101.4	99.4	100.5	100.3
MATERIAL (UNLOADED)			100.0	100.8	99.3	100.8	99.7	101.5	99.2	99.0	95.8	95.1	94.9
INSTALLATION			--	--	--	--	--	--	--	--	--	--	--
EQ SPEC			--	--	--	--	--	--	--	--	--	--	--
LOADED MATERIAL			100.0	100.5	99.3	104.7	100.1	103.1	100.8	100.2	98.0	99.0	98.7
TELCO LABOR COE			100.0	103.3	105.8	107.3	108.8	112.0	115.7	114.2	117.5	119.8	121.6
TELCO ENGINEERING			100.0	104.9	104.9	106.5	107.7	108.1	109.9	117.4	119.4	124.7	127.7
STATION APPARATUS	2311	318C	100.0	98.3	93.4	97.9	101.7	99.4	100.2	101.0	102.6	102.4	101.8
LARGE PBX	2341	258C	100.0	103.4	103.2	105.9	105.2	107.8	104.4	101.8	100.6	100.1	99.9
MATERIAL (UNLOADED)			100.0	100.6	99.6	100.8	100.4	102.0	99.3	97.5	94.5	93.4	93.1
LOADED MATERIAL			100.0	103.3	102.7	105.7	104.6	107.3	103.1	100.0	98.4	97.6	97.3
INSTALLATION (CONTRACT)			--	--	--	--	--	--	-- --	--	--	--	
TELCO LABOR			100.0	103.3	105.9	107.4	108.9	112.1	115.8	114.4	117.6	119.9	121.7
TELCO ENGINEERING			100.0	104.9	105.0	106.5	107.7	108.1	109.8	117.4	119.4	124.6	127.7
PUBLIC TELEPHONES	2351	198C	100.0	99.7	99.0	99.5	98.9	101.5	101.6	103.0	103.8	104.5	105.2
MATERIAL			100.0	99.7	99.0	99.5	98.9	101.5	101.6	102.9	103.8	104.5	105.2
TELCO LABOR			100.0	103.3	105.9	107.5	108.9	112.1	115.8	114.4	117.6	119.9	121.7
CONTRACT LABOR			100.0	101.6	103.4	107.1	110.3	113.3	117.0	120.8	124.0	127.1	128.5
OTHER TERMINAL EQ.	2362	558C,858C	100.0	101.2	101.1	102.4	102.6	104.6	103.7	102.2	100.2	99.7	99.8
MATERIAL			100.0	100.6	99.6	100.8	100.4	102.0	99.3	97.5	94.5	93.4	93.1
TELCO LABOR			100.0	103.3	105.8	107.3	108.8	112.0	115.7	114.2	117.5	119.7	121.6
TELCO ENGINEERING			100.0	104.9	105.0	106.5	107.7	108.1	109.9	117.4	119.4	124.7	127.7
CONTRACT LABOR			100.0	101.6	103.4	107.1	110.3	113.3	117.0	120.8	124.0	127.1	128.5

BELLSOUTH TELECOMMUNICATIONS
HISTORICAL TELEPHONE PLANT INDEXES
ACCOUNTS ON A PART 32 USOA BASIS
1988=100

ACCOUNT NAME	ACCT #	FRC	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1/98
AERIAL CABLE COMPOSITE	2421		100.0	111.7	110.6	113.6	104.9	104.6	99.1	107.5	109.7	111.6	114.8
AERIAL CABLE-COPPER		22C	100.0	113.6	112.8	116.1	105.9	106.3	101.4	111.5	114.0	116.1	120.3
MATERIAL			100.0	126.9	122.2	127.7	97.5	94.3	83.5	101.6	103.3	102.3	108.3
TELCO LABOR			100.0	104.1	106.3	108.2	111.0	115.8	114.8	115.8	119.2	124.8	126.9
TELCO ENGINEERING			100.0	104.9	104.9	106.5	107.8	108.2	109.9	117.5	119.4	124.7	127.8
CONTRACT LABOR			100.0	101.6	103.4	107.1	110.3	113.3	117.0	120.8	124.0	127.1	128.5
AERIAL CABLE-OPTICAL		822C	100.0	92.0	89.8	91.1	90.2	86.1	77.2	75.4	76.2	76.8	76.1
MATERIAL			100.0	84.5	80.8	81.6	79.3	71.1	57.7	53.6	53.6	52.8	51.4
TELCO LABOR			100.0	104.1	106.5	108.6	111.5	116.3	115.3	116.3	119.8	125.3	127.4
TELCO ENGINEERING			100.0	104.9	104.8	106.5	107.8	108.2	109.9	117.5	119.5	124.7	127.8
CONTRACT LABOR			100.0	101.6	103.4	107.1	110.3	113.3	117.0	120.8	124.0	127.1	128.5
U.G. CABLE COMPOSITE	2422		100.0	101.8	99.1	100.5	95.8	93.2	85.2	88.9	89.9	89.9	90.4
U.G. CABLE-COPPER		5C	100.0	110.3	107.9	109.8	100.2	101.3	96.2	107.3	109.0	108.8	112.5
MATERIAL			100.0	117.8	109.9	111.6	85.9	85.3	75.9	94.5	95.0	90.8	95.5
TELCO LABOR			100.0	104.1	106.4	108.2	111.1	115.9	114.9	115.9	119.3	124.9	127.0
TELCO ENGINEERING			100.0	104.9	104.9	106.5	107.8	108.2	109.9	117.5	119.4	124.7	127.8
CONTRACT LABOR			100.0	102.0	104.2	107.0	109.9	105.1	106.6	109.4	113.1	116.4	117.7
U.G. CABLE-OPTICAL		85C	100.0	90.9	88.2	89.2	87.9	82.5	72.6	70.3	70.9	71.0	70.0
MATERIAL			100.0	84.5	80.8	81.6	79.3	71.1	57.7	53.6	53.6	52.8	51.4
TELCO LABOR			100.0	104.1	106.0	107.2	110.0	114.8	113.7	114.8	118.2	123.7	125.7
TELCO ENGINEERING			100.0	104.9	105.1	106.4	107.7	108.1	109.8	117.4	119.3	124.6	127.7
CONTRACT LABOR			100.0	102.0	104.2	107.0	109.9	105.1	106.6	109.4	113.1	116.4	117.7
BURIED CABLE COMPOSITE	2423		100.0	108.7	108.3	112.4	105.4	103.7	102.1	107.2	109.4	112.5	114.5
BURIED CABLE-COPPER		45C	100.0	110.4	110.0	114.4	106.2	105.1	104.1	110.0	112.2	115.6	118.1
MATERIAL			100.0	124.1	118.9	127.9	95.7	94.6	89.8	100.8	99.9	101.6	105.6
TELCO LABOR			100.0	104.1	106.4	108.5	111.3	116.2	115.1	116.2	119.6	125.2	127.3
TELCO ENGINEERING			100.0	104.9	104.9	106.5	107.8	108.2	109.9	117.5	119.4	124.7	127.8
CONTRACT LABOR			100.0	102.0	104.2	107.0	109.9	105.1	106.6	109.4	113.1	116.4	117.7
BURIED CABLE-OPTICAL		845C	100.0	94.5	93.7	95.4	95.7	90.6	86.2	86.6	88.4	89.7	89.7
MATERIAL			100.0	84.5	80.8	81.6	79.3	71.1	57.7	53.6	53.6	52.8	51.4
TELCO LABOR			100.0	104.1	106.0	107.2	110.0	114.8	113.7	114.8	118.2	123.7	125.7
TELCO ENGINEERING			100.0	104.9	104.8	106.6	107.8	108.2	109.9	117.5	119.5	124.7	127.8
CONTRACT LABOR			100.0	102.0	104.2	107.0	109.9	105.1	106.6	109.4	113.1	116.4	117.7
SUBMARINE CABLE-COMPOSITE	2424		100.0	106.5	106.5	109.7	107.2	100.8	95.8	96.1	98.4	100.6	101.3
SUB. CABLE-COPPER		6C	100.0	118.3	119.2	123.4	119.3	118.8	116.3	124.1	125.5	129.2	132.6
MATERIAL			100.0	124.1	118.9	127.9	95.7	94.6	89.8	100.8	99.9	101.6	105.6
TELCO LABOR			100.0	104.1	106.1	107.4	110.2	115.0	113.9	115.0	118.4	123.9	126.0
TELCO ENGINEERING			100.0	104.9	105.1	106.4	107.7	108.1	109.8	117.4	119.3	124.6	127.7
CONTRACT LABOR			100.0	102.0	104.2	107.0	109.9	105.1	106.6	109.4	113.1	116.4	117.7

BELLSOUTH TELECOMMUNICATIONS
HISTORICAL TELEPHONE PLANT INDEXES
ACCOUNTS ON A PART 32 USOA BASIS
1988=100

ACCOUNT NAME	ACCT #	FRC	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1/98
SUB. CABLE-OPTICAL		86C	100.0	97.1	95.7	97.4	97.2	91.2	86.4	86.4	88.7	90.5	90.9
MATERIAL			100.0	84.5	80.8	81.6	79.3	71.1	57.7	53.6	53.6	52.8	51.4
TELCO LABOR			100.0	104.1	106.4	108.3	111.1	115.9	114.9	115.9	119.3	124.9	127.0
TELCO ENGINEERING			100.0	104.9	104.8	106.6	107.8	108.2	109.9	117.5	119.5	124.7	127.8
CONTRACT LABOR			100.0	102.0	104.2	107.0	109.9	105.1	106.6	109.4	113.1	116.4	117.7
INTRABLDG NW CABLE-COMPOSITE	2426		100.0	114.4	113.3	116.8	103.6	105.5	99.8	107.6	110.8	108.7	110.7
INTBLDG NW CABLE -COPPER		52C	100.0	114.9	113.9	117.5	103.9	106.4	101.1	109.8	113.2	110.8	113.0
MATERIAL			100.0	126.9	122.2	127.7	94.4	95.8	86.6	99.8	103.0	97.2	99.3
TELCO LABOR			100.0	104.1	106.4	108.4	111.2	116.0	115.0	116.0	119.5	125.0	127.1
TELCO ENGINEERING			100.0	104.9	104.9	106.5	107.8	108.2	109.9	117.5	119.4	124.7	127.8
CONTRACT LABOR			100.0	101.6	103.4	107.1	110.3	113.3	117.0	120.8	124.0	127.1	128.5
INTBLDG NW CABLE-OPTICAL		852C	100.0	96.2	93.8	95.1	94.1	89.3	79.1	76.6	77.8	79.1	79.0
MATERIAL			100.0	84.5	80.8	81.6	79.3	71.1	57.7	53.6	53.6	52.8	51.4
TELCO LABOR			100.0	104.1	106.6	108.9	111.7	116.6	115.5	116.6	120.0	125.6	127.7
TELCO ENGINEERING			100.0	104.9	104.8	106.6	107.8	108.2	109.9	117.5	119.5	124.7	127.8
CONTRACT LABOR			100.0	101.6	103.4	107.1	110.3	113.3	117.0	120.8	124.0	127.1	128.5
CABLE COMPOSITE			100.0	108.7	107.7	111.1	104.0	102.6	99.2	105.0	107.0	109.4	111.5
CABLE-COPPER			100.0	111.3	110.7	114.7	105.7	105.2	102.8	110.2	112.5	115.3	118.4
CABLE-OPTICAL			100.0	92.5	90.7	92.0	91.4	86.5	79.3	78.4	79.4	80.2	79.6
AERIAL WIRE	2431		100.0	110.7	110.4	112.9	107.2	109.3	108.2	114.0	116.6	120.9	123.8
MATERIAL			100.0	126.9	122.2	127.7	97.5	94.3	83.5	101.6	103.3	102.3	108.3
TELCO LABOR			100.0	104.1	106.1	107.4	110.2	115.0	114.0	115.0	118.4	123.9	126.0
TELCO ENGINEERING			100.0	104.9	105.1	106.5	107.7	108.1	109.8	117.4	119.4	124.6	127.7
CONTRACT LABOR			100.0	101.6	103.4	107.1	110.3	113.3	117.0	120.8	124.0	127.1	128.5
CABLE & WIRE			100.0	108.7	107.8	111.2	104.0	102.6	99.2	105.1	107.1	109.4	111.6
OSP STRUCTURES			100.0	99.2	99.1	98.8	100.6	94.8	98.4	106.8	108.1	110.6	112.5
POLE LINES	2411	1C	100.0	102.8	104.5	106.6	111.6	113.9	116.6	125.9	128	131.3	133.4
MATERIAL			100.0	100.0	100.0	99.3	108.8	110.8	114.5	134.3	134.3	134	134
TELCO LABOR			100.0	104.1	106.4	108.3	111.1	115.9	114.9	115.9	119.4	124.9	127
TELCO ENGINEERING			100.0	104.9	105.0	106.5	107.7	108.1	109.9	117.4	119.4	124.6	127.7
CONTRACT LABOR			100.0	103.5	106.8	111.2	115.5	118.1	121.2	124.9	127.8	132.1	135
U.G. CONDUIT	2441	4C	100.0	96.8	95.6	93.9	93.9	83.9	87.9	95.7	96.6	98.7	100.5
MATERIAL			100.0	87.0	81.3	72.1	69.5	70.0	73.9	83.9	77	76.1	79.5
TELCO LABOR			100.0	104.1	106.4	108.5	111.3	116.1	115.1	116.1	119.6	125.1	127.2
TELCO ENGINEERING			100.0	104.9	104.9	106.5	107.8	108.2	109.9	117.5	119.4	124.7	127.8
CONTRACT LABOR			100.0	99.9	101.1	103.2	104.4	88.0	92.7	100.4	103.6	106.4	107.7

BELL SOUTH REGION - BUILDINGS SUBCOMPONENTS
1988 = 0

	1988	1/1/89	1989	1/1/90	1990	1/1/91	1991	1/1/92	1992	1/1/93	1993	1/94	1994	1/95	1995	1/96	1996	1/97	1997	1/98
GENL RQMT	100.0	100.0	104.0	104.0	108.1	108.1	112.2	112.2	116.3	116.3	120.1	120.1	123.5	123.5	126.8	128.2	130.8	131.8	134.8	136.5
SITEWORK	100.0	104.7	102.8	104.2	103.6	103.3	111.0	119.1	117.2	115.5	109.5	109.9	110.7	111.8	113.3	115.0	116.5	117.2	118.2	118.7
CONCRETE	100.0	103.3	99.1	98.7	98.6	98.8	99.3	100.8	99.1	97.7	88.6	89.3	91.4	92.7	95.6	97.4	99	99.9	101.7	103.1
MASONRY	100.0	102.3	96.3	97.3	97.2	98.3	98.6	100.0	100.5	101.6	100.5	101.0	101.5	102.5	104.2	105.8	108.3	109.9	110.6	111.4
METALS	100.0	109.7	106.9	109.2	111.2	113.8	113.7	114.3	112.0	110.1	115.6	113.3	114.8	116.8	121.1	126.1	130.4	134.3	136.8	139.4
WOOD&PLASTICS	100.0	103.5	98.9	97.9	98.0	98.7	98.2	99.6	99.8	99.7	98.2	97.3	99.5	101.3	99.4	99.1	99.2	100.3	101.5	101.6
THERM&MOIST PRO	100.0	102.4	102.9	106.8	107.2	108.3	106.5	105.4	110.0	115.0	113.8	114.7	114.5	113.7	115.6	117.6	124.6	130.2	131	132.2
DOORS&WINDOWS	100.0	105.4	100.1	100.6	100.8	101.8	101.1	101.7	101.8	101.9	115.4	116.5	118.7	120.6	123.0	125.9	127.5	129.1	130.5	131.4
FINISHES	100.0	90.1	93.7	95.1	96.7	98.7	98.6	99.8	99.5	99.7	98.6	98.1	100.6	102.7	100.6	101.0	100.1	101.5	100.1	98.9
SPECIALTIES	100.0	105.6	105.2	107.2	107.7	107.8	105.4	103.1	105.3	107.5	110.3	111.4	112.0	112.7	115.9	118.6	122	125.1	125.4	125.8
SPEC CONST	100.0	106.5	104.9	106.2	107.9	109.4	110.1	110.8	110.0	109.2	109.8	108.5	110.6	112.8	116.8	120.4	123.5	126.3	128.1	130.1
CONVEYING SYSTEMS	100.0	107.9	113.6	123.0	123.3	123.3	123.7	124.2	122.7	121.1	128.1	133.1	135.5	138.0	139.6	140.6	143.8	146.7	148.7	150.8
MECHANICAL	100.0	93.3	99.8	103.6	104.3	105.7	107.2	110.2	113.3	116.9	122.2	126.9	125.2	123.2	126.1	130.6	127.8	125.3	119.1	113.6
ELECTRICAL	100.0	102.0	100.2	100.2	100.6	102.6	103.5	105.8	114.0	122.4	124.4	127.6	131.3	134.4	137.5	141.6	139.8	139.6	138.8	139.1

BELLSOUTH TELECOMMUNICATIONS
FORECAST TELEPHONE PLANT INDEXES
ACCOUNTS ON PART 32 USOA BASIS
OCTOBER 1998 FORECAST OF % COST CHANGE

ACCOUNT NAME	ACCT #	FRC	ACTUAL 1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008+
BUILDINGS	2121	10C	0.4	2	2	2	2	2	3	3	3	3	3	3
MOTOR VEHICLES	2112	40C	-1.0	-1	-1	1	1	1	1	1	1	1	1	1
AIRCRAFT	2113	140C	1.8	0	0	2	2	3	4	4	4	4	4	4
GARAGE WORK EQ	2115	340C	1.0	0	0	2	2	2	2	2	2	2	2	2
OTHER WORK EQ	2116	540C	1.7	2	2	2	2	2	2	2	2	2	2	2
FURNITURE	2122	30C	1.7	1	2	2	2	2	2	2	2	2	2	2
OFFICE EQUIPMENT	2123	430,718C	0.2	-1	0	0	0	1	1	1	1	1	1	1
OFF SUPPORT EQ			0.4	0	0	0	0	0	1	1	1	1	1	1
OTH COMM EQ			0.1	-1	-1	0	0	1	1	1	2	2	2	2
G.P. COMPUTERS	2124	530C	-19.3	-20	-19	-18	-17	-17	-16	-16	-16	-15	-15	-5
GEN EQ COMPOSITE			-12.8	-12	-11	-9	-7	-6	-5	-4	-3	-2	-2	0
ANALOG ELECTRONICS	2211	77C	-1.2	1	2	2	2	2	3	3	3	3	3	--
DIGITAL ELECTRONICS	2212	377C	-0.4	-2	-1	1	1	1	2	0	0	-1	-1	1
OPERATOR SYSTEMS	2220	117C	0.5	-3	-1	0	1	1	2	0	0	-1	-1	1
RADIO	2231	67C	0.4	0	0	0	0	0	0	0	0	0	1	1
CIRCUIT COMPOSITE	2232		-0.5	-3	-1	-1	-1	0	-1	-2	-2	-2	-2	0
ANALOG		57,457C	4.2	3	2	5	4	3	3	3	3	3	0	--
DIGITAL SPG		257C	1.1	-3	0	-2	0	0	0	-1	-2	-2	-2	0
OTHER DIGITAL		157,357C	-3.2	-3	-3	-1	-2	-2	-2	-2	-2	-2	-2	0
COE COMPOSITE			-0.5	-3	-1	-1	0	0	0	-1	-1	-1	-1	1
STATION APPARATUS	2311	318C	-0.2	-2	-1	-1	0	0	1	1	1	2	2	2
LARGE PBX	2341	258C	-0.5	-2	-2	-1	-1	0	0	-1	-1	-1	-1	1
PUBLIC TELEPHONES	2351	198C	0.7	1	1	1	1	1	1	1	1	1	1	1
OTH TERM EQ	2362	558,858C	-0.5	-1	-1	0	0	1	1	0	0	0	0	1
STATION COMPOSITE			-0.1	0	-1	0	0	0	1	0	0	0	0	1
ISP COMPOSITE			-0.5	-3	-1	-1	0	0	0	-1	-1	-1	-1	1

BELLSOUTH TELECOMMUNICATIONS
FORECAST TELEPHONE PLANT INDEXES
ACCOUNTS ON PART 32 USOA BASIS
OCTOBER 1998 FORECAST OF % COST CHANGE

ACCOUNT NAME	ACCT #	FRC	ACTUAL 1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008+
POLES	2411	1C	2.6	4	3	4	4	4	4	4	4	4	4	4
AERIAL CABLE	2421		1.7	-1	1	4	4	3	3	3	3	3	3	2
COPPER		22C	1.8	-1	1	4	4	4	4	3	3	4	4	4
OPTICAL		822C	0.8	1	1	1	1	1	-1	1	1	2	2	2
U.G. CABLE	2422		0.0	-1	0	2	2	2	0	2	2	2	2	1
COPPER		5C	-0.2	-2	0	5	4	4	3	3	3	3	4	3
OPTICAL		85C	0.1	0	0	0	0	0	-2	0	1	1	1	1
BURIED CABLE	2423		2.8	1	2	4	3	3	3	3	3	3	4	2
COPPER		45C	3.0	1	2	4	3	3	3	3	3	4	4	3
OPTICAL		845C	1.5	2	2	2	2	2	1	2	2	3	3	2
SUBMARINE CABLE	2424		2.2	1	2	3	3	3	2	3	3	3	3	3
COPPER		6C	2.9	-1	1	4	4	3	3	3	3	3	3	3
OPTICAL		86C	2.0	2	2	2	3	3	2	3	3	3	3	3
INBLDG NETWK CABLE	2426		-1.9	-3	0	4	4	3	3	3	3	3	3	2
COPPER		52C	-2.1	-3	0	5	4	4	3	3	3	3	3	3
OPTICAL		852C	1.7	1	1	2	2	2	1	2	2	2	3	2
CABLE COMPOSITE			2.2	0	1	4	3	3	3	3	3	3	3	2
COPPER			2.5	0	2	4	4	4	4	3	3	4	4	3
OPTICAL			1.0	1	1	1	1	1	0	1	2	2	2	2
CONDUIT SYSTEMS	2441	4C	2.2	2	3	3	4	4	3	3	3	4	4	3
OSP STRUCTURES			2.3	2	3	3	4	4	4	4	4	4	4	4
OSP COMPOSITE			2.2	0	2	4	3	3	3	3	3	3	3	3
TOTAL COMPOSITE			-1.2	-2	-1	0	1	1	1	1	0	1	1	

BELLSOUTH TELECOMMUNICATIONS
FORECAST TELEPHONE PLANT INDEXES
ACCOUNTS ON PART 32 USOA BASIS
OCTOBER 1998 FORECAST OF % COST CHANGE

ACCOUNT NAME	ACCT #	FRC	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
BUILDINGS	2121	10C	122	124	126	129	132	136	140	144	148	152
MOTOR VEHICLES	2112	40C	116	115	116	117	118	119	120	121	122	123
AIRCRAFT	2113	140C	144	144	147	150	155	161	167	174	181	188
GARAGE WORK EQ	2115	340C	136	136	139	142	145	148	151	154	157	160
OTHER WORK EQ	2116	540C	130	133	136	139	142	145	148	151	154	157
FURNITURE	2122	30C	125	128	131	134	137	140	143	146	149	152
OFFICE EQUIPMENT	2123	430,718C	104	104	104	104	105	106	107	108	109	110
OFF SUPPORT EQ	2123.1		105	105	105	105	105	106	107	108	109	110
OFF COMM EQ	2123.2		105	104	104	104	105	106	107	109	111	113
G.P. COMPUTERS	2124	530C	26	21	17	14	12	10	8	7	6	5
GEN EQ COMPOSITE			47	42	38	35	33	31	30	29	28	27
ANALOG ELECTRONICS	2211	77C	121	123	125	128	131	135	139	143	147	151
DIGITAL ELECTRONICS	2212	377C	105	104	105	106	107	109	109	109	108	107
OPERATOR SYSTEMS	2220	117C	98	97	97	98	99	101	101	101	100	99
RADIO	2231	67C	124	124	124	124	124	124	124	124	124	125
CIRCUIT COMPOSITE	2232		93	92	91	90	90	89	87	85	83	81
ANALOG		57,457C	128	131	138	144	148	152	157	162	167	167
DIGITAL SPG		257C	98	98	96	96	96	96	95	93	91	89
OTHER DIGITAL		157,357C	85	82	81	79	77	75	74	73	72	71
COE COMPOSITE			99	98	97	97	97	97	96	95	94	93
STATION APPARATUS	2311	318C	100	99	98	98	98	99	100	101	103	105
LARGE PBX	2341	258C	98	96	95	94	94	94	93	92	91	90
PUBLIC TELEPHONES	2351	198C	106	107	108	109	110	111	112	113	114	115
OTH TERM EQ	2362	558,858C	99	98	98	98	99	100	100	100	100	100
STATION COMPOSITE			101	100	100	100	100	101	101	101	101	101
INSIDE PLANT COMP.			99	98	97	97	97	97	96	95	94	93

BELLSOUTH TELECOMMUNICATIONS
FORECAST TELEPHONE PLANT INDEXES
ACCOUNTS ON PART 32 USOA BASIS
OCTOBER 1998 FORECAST OF % COST CHANGE

ACCOUNT NAME	ACCT #	FRC	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
POLES	2411	1C	136	140	146	152	158	164	171	178	185	192
AERIAL CABLE	2421		111	112	116	121	125	129	133	137	141	145
COPPER		22C	115	116	121	126	131	136	140	144	150	156
OPTICAL		822C	78	79	80	81	82	81	82	83	85	87
U.G. CABLE	2422		89	89	91	93	95	95	97	99	101	103
COPPER		5C	107	107	112	116	121	125	129	133	137	142
OPTICAL		85C	71	71	71	71	71	70	70	71	72	73
BURIED CABLE	2423		114	116	121	125	129	133	137	141	145	151
COPPER		45C	117	119	124	128	132	136	140	144	150	156
OPTICAL		845C	92	94	96	98	100	101	103	105	108	111
SUBMARINE CABLE	2424		102	104	107	110	113	115	118	122	126	130
COPPER		6C	128	129	134	139	143	147	151	156	161	166
OPTICAL		86C	93	95	97	100	103	105	108	111	114	117
INBLDG NETWK CABLE	2426		106	106	110	114	117	121	125	129	133	137
COPPER		52C	108	108	113	118	123	127	131	135	139	143
OPTICAL		852C	80	81	83	85	87	88	90	92	94	97
CABLE COMPOSITE			109	110	114	117	121	125	129	133	137	141
COPPER			115	117	122	127	132	137	141	145	151	157
OPTICAL			81	82	83	84	85	85	86	88	90	92
CONDUIT SYSTEMS	2441	4C	101	104	107	111	115	118	122	126	131	136
OSP STRUCTURES			113	116	119	124	129	134	139	145	151	157
OSP COMPOSITE			110	112	116	119	123	127	131	135	139	143
TOTAL COMPOSITE			95	94	94	95	96	97	98	98	99	100

BELLSOUTH TELECOMMUNICATIONS TPI COMPONENTS
OCTOBER 1998 FORECAST

MATERIALS
(percentage changes)

	COPPER AERIAL CABLE	COPPER U.G. CABLE	COPPER BURIED CABLE	COPPER SUBMARINE CABLE	COPPER INTRBLDG CABLE	COMBINED COPPER CABLE	COMBINED OPTICAL CABLE	POLES	CONDUIT
1995	21.7	24.5	12.2	12.2	15.2	16.6	-7.1	17.3	13.5
1996	1.7	0.5	-0.9	-0.9	3.2	0.2	0.0	0.0	-8.2
1997	-1.0	-4.4	1.7	1.7	-5.6	0.1	-1.5	-0.2	-1.2
1998	-7.9	-8.0	-6.1	-6.5	-7.9	-7.0	-2.0	4.0	-7.0
1999	-3.6	-4.2	-2.4	-2.4	-3.6	-3.0	-2.0	2.7	-2.4
2000	5.1	5.4	5.5	5.5	5.1	5.3	-2.0	3.6	1.1
2001	4.1	3.2	2.3	4.2	4.1	3.0	-2.0	3.6	3.8
2002	3.2	2.9	2.3	2.3	3.2	2.7	-2.0	3.6	2.9
2003	3.0	2.3	2.1	2.3	3.0	2.5	-6.0	3.6	2.0
2004	2.2	1.8	1.6	1.9	2.2	1.9	-2.0	3.6	1.8
2005	2.2	1.9	1.7	1.9	2.2	1.9	-2.0	3.6	1.9
2006	2.5	2.3	1.9	2.1	2.5	2.1	-2.0	3.6	1.9
2007	2.7	2.5	2.0	2.3	2.7	2.3	-2.0	3.6	1.9

	UNLOADED RADIO	UNLOADED ANALOG CIRCUIT	UNLOADED DIGITAL SPG	UNLOADED OTHER DIG CIRCUIT	UNLOADED ANALOG ESS	UNLOADED DIGITAL ESS	UNLOADED OPERATOR SYSTEMS
1995	-1.7	3.0	-0.2	-3.5	1.9	2.0	2.0
1996	-3.1	-0.7	-3.2	-3.2	4.0	7.6	7.6
1997	0.0	3.9	-0.7	-1.9	-1.6	0.1	0.1
1998	-1.0	2.6	-3.3	-3.5	1.4	-2.6	-2.6
1999	-0.9	2.3	-0.3	-3.2	1.7	-1.0	-1.0
2000	-0.5	5.1	-2.3	-1.3	1.9	0.4	0.4
2001	-0.3	4.1	-0.7	-1.9	2.2	0.8	0.8
2002	-0.1	3.3	0.0	-1.9	2.3	0.9	0.9
2003	-0.1	3.0	-0.7	-2.1	2.5	1.5	1.5
2004	0.0	2.8	-1.9	-2.6	2.6	0.2	0.2
2005	0.1	2.8	-3.1	-2.6	2.7	-0.4	-0.4
2006	0.0	2.8	-2.4	-2.6	2.8	-1.2	-1.2
2007	0.0	2.7	-2.4	-2.6	2.9	-1.6	-1.6

BELLSOUTH TELECOMMUNICATIONS TPI COMPONENTS
OCTOBER 1998 FORECAST

MATERIALS
(percentage changes)

	VEHICLES	WORK EQUIP	GARAGE WK EQ	OFFICE EQUIP	FURNITURE	COMPUTERS	OTHER COMM EQ	PUBLIC PHONES	OTHER TERM EQ	STATION APPARATUS
1995	1.2	2.3	3.0	0.2	2.4	-10.4	0.8	1.3	-1.8	0.0
1996	0.9	2.2	2.4	0.5	2.3	-16.0	1.6	0.9	-3.1	0.0
1997	-1.0	1.7	1.0	0.4	1.7	-19.2	-0.2	0.7	-1.2	0.0
1998	-1.3	2.3	0.1	-0.1	0.7	-19.6	-1.7	1.0	-2.6	-1.5
1999	-0.7	1.7	0.5	0.0	1.9	-19.0	-1.1	0.5	-2.8	0.4
2000	0.9	1.8	2.0	0.3	2.2	-18.2	-0.5	0.8	-2.0	0.4
2001	1.1	2.0	2.2	0.5	2.3	-17.4	0.1	0.6	-1.3	0.5
2002	1.0	1.9	2.1	0.4	2.3	-16.7	0.4	0.7	-1.1	0.4
2003	1.2	2.1	2.4	0.5	2.3	-16.1	0.8	0.6	-0.9	0.4
2004	1.3	2.2	2.5	0.6	2.3	-15.8	1.1	0.7	-1.6	0.4
2005	1.3	2.2	2.5	0.6	2.3	-15.6	1.3	0.8	-1.9	0.4
2006	1.2	2.1	2.4	0.5	2.3	-15.4	1.6	0.7	-2.0	0.4
2007	1.2	2.1	2.4	0.5	2.3	-15.2	1.7	0.7	-2.1	0.4

LABOR
(percentage changes)

	TELCO ENGINEERING	TELCO COE	TELCO OSP	TELCO STATION	CONTRACT CONDUIT	CONTRACT BUR&UG CABLE	CONTRACT AERIAL CABLE	CONTRACT POLES	CONTRACT BOOTHS
1995	6.8	-1.2	0.9	-1.2	8.3	2.6	3.2	3.1	3.2
1996	1.7	2.8	3.0	2.8	3.2	3.4	2.6	2.3	2.6
1997	4.4	2.0	4.6	2.0	2.7	2.9	2.5	3.4	2.5
1998	4.8	2.7	3.5	2.7	3.2	2.7	3.0	3.8	3.0
1999	4.6	3.8	3.8	3.8	3.4	3.1	3.3	3.5	3.3
2000	5.0	4.0	3.9	4.0	3.5	3.3	3.5	3.5	3.5
2001	4.5	4.1	4.1	4.1	3.6	3.5	3.6	3.6	3.6
2002	4.5	4.1	4.1	4.1	3.6	3.5	3.6	3.6	3.6
2003	4.5	4.1	4.1	4.1	3.6	3.5	3.6	3.6	3.6
2004	4.5	4.1	4.1	4.1	3.6	3.5	3.6	3.6	3.6
2005	4.5	4.1	4.1	4.1	3.6	3.5	3.6	3.6	3.6
2006	4.7	4.4	4.4	4.4	3.7	3.7	3.8	3.8	3.8
2007	4.7	4.4	4.4	4.4	3.7	3.7	3.8	3.8	3.8

BELLSOUTH TELECOMMUNICATIONS TPIs

OCTOBER 1998 FORECAST ASSUMPTIONS

	PRICE INDEX NONRESIDENTIAL STRUCTURES	CHAIN PRICE INDEX GDP	GDP 1992$	CAPITAL EQUIPMENT PPI	UNION WAGES	COPPER CATHODE PPI	PVC PPI	SEMICOND. PPI
1994	3.6	2.4	3.5	2.1	3.1	22.2	13.3	-0.9
1995	4.2	2.5	2.0	2.0	2.6	27.9	10.5	-7.0
1996	2.3	2.3	2.8	1.2	2.7	-21.5	-14.5	-8.1
1997	3.3	2.0	3.8	0.0	2.6	-2.9	4.7	-10.9
1998	2.5	1.2	3.3	-0.7	2.9	-26.3	-17.0	-9.5
1999	2.0	1.9	1.9	-0.2	3.2	-5.0	-1.5	-9.0
2000	1.9	2.3	2.6	1.2	3.4	3.5	1.0	-8.0
2001	2.1	2.3	2.3	1.4	3.5	8.0	6.0	-8.0
2002	1.9	2.3	2.3	1.3	3.5	5.0	4.0	-7.0
2003	2.0	2.3	2.4	1.5	3.5	2.5	3.0	-7.0
2004	2.0	2.3	2.5	1.6	3.5	2.5	2.5	-7.0
2005	2.2	2.3	2.5	1.6	3.5	3.0	2.6	-7.0
2006	2.2	2.3	2.5	1.5	3.7	3.5	2.6	-7.0
2007	2.2	2.3	2.4	1.5	3.7	3.5	2.6	-7.0

BELLSOUTH COMMUNICATIONS
TPI COMPARED TO OTHER PRICE INDEXES
1988=100

	TOTAL TPI	GDP DEFLATOR	CPI URBAN
1959	29.6	26.6	24.6
1960	29.6	27.1	25.0
1961	29.4	27.4	25.3
1962	29.2	27.8	25.5
1963	29.5	28.1	25.9
1964	29.8	28.5	26.2
1965	29.8	29.0	26.6
1966	30.4	29.8	27.4
1967	31.7	30.8	28.2
1968	33.5	32.2	29.4
1969	35.4	33.7	31.0
1970	37.7	35.5	32.8
1971	40.1	37.4	34.2
1972	42.7	38.9	35.3
1973	44.9	41.1	37.5
1974	50.6	44.7	41.7
1975	55.5	49.0	45.5
1976	59.9	51.8	48.1
1977	62.3	55.1	51.2
1978	64.8	59.2	55.1
1979	68.7	64.2	61.4
1980	72.3	70.2	69.7
1981	78.6	76.5	76.8
1982	85.1	81.4	81.6
1983	89.7	84.9	84.2
1984	94.2	88.2	87.8
1985	98.6	91.1	91.0
1986	99.9	93.6	92.6
1987	100.5	96.5	96.0
1988	100.0	100.0	100.0
1989	102.2	104.2	104.8
1990	101.7	108.7	110.5
1991	101.9	113.0	115.1
1992	99.8	116.1	118.6
1993	99.4	119.2	122.1
1994	96.6	122.1	125.3
1995	97.7	124.9	128.8
1996	98.0	127.2	132.6
1997	96.8	129.6	135.7

BELLSOUTH COMMUNICATIONS
TPI COMPARED TO OTHER PRICE INDEXES
PERCENT CHANGE

	TOTAL TPI	GDP DEFLATOR	CPI URBAN
1960	0.0	1.9	1.6
1961	-0.7	1.1	1.2
1962	-0.7	1.5	0.8
1963	1.0	1.1	1.6
1964	1.0	1.4	1.2
1965	0.0	1.8	1.5
1966	2.0	2.8	3.0
1967	4.3	3.4	2.9
1968	5.7	4.5	4.3
1969	5.7	4.7	5.4
1970	6.5	5.3	5.8
1971	6.4	5.4	4.3
1972	6.5	4.0	3.2
1973	5.2	5.7	6.2
1974	12.7	8.8	11.2
1975	9.7	9.6	9.1
1976	7.9	5.7	5.7
1977	4.0	6.4	6.4
1978	4.0	7.4	7.6
1979	6.0	8.4	11.4
1980	5.2	9.3	13.5
1981	8.7	9.0	10.2
1982	8.3	6.4	6.3
1983	5.4	4.3	3.2
1984	5.0	3.9	4.3
1985	4.7	3.3	3.6
1986	1.3	2.7	1.8
1987	0.6	3.1	3.7
1988	-0.5	3.6	4.2
1989	2.2	4.2	4.8
1990	-0.5	4.3	5.4
1991	0.2	4.0	4.2
1992	-2.1	2.7	3.0
1993	-0.4	2.7	3.0
1994	-2.8	2.4	2.6
1995	1.1	2.3	2.8
1996	0.3	1.8	3.0
1997	-1.2	1.9	2.3

****Note this question contains information that BellSouth deems proprietary.******

REQUEST: Listed in BellSouth's 2001 Loop Technology Deployment Directives, RL:01-03-001BT, Core Business Strategies, page 27 in bold print it states "these directives re-confirm a corporate strategy to terminate no new copper cables at the central office: and on page 26 it outlines BellSouth ADSL on Fiber Distribution strategy. Do these statements mean BellSouth is currently provisioning DSL service and plans to provision its DSL service primarily through the deployment of DSLAMs at remote terminals?

RESPONSE: Bellsouth's DSLAM deployment plans are developed to reach the greatest number of potential subscribers of DSL service. This approach is specifically designed to maximize the available end-user customer base for our ISP customers. Significant portions of the non-DSL qualified end-users in BellSouth's territory have their underlying phone service provisioned via a remote terminal. In order for these end-users to have DSL service via the BellSouth network, it is necessary for BellSouth to continue to deploy DSLAM capability at the remote terminals that provide the underlying phone service.

PROVIDED BY: Eric Fogle

ATTACHMENT ONE

PROPRIETARY

DECLASSIFIED

CONFIDENTIAL

NOTE: ITEMS SHOWN IN 'BRACKETS' SUCH AS PAIRS HANDLED, EXISTING CABLE, ETC. ARE FOR ILLUSTRATION PURPOSES ONLY AND ARE NOT TO BE SHOWN ON A DRAWING.

USPLICE02

1.2 5M PRID=800 AT SPLICE [400 PAIRS TONED IN CABLE 1 FROM CO]
[400 PAIRS TONED IN CABLE 3 FROM XBOX AT F4807 CATALINA AVE]

1.3 5M PRID=400 CO

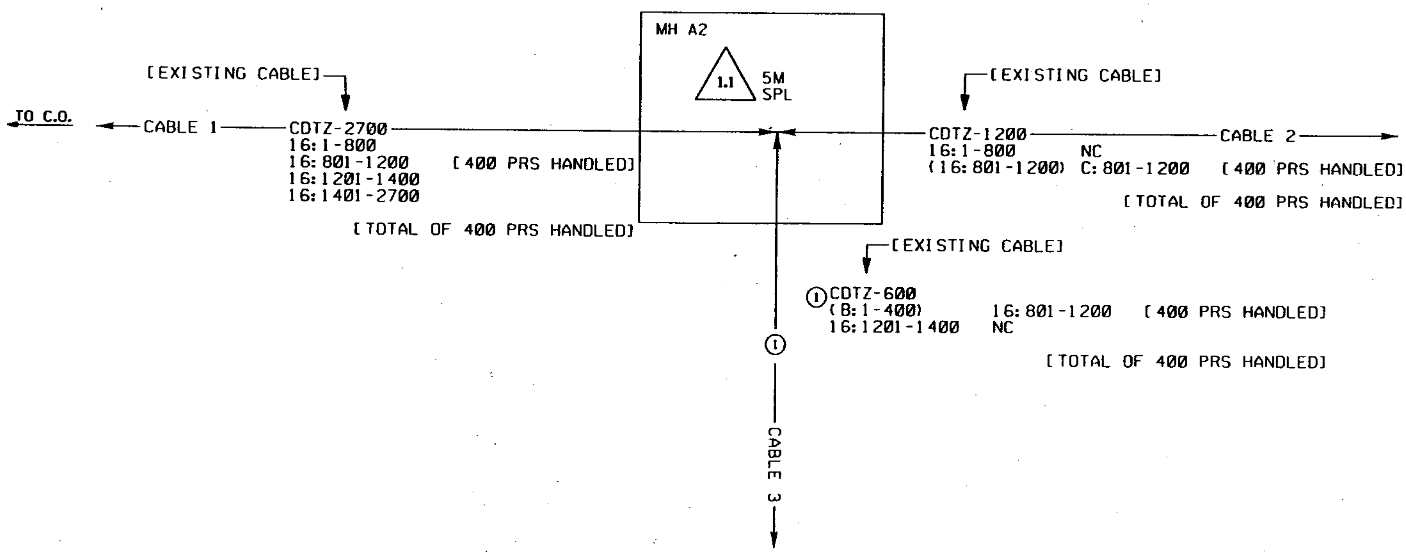
1.4 5M PRID=400 XBOX AT F4807 CATALINA AVE

1.5 5M SETUP PLACE BUFFER ON CABLE 2 AT MH A4

1.6 5M SETUP REMOVE BUFFER FROM CABLE 2 AT MH A4

1.7 5M SETUP PLACE BUFFER ON CABLE 3 AT MH A2-1

1.8 5M SETUP REMOVE BUFFER FROM CABLE 3 AT MH A2-1



PRIVATE/PROPRIETARY: NOT FOR DISCLOSURE OUTSIDE BELLSOUTH EXCEPT BY WRITTEN AGREEMENT.

Work Required →

12/31/00

BST Construction Work Drawing

PROPRIETARY INFORMATION
Not for disclosure outside BellSouth or any of its subsidiaries except under written agreement.

State: Georgia
District: Newtown
Exchange: NEWT
Wire Ctr: 991

A.A./Taper: 1207
Tax District: 0813
RZ/CZ: 13/00

Designer: GWG
Phone: 404-529-5959

Records Ref: D11012

Job Description:
Activate 400 pairs.
Cut 400 pairs dead.

Job Number: USPLICE02

DWG 1 OF 5

Dec. 01, 2000 08:44:51

ATTACHMENT TWO

PROPRIETARY

WORK ACTION CODE "LONG" DESCRIPTIONS

(Fifth Issue, supersedes RL: 99-11-003BT)

WORK ACTIONS (WA)	WORK ENVIR-ONMENTS (WE)	WORK ACTION CODE "LONG" DESCRIPTIONS Clarifications of work operation / work content	Quantity To be Encoded	Job Entry Screen Name See NOTE 5	Work Print WorkID Symbol
SITE	B	SITE PREPARATION - Use SITE when the work operation calls for an OSP Contractor to prepare a site area for installation of Carrier systems, X-Box or any other type of material or structure pertaining to outside plant operations. Types of activity for preparing sites are as follows but not limited to: leveling ground, clearing trash and debris, tree /brush removal, install drainage pipes if applicable.	Number of sites See NOTE 1	OTHER screen	RECTANGLE
SITEMT	B	DLC / CEV SITE MAINT -Use SITEMT when the work operation is for an OSP Contractor to perform maintenance functions (cutting grass, cleaning up trash, debris etc.) at DLC / CEV site location.	Number of sites See NOTE 1	OTHER screen	RECTANGLE
SPL *(Updated wording, supercedes description in RL: 99-11-003BT*	A, B, H, U	SPLICING - Use SPL when the work operation is for splicing all types of cables (e.g., copper air-core and filled, all configurations of fiber, coax, composite, duct-PIC, Pulp, etc.), stubs, terminal and apparatus tails, etc., using any approved/prescribed splicing method. Includes pumping manhole or pit, plugging conduits, testing and ventilating manhole, placing and removing ladders/platforms and tents, identifying cable and splice, preparing cable core, joining and un-joining wires, air pressure readings, buffering, soaping, grounding and bonding (including drop wires), racking and re-racking, etc., at the primary work location. **Also,** Transfer Pairs Regular and Transfer Pairs Specials includes necessary and special handling and coordination, establishing communication, identifying and testing, transferring, connecting and/or terminating and re-testing and up-dating records. Any associated work at other locations such as buffering, re-stenciling terminals or pair identification will require another work action code and work ID. **Includes Travel Incidental and Support Time (TSI) Proper Work Area Protection (WAP) and site setup, see NOTE 3.**	Number of copper pairs being spliced. Number of single fibers being spliced in Stranded fiber cables. Number of complete ribbons being spliced in Ribbon fiber cables.	SPLICING screen Spliced means either: Joined, unjoined, or Transferred.	TRIANGLE

WORK ACTIONS (WA)	WORK ENVIR-ONMENTS (WE)	WORK ACTION CODE "LONG" DESCRIPTIONS Clarifications of work operation / work content	Quantity To be Encoded	Job Entry Screen Name See NOTE 5	Work Print WorkID Symbol
* PRID	A, B, H, U	NON-COLOR CODE CABLE PAIR IDENTIFICATION - Use PRID when the required work operation is to "pick-up", identify, or tone cable pairs in non-color coded cables or in cables where the integrity of the color code is suspect or non-existent. The work associated with PRID also includes any required "re-stenciling" at terminating locations to correct discrepancies and the preparation and timely submittal of E-4108 forms as required to update/correct records. NOTE: For pair identification work operations where Construction technicians are needed on both ends of the cable use a PRID substep and a SETUP substep at the location where the only work to be performed is identifying pairs. If the other end is at a splicing work location (SPL substep), which is normally the case, do NOT add a SETUP substep at that location (i.e., there is adequate setup time included in the SPL substep). If the only work at both ends of the cable is pair identification, then PRID substeps and SETUP substeps are appropriate at both locations.	Number of pairs to be identified	OTHER screen	TRIANGLE
PROU	B, H, U	PLACE PROTECTOR UNITS - Use PROU when the work operation is to place any type of protector units, e.g., 3B1E, 4B1EW, 3B1FSBK, etc., into a terminal block. This work action is normally associated with placing (PLAC) and splicing (SPL) terminal blocks. **Includes Travel, Support and Incidental (TSI), proper Work Area Protection (WAP) and site setup time, see NOTE 3.**	Number of units installed	OTHER screen	TRAPEZOID
PULLBK	B	PULLBACK ITEM WITH DBOR - Use PULLBK when the work operation is for an OSP Contractor to pull back an item of plant after they have completed a directional bore.	Footage of bore See NOTE 1	PLACING screen	RECTANGLE

WORK ACTION CODE "LONG" DESCRIPTIONS

(Fifth Issue, supersedes RL: 99-11-003BT)

* SETUP *(Updated wording, supercedes description in RL: 99-11-003BT)*	A, B, H, U	SITE SETUP - - The use of a SETUP substep is normally to supplement other work action codes that because of the short duration of time assigned to them (for small quantities) do not include adequate time for setting up work area protection and other work site requirements. At these work locations two substeps are required, one for the primary work operation and one for the supplemental code of SETUP. Some specific work action codes are PRID, IR, IPIN, TESTC, TESTF and XCONE. However, when any of these codes are used at a splicing work location or where another work operation is being performed at the same time, the setup time for them comes from the other work operation (i.e., the use of a SETUP substep would not be appropriate in that instance). The use of a SETUP substep will also provide work time for some specific routine work functions not covered by any other work action codes. These are predominantly in the Underground (M/H) work environment. Some examples are: placing and removing buffering, verifying cables or load coils in manholes, relocating, moving or re-racking cables in manholes, pumping manholes for inspections and/or checking for vacant ducts, and pumping manholes to keep water from traveling to adjacent manholes where other work is being performed. On pair identification work operations (PRID substeps), the use of a supplemental SETUP substep is not appropriate at any location where splicing work is being performed (i.e., at a SPL work location). At the other end of cable, where only pair identification work will be performed the use of a PRID substep and a supplemental SETUP substep is appropriate. If the only work to be performed at both ends of the cable is to identify pairs, then PRID substeps and SETUP substeps at both locations are appropriate. SETUP includes time for setting up and taking down proper work area protection (i.e., placing and removing signs, cones and barricades), securing vehicle, unloading work equipment from vehicle, pumping M/H or pit, testing and ventilating M/H, placing and securing ladder and/or platform, reloading work equipment onto vehicle, etc. This work action code is NOT for use with a multi-day/multi-entry Splicing (SPL) operation, or a multi-day/multi-entry placing (PLAC) operation or Pull-thru-manhole (PUTH) operation. Also, return visits to unfinished work locations on the same day, or on subsequent days; DO NOT warrant the encoding of additional SETUP substeps. **Includes Travel Incidental and Support Time (TSI) Proper Work Area Protection (WAP) and site setup, see NOTE 3.**	Number of locations or manholes to be entered	OTHER screen	TRAPEZOID or TRIANGLE

ATTACHMENT FOUR

PROPRIETARY

MP-10399
BY: LENEY H ON
DATE: 12/01/2000 08:50 AM
JOB: RWRKTSR

WORK TASK SUMMARY RE T
JOB USPLICE02
WCA 770422

PAGE:
CMC: MARA
STATE: GA

PRT	STP	WRK ID	TAX	GLC	ENV	WRK ACT	FRC	MTL CAT	SUB CAT	MTL DESC	ENC	FXT	RS	CABLE SIZE	CABLE TYPE	N/E/R	QTY	STI CODE	STI HRS	CTI	RCPR	PCPR	RESID
1	1	1.1			U	SPL	5M				N	N		2700	P	E	400.00			T	0	0	GJMM04
					U	SPL	5M				N	N		1200	P	E	400.00			T	0	0	GJMM04
					U	SPL	5M				N	N		600	P	E	400.00			T	0	0	GJMM04
					U	SPL	5M				N	N		0	P			100		T	0	0	GJMM04
					U	SPL	5M				N	N		0	P			101	2.16	T	0	0	GJMM04
					U	SPL	5M				N	N		0	P			101	.96	T	0	0	GJMM04
					U	SPL	5M				N	N		0	P			101	.48	T	0	0	GJMM04
					U	SPL	5M				N	N		0	P			103	1.00	T	0	0	GJMM04
					U	SPL	5M				N	N		0	P			103	1.00	T	0	0	GJMM04
					U	SPL	5M				N	N		0	P			103	1.00	T	0	0	GJMM04
					U	SPL	5M				N	N		0	P			E12	1.00	T	0	0	GJMM04
					U	SPL	5M				N	N		0	P			E24	2.00	T	0	0	GJMM04
					U	SPL	5M				N	N		0	P			E30	2.50	T	0	0	GJMM04
																		WORK ID OBJ HRS -					12.10
		1.2			U	PRID	5M					N		0			800.00	118	12.00	T	0	0	GJMM04
																		WORK ID OBJ HRS -					12.00
		1.3			U	PRID	5M					N		0			400.00	118	6.00	T	0	0	GJMM04
																		WORK ID OBJ HRS -					6.00
		1.4			U	PRID	5M					N		0			400.00	118	6.00	T	0	0	GJMM04
																		WORK ID OBJ HRS -					6.00
		1.5			U	SETUP	5M					N		0			1.00	E24	2.00	T	0	0	GJMM04
																		WORK ID OBJ HRS -					2.00
		1.6			U	SETUP	5M					N		0			1.00	E24	2.00	T	0	0	GJMM04
																		WORK ID OBJ HRS -					2.00
		1.7			U	SETUP	5M					N		0			1.00	E24	2.00	T	0	0	GJMM04
																		WORK ID OBJ HRS -					2.00
		1.8			U	SETUP	5M					N		0			1.00	E24	2.00	T	0	0	GJMM04
																		WORK ID OBJ HRS -					2.00
																		TOTAL OBJ HOURS -					44.10

***** END OF REPORT *****

ATTACHMENT

PROPRIETARY

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Calculate Prorates:

Rates are not calculated for the EMAT process. Instead, Exempt Material prorate factors are mechanically developed based on direct labor dollars.

At end of the month (after close of books), AMD creates an extract file with prior month direct labor salary transactions. The file contains direct labor salary transactions charged to work IDs and asset categories associated with Plant Assets (C codes), Cost of Removal (X codes), and Plant Specific Operating Expense (M codes). While Central Office Equipment (COE) is included in Plant Assets and Plant Specific Expense, COE does not receive exempt material allocation. Extract file selection criteria:

- RTC = CP1 (Plant Labor - Direct - Salaries)
- Account category indicator = C (Plant Assets), D (Cost of Removal) and G (Plant Specific Expense)

Asset category = See the Asset Categories Inclusion table for a current list of Asset Categories that receives EMAT loadings.

The direct labor salary records are summarized based on the following fields:

Fields	Fields	Fields
Asset Category	GMA	Regulatory Entity
Asset Status	OCC (6th tier)	RTC
Company ID	Product Code	Source Code
GLC	Reason ID	Work ID

The direct labor salary transactions for the prior month are edited for valid and active data using the current month Accumulate and Manage Data (AMD) Common Callable Edit (CCE). Any direct labor salary transactions with invalid or inactive fields are written to the invalid transaction output file (TFFIIA04); they are not included in developing the allocate prorate factors. If the total dollar amount of the error transactions exceeds 3% of the total amount of valid transactions (TFFIIB01), the system will require intervention to determine the reason for the high error rate before processing resumes. Error transactions will be retained for 90 days for inquiries.

In addition to the error file discussed above, when the direct labor salary transactions are received from AMD, EMAT excludes the following transactions from future processing:

- Headquarters transactions
- Account Category not C, D or G
- Asset Category not listed on the A/C Inclusion table
- All source codes except DER

For each RE, prior month direct labor salary dollars are divided into two categories:

- Capital (C codes)
- Expense (M & X codes)

Capital charges are defined as charges to work ID C000. All other direct labor salary charges are considered expense charges. Percent to total factors are developed separately for capital and expense by:

Category	Category	Category
Asset Category	GMA	Regulatory Entity
Asset Status	OCC (5th tier)	RTC
Company ID	Product Code	Source Code
GLC	Reason ID	Work ID

Allocation factors are stored on an output file for 90 days.

Apply Prorates:

The beginning balance for the current month in Account 1220.1200 is retrieved from the General Ledger by Regulatory Entity (RE). This balance represents the prior month exempt material purchases. The exempt material balance is split into capital and expense totals based on predefined percentages. The predefined capital/expense percentages are provided, as appropriate, by the Network Budget staff. The Central Allocations Group will update the percentages to the exempt material process with concurrence of the Accounting Policy and Compliance Group.

For each RE, the **capital portion** of the exempt material balance is allocated based on the prior month's capital direct labor salary dollars transactions as follows:

Category:	Category:	Category:
Asset Category	GMA	Regulatory Entity
Asset Status	OCC (5th tier)	RTC
Company ID	Product Code	Source Code
GLC	Reason ID	Work ID

For each RE, the **expense portion** of the exempt material balance is allocated based on the prior month's expense direct labor salary dollars transaction as follows:

Category:	Category:	Category:
Asset Category	GMA	Regulatory Entity
Asset Status	OCC (5th tier)	RTC
Company ID	Product Code	Source Code
GLC	Reason ID	Work ID

Output records are formatted with Source Code **"FIA"** and Resource Type Code (RTC) **"CQ1"**.

One offset entry is journalized for Account 1220.1200 (Work ID = spaces and asset category = C52) per RE.

A call to CCE calculates the provisioning loading amounts, RTCs, and offset amounts for the exempt material transactions. The provisioning transactions are formatted and written to the output file along with the exempt material transactions. The output file becomes one of the TDFI common input files to post to the General Ledger (GL).

When the GL generates the Output Interface file for input to AMD (probably weekly), the exempt material and associated provisioning transactions are included. The certified call to CCE provides the required footprint for AMD.

Project:	**Transform Data into Financial Information**
Group:	**Allocations**
Class:	***Exempt Material***
Title:	***Apply Prorates***

Listed below is an example of how charges from the Plant Supplies - Exempt Account (1220.1200) will be allocated to the Plant Asset (24XX, "C" codes) and Plant Specific Operating Expense (3100.4XXX, 63XX & 64XX, "M & X" codes) Accounts based on direct labor dollars.

Part 1 of 3: Example of RTC CP1 transactions for previous month received from AMD; RTC CP1 = Plant Labor Direct Salaries; C = Capital/Installation, M = Maintained/Expense, X = Removed/Depreciation

Allocations - Exempt Material

Assume: Ratio 60% capital, 40% expense split

January activity (CP1 transactions - Direct Labor Charges from AMD):

RE	Work ID	Asset Category	Asset Status	Product Code	GLC	OCC	Reason ID	Direct Labor Charges	Other Charges
FL	C000	045			F123	123	A11	100.00	
FL	C000	045			F123	123	A11	40.00	
FL	C000	045			F546	124	A12	180.00	
FL	C000	022			F845	124	A12	200.00	
FL	C000	005			F123	125	A13	400.00	
FL	M000	005			F123	125	A19	100.00	
FL	M000	045			F123	123	A11	100.00	
FL		C52				126			**$5,000.00**

Project:	**Transform Data into Financial Information**
Group:	**Allocations**
Class:	***Exempt Material***
Title:	***Apply Prorates***

Part 2 of 3: Example of plant labor direct amounts received from AMD are split between capital and expense based on predetermined percentages received from Network. A percent to total is developed for each Work ID, Asset Category, GLC, OCC, Reason ID transaction.

Allocations - Exempt Material

After January close (approx. 8th WD of Feb.) - Exempt Material Process - Account 1220.1200

$5000.

$3000.
60% capital

RE	Work ID	Asset Category	GLC	OCC	Reason ID	Direct Labor Charges	Ratio	Amount
FL	C000	045	F123	123	A11	140.00	.15	456.52
FL	C000	045	F546	124	A12	180.00	.20	586.96
FL	C000	022	F845	124	A12	200.00	.22	652.17
FL	C000	005	F123	125	A13	400.00	.43	1,304.35
						920.00	1.00	**3,000.00**

$2000.
40% expense

RE	Work ID	Asset Category	GLC	OCC	Reason ID	Direct Labor Charges	Ratio	Amount
FL	M000	005	F123	125	A19	100.00	.50	1,000.00
FL	M000	045	F123	123	A11	100.00	.50	1,000.00
						200.00	1.00	**2,000.00**

Project:	**Transform Data into Financial Information**
Group:	**Allocations**
Class:	***Exempt Material***
Title:	***Apply Prorates***

Part 3 of 3: Example of transactions which will be journalized.

Allocations - Exempt Material

As a result of the January activity, the following entries will be journalized for February business after February's EMAT process is complete:

RE	Work ID	Asset Category	Asset Status	Product Code	GLC	OCC	Reason ID	RTC	Amount
FL	C000	045			F123	123	A11	CQ1	456.52
FL	C000	045			F546	124	A12	CQ1	586.96
FL	C000	022			F845	124	A12	CQ1	652.17
FL	C000	005			F123	125	A13	CQ1	1,304.35
FL	M000	005			F123	125	A19	CQ1	1,000.00
FL	M000	045			F123	123	A11	CQ1	1,000.00
FL		**C52 (CR 1220.1200)**						CQ1	**(5,000.00)**

Note! These transactions will carry a Source Code of FIA.

Methodology:

The purpose of this document is to detail the procedures associated with developing, calculating, applying and monitoring Exempt Material (EMAT). It highlights the primary responsibilities of the Central Allocations Group.

Exempt Material prorate factors provides the ability to allocate exempt material charges to Plant Asset (24XX) and Plant Specific Operations Expense (3100.4XXX, 63XX & 64XX) Accounts in accordance with FCC and GAAP requirements.

Exempt material is an item which is individually of small value and ordinarily is not reused when recovered. It is not practical to report the individual items when used in or recovered from plant. Exempt material is charged to Account 1220.1200 (Asset Category C52), Plant Supplies - Exempt.

The purpose of the exempt material allocation is to allocate dollars from the Plant Supplies - Exempt Account (1220.1200) to Plant Asset (24XX, "C" codes) and Plant Specific Operating Expense (3100.4XXX, 63XX & 64XX, "M & X" codes) Accounts based on direct labor dollars. This concept also includes maintaining a "static inventory" for Account 1220.1200. All exempt material purchased in a month will be 100% distributed the following month. The exempt material allocation is done in accordance with FCC and GAAP requirements.

Part 32 Requirements for EMAT:

Allocations are performed to ensure that financial statements are presented in accordance with standards established by the SEC, FCC and PSC's. There are two types of allocations within BellSouth: Rates and Prorates.

Rates are used to load various costs to transactions that meet certain criteria. Prorates split single transactions into two or more transactions for the purpose of accurately distributing a charge to final accounting classification. EMAT is a 'prorate' type of allocations.

General Requirements:

The following requirements are common to all EMAT prorates:

- Provide the ability to develop, store, and apply rules for calculation of each rate/prorate.
- Provide the ability to accumulate and analyze data from outside systems/groups to be used in development of rate/prorate calculation rules.
- Provide the ability to review and update rate/prorate calculation rules as needed.
- Provide audit reports to verify update of rate/prorate calculation rules.
- Provide the ability to accumulate and analyze data for rate/prorate factor calculation, as defined in the rules for rate/prorate calculation.
- Provide the ability to accumulate expenses to be allocated (in clearing accounts or other expense accounts).
- Provide the ability to mechanically calculate standard rates based on relevant data.
- Provide the ability to mechanically calculate prorate factors based on relevant data.
- Provide the ability to mechanically update rate/prorate factors as needed.
- Produce audit reports to verify update of rate/prorate factors.
- Provide the ability to maintain 2 year history of rates on-line.
- Provide the ability to maintain 7 year archive of rates.
- Provide the ability to develop methodology for application of rates/prorates.
- Provide the ability to distribute rate/prorate application methodology to appropriate systems.
- For appropriate systems, perform allocations at least monthly to distribute expenses.

General Requirements (Continued):

- For appropriate systems, produce reports to monitor current month charges, dollars cleared, account balances, and factors.
- Provide the ability to correct or adjust allocations via manual journal entries (see MJE section of FSR) or updated factors, as needed.
- For appropriate systems, provide the ability to feed entries to other systems as required.
- Provide the ability to allocate exempt material charges to maintenance and construction accounts in accordance with FCC and GAAP requirements.

- **Part 32 of USOAR, 32.2000 c.2.iii**
  "Material and Supplies" includes the purchase price of material used at the point of free delivery plus the costs of inspection, loading and transportation, and an equitable portion of provisioning expense. In determining the cost of material used, proper allowance shall be made for unused material, for material recovered from temporary structures used in performing the work involved, and for discounts allowed and realized in the purchase of material.
- Arthur Andersen's "Audit Reference and Resource Disc" states: "10.10 ELEMENTS OF COST. The amount recorded for property should include all costs directly related to its acquisition including expenditures incurred to place the property in usable condition for the purchaser. Accordingly, the cost of property should include such items as design costs, sales taxes, transportation charges and installation costs."

Information to Calculate Rate	Information to which Rate Is applied	Level at which rate is applied	Target	Offset	Frequency of Factor Updates
Previous month labor charges by authorization and work ID as a percentage of total labor. Residual clearing account balances.	Beginning balance in account 1220.1200.	Authorization, work ID, and asset category for both capital and expense.	Work ID's and authorizations used to calculate clearance	1220.1200	

Project:	**Transform Data into Financial Information**
Group:	**Allocations**
Class:	***Exempt Material***
Title:	***Methodology***

Process Characteristics:

- EMAT process sits 'outside' the GL and processes twice a month. Initial process on the seventh or eight workday of the current journal month; Final process, immediately after the journal close for the current month. Provisioning is loaded on EMAT output transactions when the Source = FIA, RTC = CQ1 and Account Categories = C (Capital assets - C codes), D (Depreciation/Cost of Removal - X codes) or G (Plant specific expense - M codes)

- Exempt Material account charges are distributed one month in arrears

- Exempt Material account will carry one month rolling balance. Ending balance will consist of current month charges only. This balance will be carried over as a beginning of year balance for year end close

- Clearance is based on direct labor dollars (NOT labor hours)

- Exempt material beginning balance is split by RE into capital and expense based on predetermined percentages provided by Network

- Labor charges within a RE are divided into capital and expense pools

- **For each RE**, the capital portion of the exempt material balance is cleared over capital labor dollars (asset category, asset status, GLC, GMA, OCC rolled up to 4th tier (effective 1/1/98, 6th tier - Senior Director Level), product code, reason ID resource type code and work ID)

- Exempt Material is excluded from reporting (i.e. nails, screws, bolts, work gloves, etc.)

- SRC = 1220.1200; Asset Category = C52 (Work ID & Product Code - not applicable)

Project:	**Transform Data into Financial Information**
Group:	**Allocations**
Class:	***Exempt Material***
Title:	***Methodology***

Tasks that should be completed monthly:

1. **Maintain PS_BST_EMAT_AST_IN table -** Advise Wes Allbritton (Acctg. Class.) of planned changes; Request a confirmation from Wes on planned changes to the table

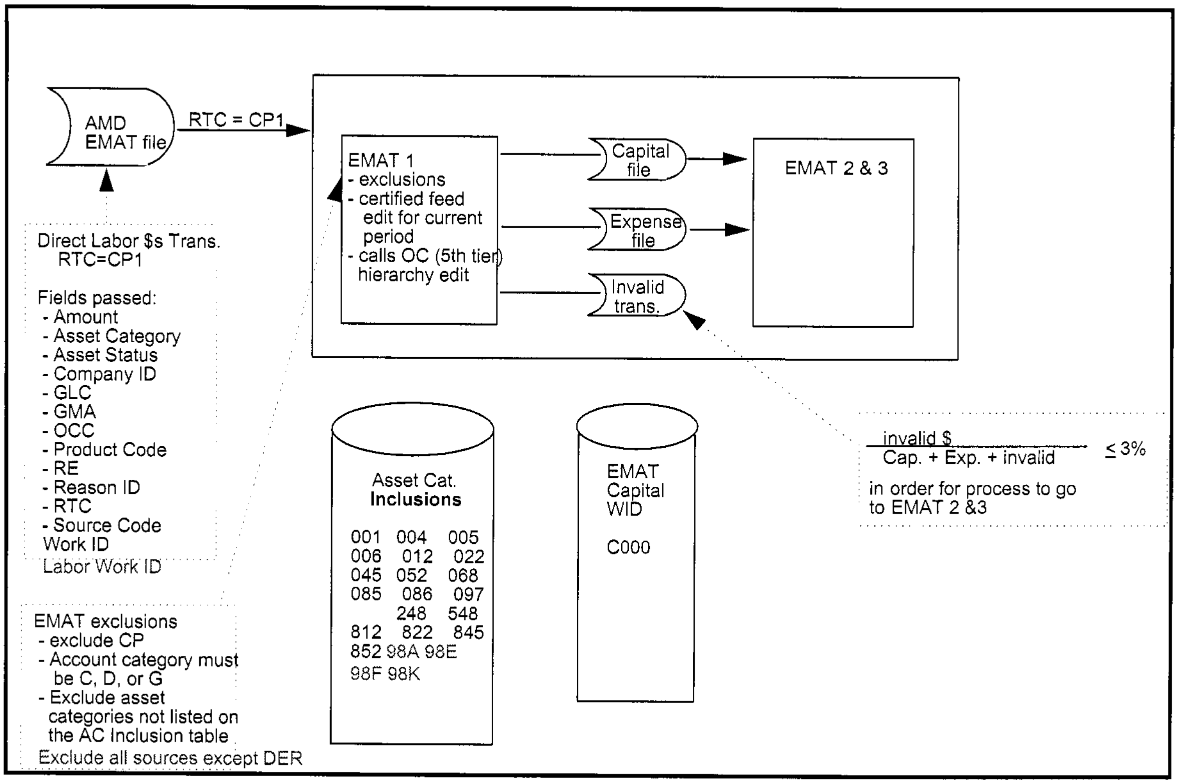
2. **Maintain PS_BST_EMAT_CAP table -** Changes received from Bob Thompson (Network); Notify Bob when changes completed

3. **Maintain PS_BST_EMAT_CAPWID table -** Currently, only has one line

4. **Monitor error threshold (currently, 3%) -** Error print provided by the GL Consultant

5. **Monitor account balance for Exempt Material (1220.1200)**; Review the GLRM3017 report

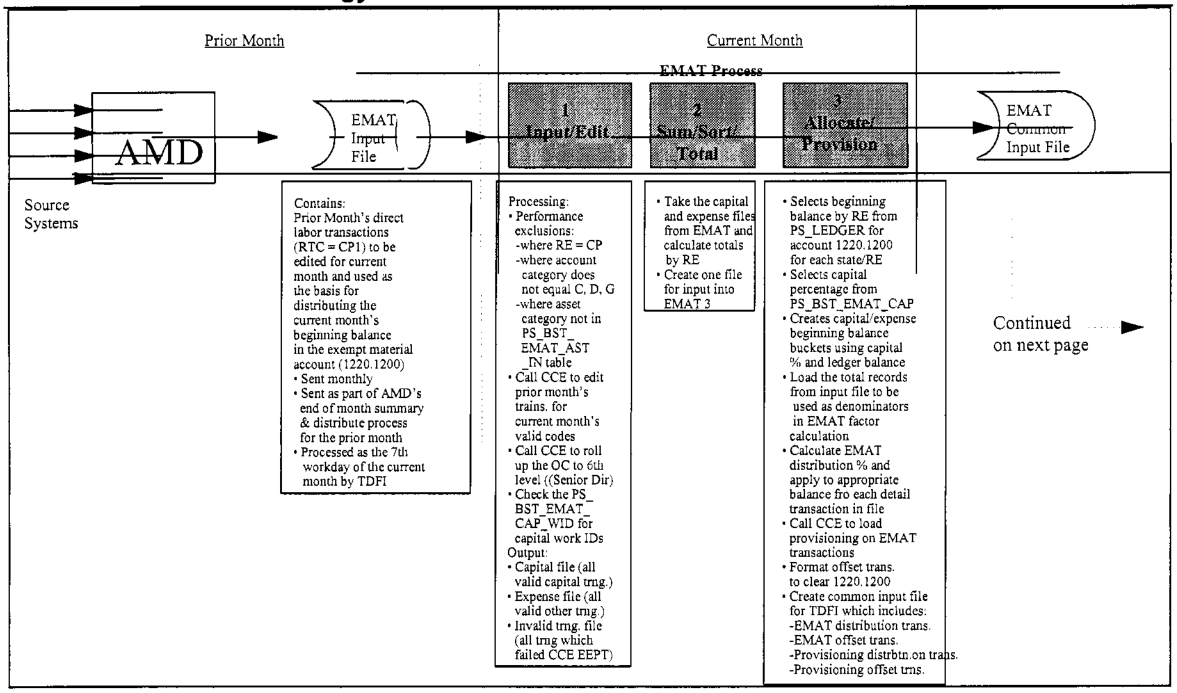
EMAT Process Flow Diagram:

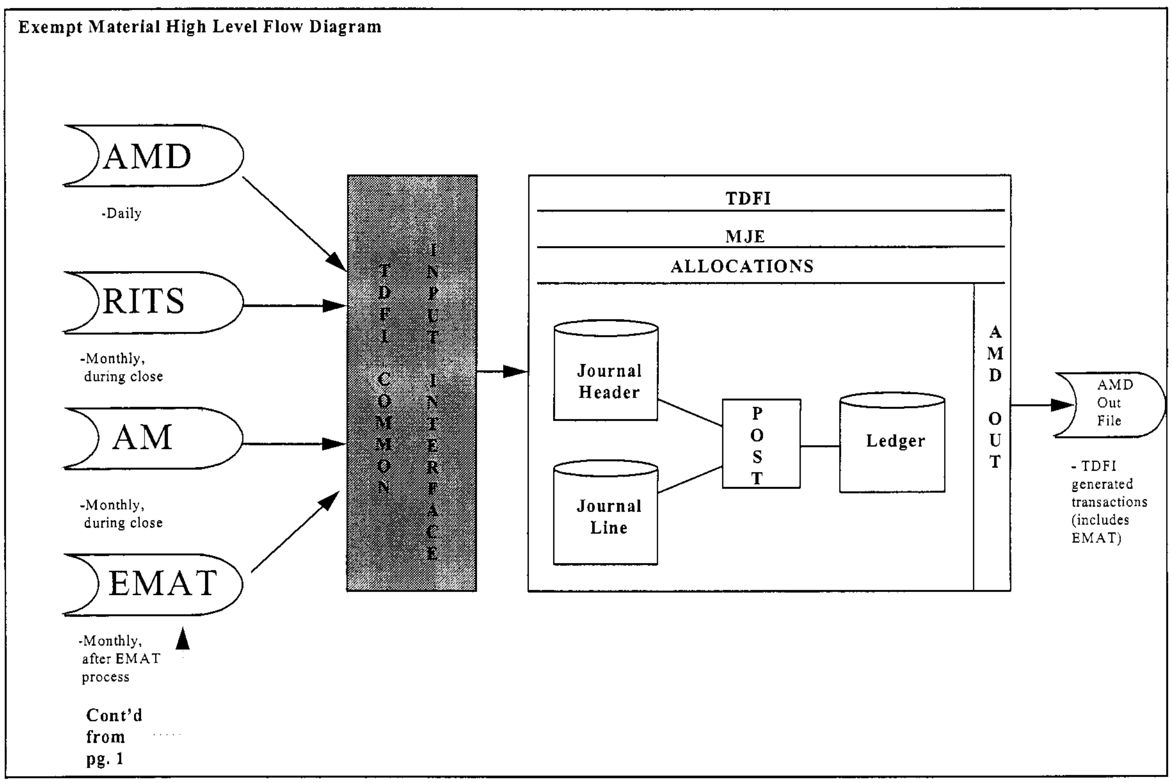


Note! CP1 transactions **do not** include the following fields:

Field	Field
Employee Status Code	OCO
Hours	Plan ID

1. Exempt Material processed after the current journal month closes
2. AMD sends EMAT file with only prior journal month transactions; RTC = CP1
3. AMD is the only file into the EMAT process
4. Sources for CP1 transactions: DER (Direct Labor Trans), FIM or ANY other source


Prior Month
Current Month
EMAT Process
AMD
Source Systems
EMAT Input File
1 Input/Edit
2 Sum/Sort/Total
3 Allocate/Provision
EMAT Common Input File
Contains:
Prior Month's direct labor transactions (RTC = CP1) to be edited for current month and used as the basis for distributing the current month's beginning balance in the exempt material account (1220.1200)
• Sent monthly
• Sent as part of AMD's end of month summary & distribute process for the prior month
• Processed as the 7th workday of the current month by TDFI
Processing:
• Performance exclusions:
-where RE = CP
-where account category does not equal C, D, G
-where asset category not in PS_BST_EMAT_AST_IN table
• Call CCE to edit prior month's trains. for current month's valid codes
• Call CCE to roll up the OC to 6th level ((Senior Dir)
• Check the PS_BST_EMAT_CAP_WID for capital work IDs
Output:
• Capital file (all valid capital trng.)
• Expense file (all valid other trng.)
• Invalid trng. file (all trng which failed CCE EEPT)
• Take the capital and expense files from EMAT and calculate totals by RE
• Create one file for input into EMAT 3
• Selects beginning balance by RE from PS_LEDGER for account 1220.1200 for each state/RE
• Selects capital percentage from PS_BST_EMAT_CAP
• Creates capital/expense beginning balance buckets using capital % and ledger balance
• Load the total records from input file to be used as denominators in EMAT factor calculation
• Calculate EMAT distribution % and apply to appropriate balance fro each detail transaction in file
• Call CCE to load provisioning on EMAT transactions
• Format offset trans. to clear 1220.1200
• Create common input file for TDFI which includes:
-EMAT distribution trans.
-EMAT offset trans.
-Provisioning distrbtn.on trans.
-Provisioning offset trns.
Continued on next page


Exempt Material High Level Flow Diagram
AMD
-Daily
RITS
-Monthly, during close
AM
-Monthly, during close
EMAT
-Monthly, after EMAT process
Cont'd from pg. 1
TDFI COMMON INPUT INTERFACE
TDFI
MJE
ALLOCATIONS
Journal Header
Journal Line
POST
Ledger
AMD OUT
AMD Out File
- TDFI generated transactions (includes EMAT)

ATTACHMENT

PROPRIETARY

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RL: 01-03-013BT

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filecode: **204.0100**

subject: Terminating Universal versus Integrated DLC Systems In Offices With Surplus Analog Lines

type: Information Letter

date: **March 16, 2001**

to: Attached Distribution List

entities: BellSouth Telecommunications, Inc.

from: Jim Jackson, Research Director

description: Provides preliminary recommendations for terminating new Digital Loop Carrier systems in offices with surplus analog line terminations.

* * *

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ENTITY SYSTEM "http://belsweb.bst.bls.com/filenet/document/get?library=Central+Libr
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In connection with the Capital Efficiency Initiative (CEI), we were asked to do an analysis of surplus analog lines in digital switches and their impact on loop DLC/NGDLC system terminations. These surplus line terminations are the result of several factors including loss of lines to competitive providers, ADSL deployment, customer movement to other wire center areas, and replacement of feeder facilities. We are in the process of finalizing new loop and switching Technology Directives regarding these issues, but I wanted to share with you now the findings of this analysis and encourage you to begin implementing these strategies as opportunities arise in order to reduce the overall 2001 budget as well as significantly reduce our continued investment in circuit switching equipment.

The attached materials highlight the critical issues and findings related to the costs to terminate DLC/NGDLC systems in universal versus integrated arrangements if "free" analog line cards are available in digital switches. There are approximately 60 variations of system and switch configurations in this study and a number of assumptions can be varied to produce slightly different results in some cases. However, the results highlighted in the attached material indicate substantial savings can be achieved by continuing to integrate in some situations and deploying universal COTs in others. In particular, integrated GR-303 terminations from NGDLC platforms prove to be more economical than universal even when assuming "free" analog line cards. However, universal terminations (with "free" analog line cards) for conventional DLC systems are more economical, as a general rule, than integrated TR-008. This is particularly true when system utilizations are low. There also appears to be a significant number of surplus COTs available for reuse from recent 1A ESS replacement projects, which dramatically enhances the economics of the universal alternative for conventional systems.

Based on these results, preliminary recommendations are summarized by the following table. While this may represent a change in current strategies regarding integration, it is consistent with overriding strategies to maximize use of existing resources and to proactively reduce overall budget expenditures. Integration remains the economical choice where new analog lines and new COTs would have to be purchased for the universal option. In addition, some universal capacity must continue to be available for non-locally switched specials and UNEs. These new recommendations are focused only on those offices that currently have surplus analog line terminations and only for those locations that have available COTs or floor space available for additional COTs. Obviously, the costs of building additions to provide floor space for additional COT bays will quickly exceed the potential savings. Two major initiatives that need to be highlighted are the maximum use of GR-303 integration for NGDLC platforms and the recovery of conventional DLC COTs, commons, and channel units.

Recommended CO Terminations

		Stranded Switch Analog Line Capacity?	
		No	Yes
Spare TR-008 Capacity in Switch?	Yes	Conventional DLC: ▪ Use existing TR008 capacity ▪ Place additional integrated TR008 capacity as required NGDLC: ▪ Small – Use existing or place additional TR008 capacity ▪ Large – Use excess TR008 capacity, then integrate TR303	Conventional DLC: ▪ Use excess TR008 capacity beyond that required for NGDLC ▪ Use, reuse, or place Universal COTs NGDLC: ▪ Small – Use existing TR-008 capacity, then place universal COT capacity ▪ Large – Use excess TR008 capacity, then Integrate TR303
	No	Follow Existing Directives	Conventional DLC: ▪ Place Universal NGDLC: ▪ Small – Place Universal (DS1 1:1) ▪ Large – Integrate TR303 (DS1 4:1)

These recommendations will be incorporated into the 2001 edition of the Loop Technology Deployment Directives (LTDD) due in April. Also to be addressed in a separate Switching Directive will be recommendations regarding: a) removing stranded analog line terminations from one central office and redeploying them in another central office(s), and b) removing and retiring stranded analog line termination capacity. Capacity managers should begin dialog with their loop or switch counterparts to maximize opportunities to reduce overall costs.

If you have questions regarding this matter, please call me on 205-977-5032. Questions from your organization may be directed to Stan Fory on 205-977-7158 or Rob McKibben on 205-977-5042.

Original Signed by
Jim Jackson

cc:

Bill McNair
Ray Smets

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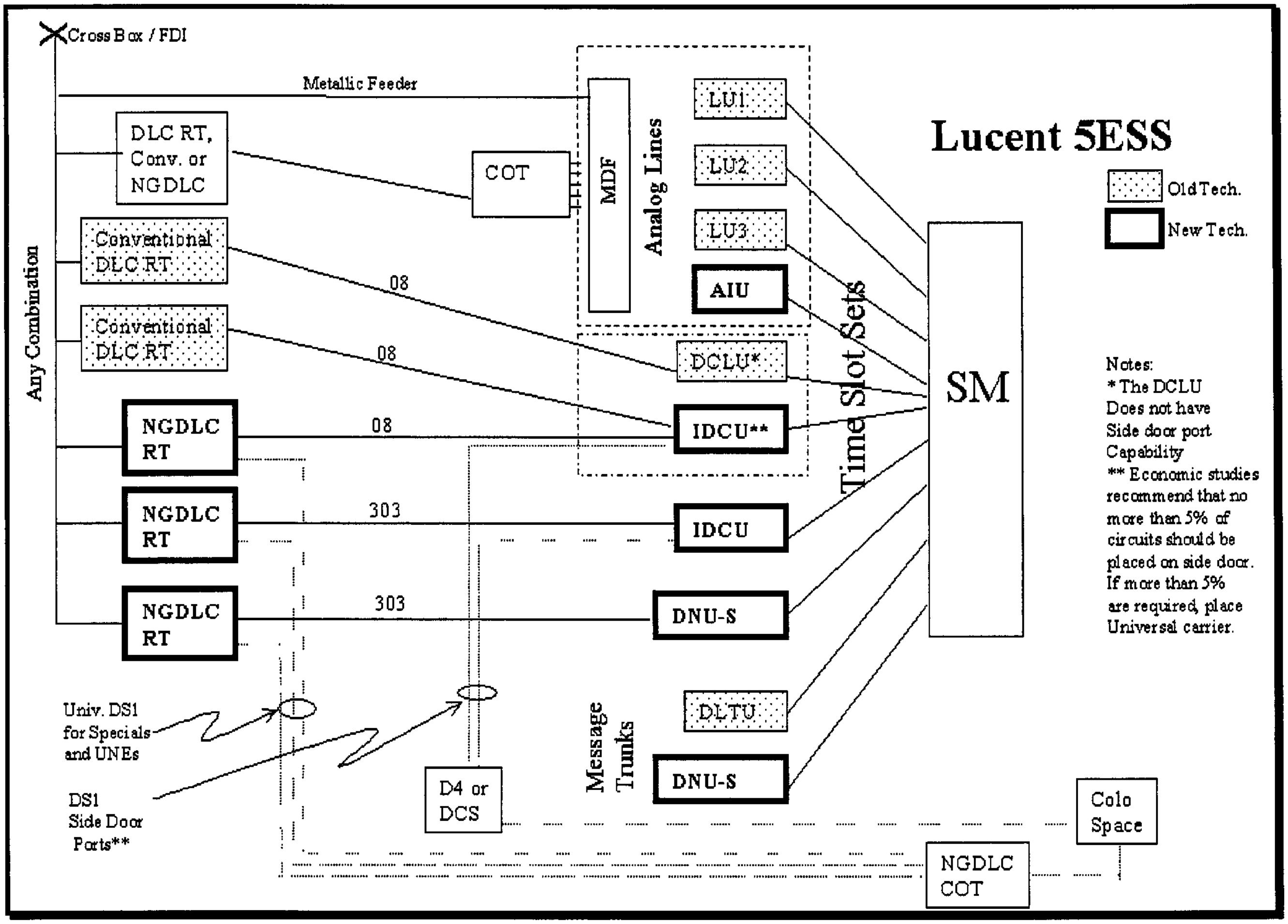
Reuse of Spare Analog Line Capacity

2. General



Recommended CO Terminations

		Stranded Switch Analog Line Capacity?	
		No	Yes
Spare TR-008 Capacity in Switch?	Yes	Conventional DLC: ▪ Use existing TR008 capacity ▪ Place additional integrated TR008 capacity as required NGDLC: ▪ Small – Use existing or place additional TR008 capacity ▪ Large – Use excess TR008 capacity, then integrate TR303	Conventional DLC: ▪ Use excess TR008 capacity beyond that required for NGDLC ▪ Use, reuse, or place Universal COTs NGDLC: ▪ Small –Use existing TR-008 capacity, then place universal COT capacity ▪ Large – Use excess TR008 capacity, then Integrate TR303
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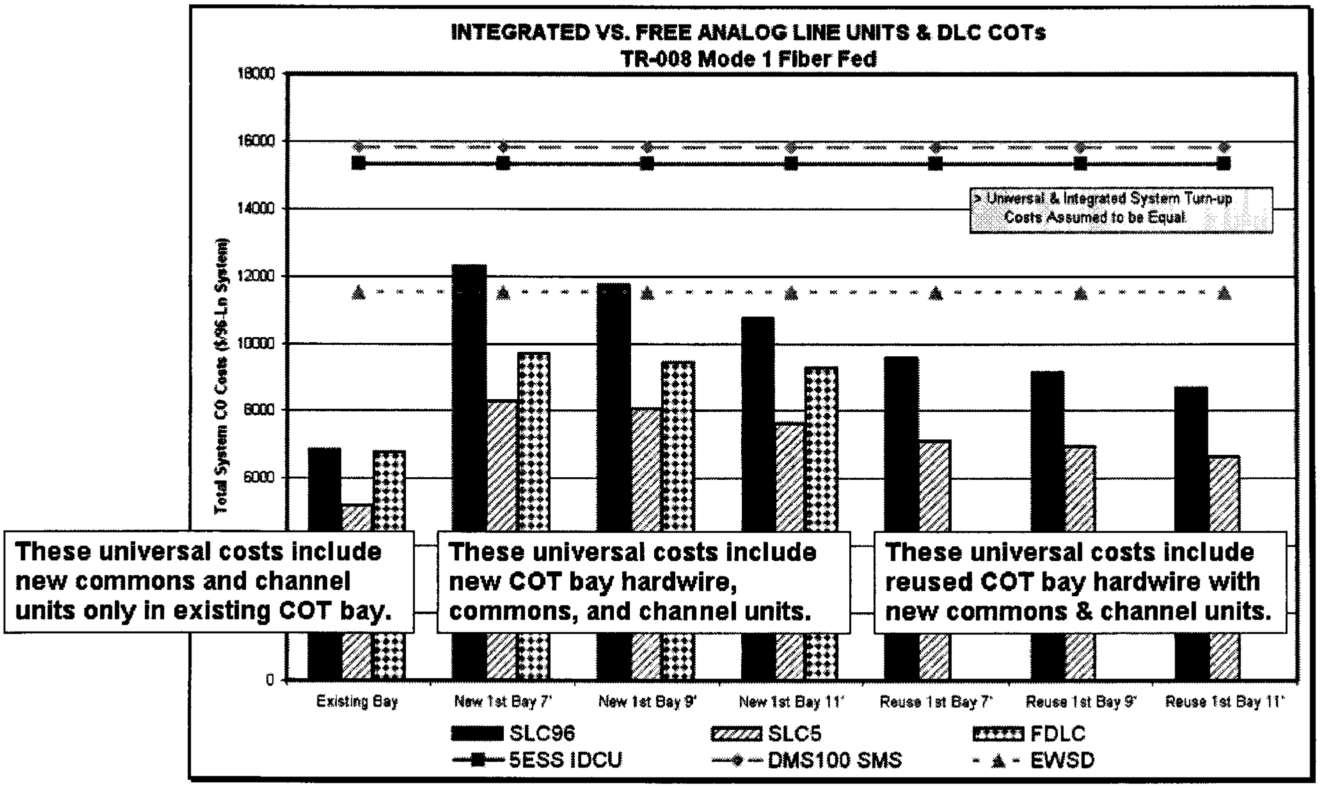

Unit Cost Analysis Preliminary Findings

- With new analog line and COT requirements, integration remains more economical and first choice for deployment.
- GR-303 terminations from NGDLC are more economical than universal, even with free analog line units.
  - Total capacity of RDT/HDT platform reserved at univ. COT
  - Universal requires significantly more transport capacity & cost
- With recovered COTs and free analog lines, universal terminations are always more economical than integrated for conventional DLC
  - Where floor space is not a limiting issue
- With new COTs and free analog lines, universal terminations are more economical than integrated for conventional DLC, except for Mode 2 in a 5ESS.
  - Where floor space is not a limiting issue

Wire Center Analysis
Preliminary Findings/Recommendations

- Sample Wire Centers 1 and 2
  - High Growth Activity in WC and RTs
  - Continue Extensive Use of GR-303 to Maximize Overall Savings
  - TR-008 Capacity Available for other Planned Terminations
  - Spare Analog Line Capacity Available for Re-Use at Other COs
- Sample Wire Centers 3 and 4
  - Extensive use of NGDLC RDT/HDT Platforms
  - No GR-303 terminations in service from NGDLC through 2000
  - 350 Vacant SLC5/SLC96 COTs in nearby COs
  - Initial TR-303 termination plans for 2001-2002
  - Limited Floor Space (floor renovation planned for Wire Center 3)
  - Spare Analog Line Capacity and COTs should be considered to accommodate conventional DLC Growth = Major Budget Savings
  - NGDLC termination plans should be revised to reflect more GR-303

GR-303 Benefits

... Saves Switch Terminations

... Saves Switch $$$$$

($30-$50/Ln 5ESS, $45/Ln D-100, $70/Ln EWSD)*

... Saves DS1 Loop Transport Capacity

... Saves Loop Transport $$$$$ ($15-$20/Ln)

... Allows Integration of ISDN Circuits

...Allows Integration of ATM-based VoDSL Lines

Additional details contained in following RLs: 00-04-004, 99-09-019, 98-11-029, and 97-12-019. All are available at http://home.snt.bst.bls.com/group/techdirect

*Based on average size of 288 lines and assume 100% fill

NOTE: In many high growth wire centers, GR-303 architectures offer a significant opportunity to reduce overall costs.

ATTACHMENT

PROPRIETARY

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filecode: **205.0200**

subject: Fiber Relief Strategies for the Loop: WDM, Bit Rate Upgrades

type: Information Letter

date: **February 23, 2001**

distribution: See Attached

related letters: RL:00-11-006BT

other: 915-730-017BT

to: Attached Distribution List

entities: BellSouth Telecommunications, Inc.

from: Network Vice President - Technology Planning Deployment Center

description: General economic recommendations for investments associated with electronics for fiber deferrals.

* * *

Click here to view or print a PDF copy of this document.

For the last several years, local loop fiber has been increasingly deployed to support demands for Digital Loop Electronics, DS1s, SmartRings and other private business networks in BellSouth. Recent fiber shortages and new options for electronics have added new variables in determining relief strategies and competitive time lines for service. Requirements to evaluate WDM (Wave Division Multiplexing) for the access network and bit rate upgrades to existing rings are quickly rising as priorities for consideration in loop planning. While WDM has been deployed in long haul networks for several years, deployments of WDM products in local loop networks are just emerging as viable cost alternatives, particularly for slow growth routes.

This letter provides current pricing information and economic analysis for current year investments in WDM and/or bit rate electronics upgrades in order to defer fiber reinforcements. Questions from your organization regarding this matter should be directed to Jim Jackson at (205) 977-5032 or Sherry Woodruff at (770) 493-3741.

Original signed by W. J. McNamara
W. J. McNamara
Network Vice President -
Technology Planning Deployment Center

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Directives

2. Introduction

Fiber demands in the network continue to increase for new service locations and for reinforcements to existing routes. The continual evolution of WDM (Wave Division Multiplexing) and lower price targets for higher bandwidth optics, have made these alternatives important strategies for route planning and relief alternatives. The recommendations in this document are based on current equipment pricing and will be revised as appropriate

2.1. Purpose

The purpose of this document is to discuss loop applications for WDM and bit rate upgrades in order to defer fiber reinforcements, and the economics associated with current year investments in electronics to defer fiber.

2.2. Audience

The target audience for this letter is Infrastructure Planners, Loop Capacity Managers (LCMs), Outside Plant Engineering Managers, Digital Loop Electronics Coordinators (DLECs), Project Managers and Engineers.

2.3. Target Area

Applications to study WDM and bit rate upgrades are applicable for the nine state area where fiber reinforcements are proposed.

2.4. Time Frames

The WaveShifter 300 and OC3+/ FLM150+ (OC12 optics in an OC3 shelf) should be considered as relief alternatives currently available.

3. Implementation Plan

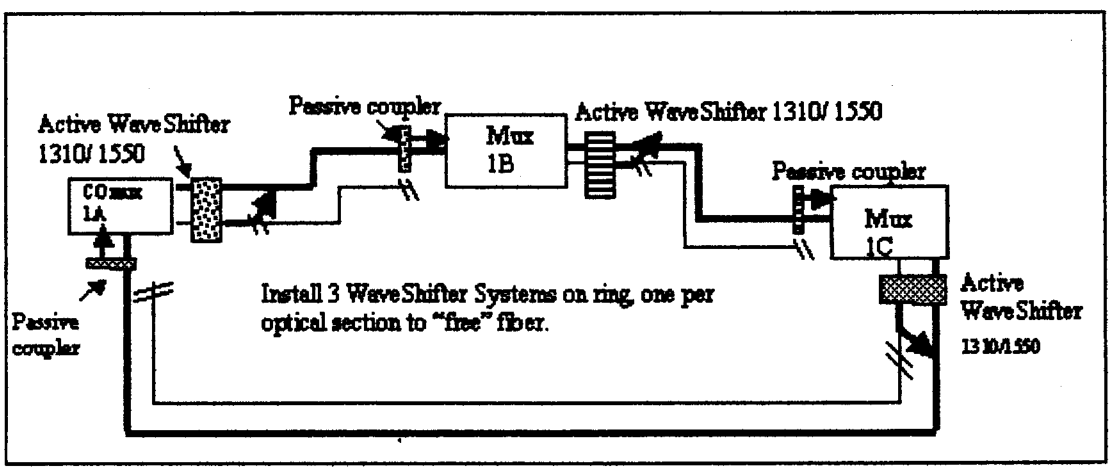
When deciding on relief strategies for fiber reinforcements, it is important to understand the facility requirements for the entire route planning cycle. Primary economic targets for electronic deferrals are slow growth routes, or routes that have extraordinary construction costs. Short-term capital solutions should be weighed against long-term economics, customer space limitations, fiber availability, customer service requirements, and budget restrictions.

3.1. Study Methodology / WDM vs. Bit Rate Upgrades

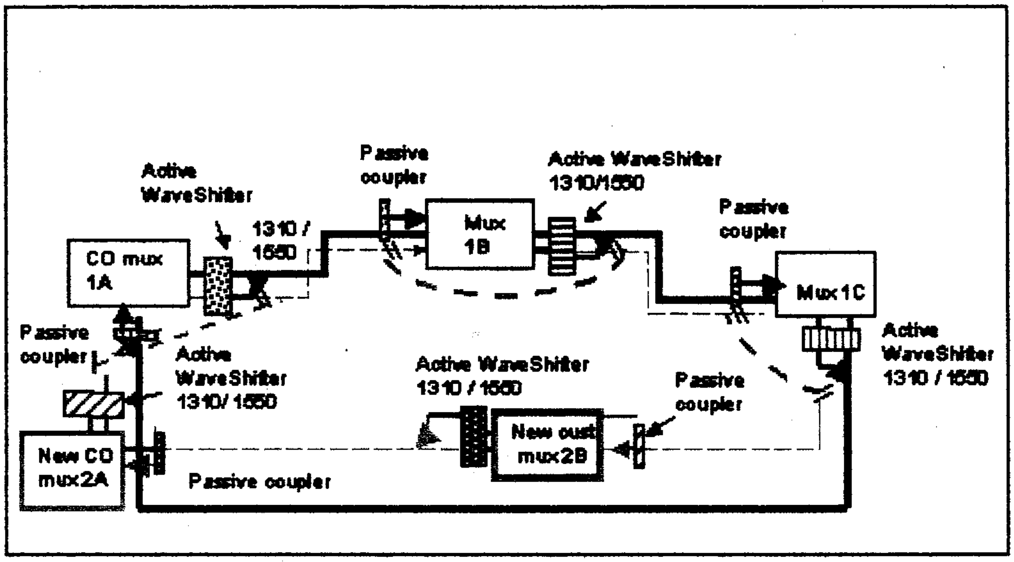
The WDM device discussed in this document is the 2 channel WaveShifter 300 manufactured by JDS Uniphase Corporation (formerly know as FITEL). WDM with JDS Uniphase can be achieved in either a bi-directional or unidirectional mode. Bi-directional operation allows two-way transmission (one signal at 1310 and the other at 1550 in the opposite direction) on the same fiber and should be used for all loop applications. This system consists of an active WaveShifter 300 at one end of an optical section, and a passive WDM module at the other. The active WaveShifter "shifts" the 1310nm "transmission" signal from the multiplexer to the 1550 nm fiber window, and receives the 1310 nm signal for delivery to the multiplexer; which are both transmitted on a single fiber. A passive WDM coupler is placed on the fiber at the other end of the optical section, which provides the functionality to process the "transmit" and "receive" signals to the multiplexer. Two WaveShifter Systems installed between 2 multiplexers supported by 4 fibers (transmit and receive main, and transmit and receive protect) can free up two fibers for other applications. The material price for this "system" is approximately $3746 per fiber gained, per optical section (between multiplexers). Thus, 4 fibers supporting a 2 node ring could utilize 4 WDM systems to "virtually" mine 4 additional fibers for a new ring for approximately $15,000. This includes 2 systems for the existing ring to free 2 fibers, and a system for each of the 2 newly vacated fibers to turn up the new ring. An additional cost of approximately $2385 per shelf ($2101 for additional shelves on the same order) via the TEO process to equip the CO with shelf assemblies to house 2 WaveShifter Modules and/or approximately $588 for 2 WDM couplers ($508 for additional shelves on the same order) should also be noted. This adds a cost of approximately $4486 for the shelves to mine 4 fibers, assuming 2 active shelves are required in the CO, for a total of $19,486. DLC work groups should typically perform installation of the shelves in remote cabinets and structures at the loaded labor rate, which will not significantly impact the cost of the WDM systems. Refer to figures 4 - 6 in attachment 3 for detailed WDM schematics and to 915-730-017BT for additional information on the WaveShifter Systems.

The figures below illustrate the cost associated with using the WaveShifter systems on a three node ring. Assuming 4 virtual fibers must be mined for a new ring, 5 WaveShifter systems are required, as well as 1 shelf each for both the active and passive components in the CO. The shelves at the remote locations will be installed using Telco labor, and are estimated to cost about $100 per shelf. (See figures 1 and 2 below.)

Add 3 WDM systems to free 2 fibers from existing ring



Add 2 additional WaveShifter systems to establish new CO mux and customer node on vacated fiber



Total cost:	5 WaveShifter Systems = 5 X $3746 =	$18,730
	1 Active shelf in CO (holds 2 systems) =	$2,385
	1 Passive shelf in CO (holds 2 systems) =	$588
	3 RT installations = 3 X $100 =	$300
	Total =	$22,003

NOTE: If the active components are placed in the CO for nodes 1C and 2B, the $588 passive shelf would not be needed, however an additional active shelf for $2101 would be required. This would bring the total to $23,516. (It is typically recommended that active components be placed in the CO or in structures, rather than cabinets.)

Bandwidth upgrades for existing OC 3 rings using Fujitsu and Lucent multiplexers may also provide an alternative for fiber deferrals. The upgrade is accomplished by replacing the OLIU's in the OC3 shelf with OC 12 optics. Fujitsu's OC12 card and Lucent's original OC12 optic card, the 24GU, require the dedication of STS1s to remote terminals. Lucent's new card, the 29GU, includes full VT access. While overall costs for new deployments are similar (including low speed cards), the cost of the optics and commons vary by supplier. Thus for upgrades, the manufacturer selected may produce different relief economics between plans. (See Table 1 for current prices as of 1/01.)

Table 1 - 2001 Supplier Prices ($000)

	Lucent	Fujitsu
cost to change out OC3 optics to OC12 per mux		
STS1 functionality	$ 4.5	$ 6.7
VT1.5 functionality	$ 5.2	
cost OC3 commons	$ 5.6	$ 5.1
cost OC3+ commons		
STS1 functionality	$ 6.6	$ 9.5
VT1.5 functionality	$ 7.3	

Fiber reinforcements should be compared with bit rate upgrades and WDM options with regards to the overall route economics, and timing for other growth demands for the route. Based on an extensive iterative Scorecard analysis, Table 2 below is provided for use in calculating the maximum capital for an electronic investment to economically defer fiber placement. Approximately 10% of the capital required for a fiber reinforcement used to defer the project 1 year will result in a positive NPV economic analysis between plans. For each subsequent year deferral, approximately an additional 10% capital in the current year can be tolerated. (See Table 2). Other considerations such as service intervals, fiber availability, or short-term capital limitations may dictate alternatives to fiber reinforcements, regardless of the economics, but there are still opportunities to minimize network investments by understanding the costs of WDM and ring upgrades.

Table 2

Calculating Economic Plan Deferrals:

Maximum capital current year =

``Fiber reinforcement cost'' X 10% X ``deferral factor''

Years deferred	deferral factor
1	1.1
2	2.1
3	3
4	3.75
5	4.5
6	5.2

Example: The ecomonic limit for a current year electronics investment in order to defer a fiber reinforcement priced at $50,000 for 4 years would be calculated:

$50,000 X 10% X 3.75 = $18,750

Attachment

Deployment Recommendations

4. Summary

Although there are a multitude of variables involved in determining costs and service requirements, the recommendations listed below are reflective of typical applications in the loop network. Since many of the original fiber allocations were for 6 fibers per ring, it is assumed that many 2- fiber opportunities exist for WDM systems as well as for sections where 4 virtual fibers are required. It is also assumed that for WDM plans, 2 active WaveShifter shelves will be required in the CO. The OC12 OLIU upgrade options listed below focus on using existing OC3 shelves to avoid additional space requirements. Another OC12 option is the LiteSpán 2012, which requires a new shelf installation, but provides additional functionality as a next generation carrier system. (Approval for the 2012 is expected early in 2001.) Typically this application would be most appropriate (as a bit rate upgrade) for large structure installations currently serviced by an asynchronous multiplexer, and selected to provide flexible service configurations for additional growth demands. Additional information will be made available upon final approval and pricing.

Upgrade opportunities are dependent upon forecast requirements and existing ring capacities. Some situations may dictate a specific solution and are not appropriate for plan comparisons between WDM and bit rate upgrades. Where ring capacities and forecasts permit, plan comparisons using existing OC3 shelves have been provided in sections 3.1.1 - 3.1.4 to provide some general economic comparisons.

Adding nodes to an existing ring, providing sufficient capacity is available on the ring, is always the least costly alternative.

If fiber is available (existing), it is typically cheaper to establish new OC3 or OC3+ rings than to upgrade an existing ring for a node insertion.

If fiber is *not* available (existing) and there are existing point-to-point asynchronous systems, WDM is typically the economic relief choice (as compared to converting the system into a ring configuration).

If fiber is *not* available (existing), deferrals for fiber placement using WDM or bit rate upgrades should be considered using table 1. When formulating a plan for fiber deferrals, evaluate the existing rings in order to consider the electronic solutions in sections 3.1.1- 3.1.4: (For clarification, an "x" node ring refers to the total of all CO and RT nodes on the ring.)

4.1. Electronic solutions for new requirements ≤ OC3

Upgrade plan to convert to OC12 and place a new remote node and CO node (OC 12 optics) versus WDM existing fibers to establish a new ring with OC3 optics:

- Lucent

  Mine 2 fibers using WDM (plus 2 existing fibers) versus upgrades

  - ♦ WDM is cost effective in all scenarios

  Mine 4 fibers using WDM versus upgrades

  - ♦ For 2 node rings, consider upgrades
  - ♦ For 3 or more node rings, WDM should be attractive unless all optical sections (fibers between multiplexers) require WDM systems

- Fujitsu

  - ♦ WDM is cost effective for all scenarios

4.2. For new requirements ≤ OC3

Upgrade plan to convert to OC12 and place a new remote node (OC 12 optics) *using the existing CO node,* versus WDM existing fibers to establish a new ring with OC3 optics: (This would typically be an interim step, which would ultimately require an additional CO node for the upgrade plan.)

- Lucent

  Mine 2 fibers using WDM (plus 2 existing fibers) versus upgrades

  - For 2 node rings, consider upgrades
  - For rings with three or more nodes, WDM will be attractive if not all of the optical sections have fiber shortages.

  Mine 4 fibers using WDM versus upgrades

  - Consider upgrades for 2, 3, and 4 node rings.
  - For rings with 5 or more nodes, upgrades are attractive if most of the optical sections require WDM.

- Fujitsu

  Mine 2 fibers using WDM (plus 2 existing fibers) versus upgrades

  - WDM is cost effective for all scenarios

  Mine 4 fibers using WDM versus upgrades

  - For 2 node rings, consider upgrades
  - For 3 or more node rings, WDM is typically cost effective

4.3. For new requirements > OC3

Upgrade plan to convert to OC12, versus WDM plan with a new ring requiring OC12 optics: (*Both* plans assume new requirements will trigger CO node additions to match the RT nodes deployed, i.e., 2 RT nodes and 2 CO nodes.)

- Lucent

  Mine 2 fibers using WDM (plus 2 existing fibers) versus upgrades

  - For 2WDM is cost effective for all scenarios node rings, consider upgrades

  Mine 4 fibers using WDM versus upgrades

  - Consider upgrades for 2 and 3 node rings, and for 4 node rings requiring more than 1 optical WDM section.
  - For rings with 5 or more nodes, WDM should be attractive unless all the optical sections have fiber shortages.

- Fujitsu

  Mine 2 fibers using WDM (plus 2 existing fibers) versus upgrades

  - WDM is cost effective for all scenarios

  Mine 4 fibers using WDM versus upgrades

  - Consider upgrades for 2 node rings.
  - For rings with 3 or more nodes consider WDM.

4.4. For new requirements > OC3

Upgrade plan to convert to OC12 versus WDM plan with a new ring requiring OC12 optics: (Assumes new requirements will trigger *1 less CO node* addition than the RT nodes deployed due to low RT utilization.)

- Lucent

  Mine 2 fibers using WDM (plus 2 existing fibers) versus upgrades

  - Consider upgrades for 2 and 3 node rings.
  - For rings with 4 or more nodes, consider WDM if not all optical sections have fiber shortages.

  Mine 4 fibers using WDM versus upgrades

  - Typically upgrades should be considered for 2, 3 and 4 node rings.
  - For 5 or more node rings, consider WDM for 1 or 2 optical section WDM requirements, and upgrades for the remaining scenarios.

- Fujitsu

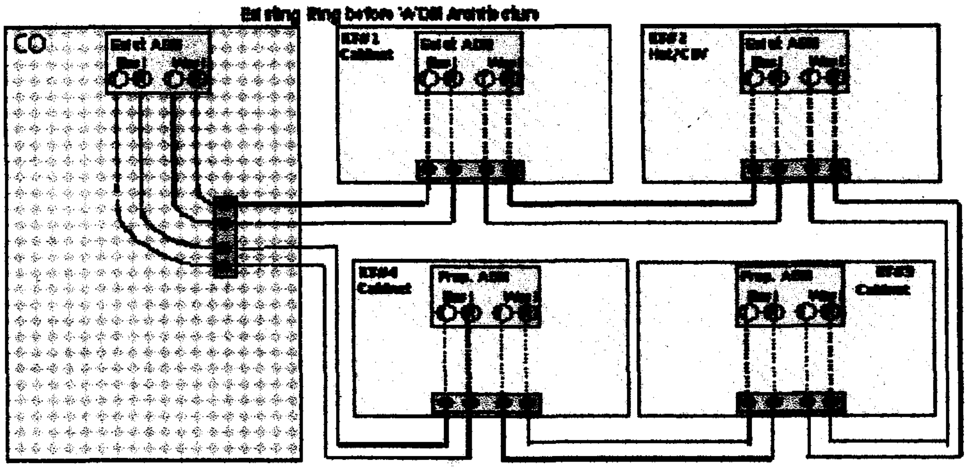
  Mine 2 fibers using WDM (plus 2 existing fibers) versus upgrades

  - Consider upgrades for all 2 node rings.
  - For 3 node rings, consider WDM if not all optical sections have fiber shortages.
  - For rings with 4 or more nodes, WDM is cost effective.

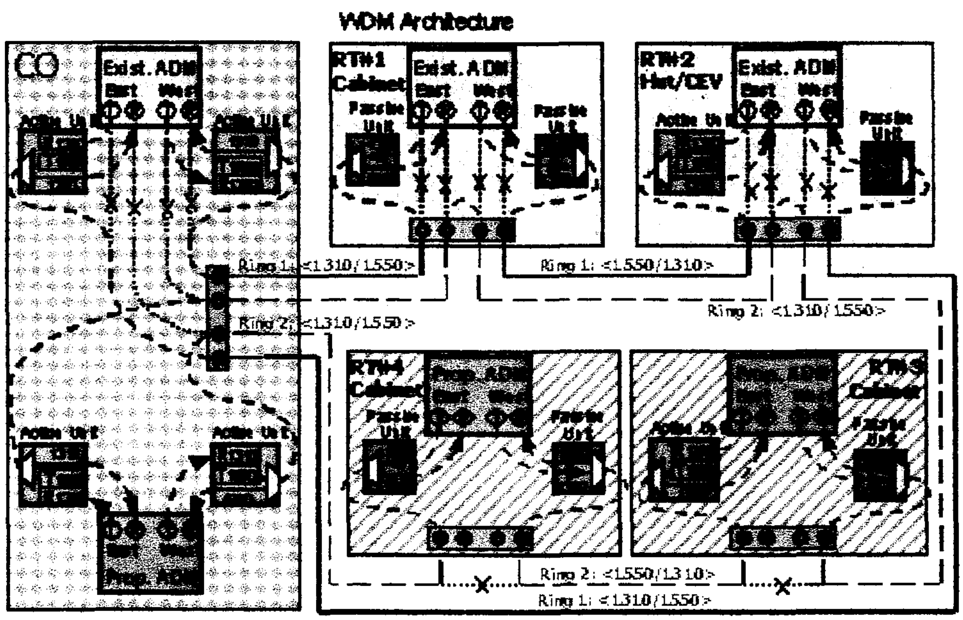
  Mine 4 fibers using WDM versus upgrades

  - Consider upgrades for all 2 and 3 node rings.
  - For rings with 4 or more nodes, WDM is cost effective for 1 optical section requirement only; otherwise consider upgrades.
  - For rings with 5 or more nodes, typically WDM is cost effective.

Existing Ring before WDM Architecture



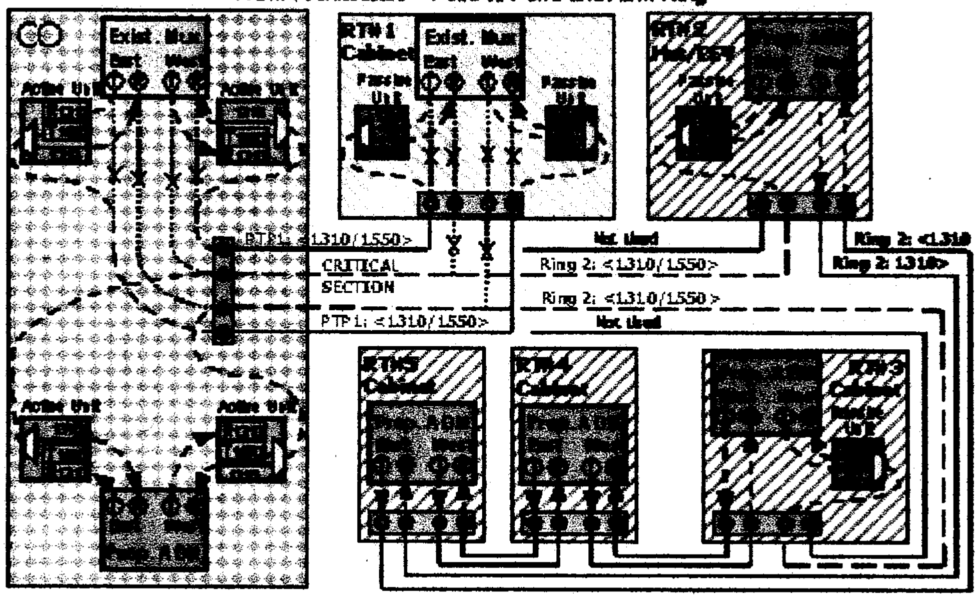
WDM Architecture



•Each set w/passive network works independently to create a 1550 nm path in each section requiring an additional optical path.
•Active units should be placed in CO or other environmentally controlled housings where possible.
•1550 nm signal received directly by DDM-2000 or other optical device <=OC-12.

WDM Architecture - Point-to-Point and ADM Ring

WDM Architecture – Point-to-Point and ADM Ring



- Each active/passive set works independently; to create a 1550 nm path in a each section requiring an additional optical path.
- Active units should be placed in CO or other environmentally controlled housings where possible.
- 1550 nm signal received directly by DDM-2000 or other optical device <=OC-12.

ATTACHMENT

PROPRIETARY

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RL: 00-11-023BT

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filecode: **204.000**

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RL: 98-11-012 BT

to: Attached Distribution List

entities: BellSouth Telecommunications, Inc.

from: D. A. Kettler, Vice President Science & Technology & Chief Architect

description: Unbundled Loop Strategies Update

* * *

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The purpose of this Information Letter is to provide the latest planning information available regarding unbundled loops associated with Local Exchange Competition. This document should be considered a replacement for RL: 98-11-012 BT.

This letter addresses planning and building the BellSouth network infrastructure, specifically unbundled loops, to meet the requirements of CLEC (Competitive Local Exchange Carriers) customers with the most cost effective architectures. The target audience for this letter is Infrastructure Planners, Capacity Managers, and Outside Plant Engineering Managers.

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For further informmation or any question contact: *Research Director* John Jackson (205) 977-5032 and *SME* John Jackson (205) 977-5043.
Approval
Original Signed by:

Attachment

Unbundled Loop Strategies

1. Basic Unbundled Loops

The general description of unbundled loops identifies a facility connection from a CLEC designated end-user address to a CLEC collocation point. ***The architecture used to provide these unbundled loops is the same architecture that would be used to provide a BellSouth private line of the same bandwidth or transmission requirement.***

All state jurisdictions require BellSouth to make unbundled loops available to certified CLECs. BellSouth is also obligated to make unbundled loops available to CLECs in a manner that is at or as near as practicable to parity with the way BellSouth provides its own comparable services. While requirements vary by state, the basic list of unbundled loops include:

Unbundled Voice Loop (UVL) The voice grade UVL is a dedicated analog transmission facility from BellSouth's main distribution frame (MDF) to a customer's premises.

Unbundled Digital Loop (UDL) The UDL will be a dedicated digital transmission facility from BellSouth's MDF to a customer's premises.

Unbundled Copper Loop (UCL) Unbundled Copper Loop (UCL) is a dedicated non-loaded metallic transmission facility from BellSouth's MDF to a customer's premises.

Unbundled Sub-Loop Concentration (USLC) USLC will allow a CLEC to concentrate up to 96 sub-loops (loop distribution elements provided by BellSouth or the CLEC) onto 2, 3 or 4 DS1s to connect the CLEC's sub-loops (at a concentrated level) to BellSouth's feeder system.

Unbundled Sub-Loop Feeder (USLF) USLF is a dedicated transmission facility that BellSouth provides from a BellSouth Central Office to a BellSouth cross-connect facility. USLF can only be connected to a CLEC provided distribution facility.

Unbundled Sub-Loop (USL) USL will consist of a BellSouth distribution pair from a BellSouth cross connect point to a customer's premises. It will allow a CLEC to provide their feeder facilities to connect to the USL.

Unbundled Loop Concentration (ULC) ULC will allow a CLEC to concentrate up to 96 loops (UVL/UDL) onto 2, 3 or 4 DS1s to transport unbundled loops from a BellSouth central office back to the CLEC collocation space.

Unbundled Dark Fiber (UDF) UDF is offered as a point-to-point arrangement between a customer designated premises and a BellSouth Wire Center or between BellSouth Wire Centers.

Table 1 illustrates the magnitude of the unbundled loop and unbundled loop/switch port combination or "combo" forecast. Combos are only a way for CLEC to resell BellSouth local service while paying BellSouth unbundled network element prices.

TABLE 1 *09/01/2000 Preliminary Forecast View - Year-End Lines In-Service (000)*						
SERVICE TYPE	2000	2001	2002	2003	2004	% Total
Unbundled loop/switch "combo" circuits	242	808	1256	1739	2163	7.9%
Unbundled loops only	298	489	706	897	1079	3.9%
Other Non-switched DS0 circuits	630	603	579	559	542	2.0%
Switched Access Lines (incl. Combos)	24710	24943	25205	25494	25809	94.1%
% Unbundled loops - BellSouth	1.2%	1.9%	2.7%	3.3%	3.9%	
% Unbundled loops - AL	0.7%	1.3%	1.9%	2.5%	2.9%	
% Unbundled loops - FL	1.3%	2.3%	3.6%	4.6%	5.5%	
% Unbundled loops - GA	1.8%	2.6%	3.3%	3.9%	4.3%	
% Unbundled loops - KY	0.5%	0.8%	1.2%	1.6%	1.9%	
% Unbundled loops - LA	0.4%	0.6%	0.8%	1.1%	1.3%	
% Unbundled loops - MS	0.4%	0.6%	0.7%	0.8%	0.9%	
% Unbundled loops - NC	1.3%	2.2%	3.2%	3.9%	4.4%	
% Unbundled loops - SC	0.8%	1.4%	2.0%	2.5%	3.0%	
% Unbundled loops - TN	1.7%	2.2%	2.9%	3.9%	5.0%	

2. UNBUNDLED LOOP PLANNING AND FACILITY RELIEF FUNDAMENTALS

All facility relief and deployments should be based on a forecast of service demand, including unbundled loops, whether that forecast is per an official source or is documented as a working forecast based on growth trends, known development, etc. BellSouth is also obligated to make unbundled loops available to CLECs in a manner that is at or as near as practicable to parity with the way BellSouth provides its own comparable services. To be able to offer unbundled loops at parity with installation intervals of BellSouth's services, universal facilities must be pre-provisioned to distribution areas (DAs) with expected unbundled loop demands. Significant reduction has been made in the number of DAs served only by integrated digital loop carrier (IDLC). In April 1998, there were 4611 DAs with 680K lines with IDLC as their only feeder facility. By November 2000, there were only 2952 DAs with 371K lines of our approximately 25 million lines remaining in DAs with IDLC as their only feeder facility. Several approaches can be employed to ensure that facility plans will accommodate expected demand for unbundled loops.

REVIEW DEMAND REQUIREMENTS AND ESTABLISH TARGETS:

- Identify high activity wire centers, areas and sites for unbundled loops. These are wire centers where CLECs are already collocated or where CLEC collocation is imminent. It should be noted that wire center forecasts now include a forecast for unbundled loops.

- Apply forecast for unbundled loops to key service points, such as cross-boxes, RTs, etc.
- Where CLECs are collocated in a wire center, a minimum of 3-5% of line capacity should be expected via unbundled loops.

IDENTIFY UNIVERSAL FACILITIES

- Identify total available universal DLC and/or metallic feeder facilities for each service area
- Universal DLC capability may include IDLC terminated on switch peripherals capable of "sidedoor or hairpin" digital cross-connect capability and IDLC terminated on digital cross-systems. Generally, these alternatives are only economical for small non-switched services demands.
- Compare demands for unbundled loops and non-switched services to available UDLC/copper facilities.
- Identify and prioritize potential shortages
- Identify other universal facilities in other areas along route.

CUTOVER POTS:

- Where total universal facilities are sufficient but are fully utilized by other services and no other facility relief is required, consider cutover of switched services from universal facilities to existing IDLC consistent with forecasted demand requirements for unbundled loops and other non-switched services.

CUTOVER POTS IN OTHER AREA:

- Universal facilities serving other service areas may also be available or may be made available by cutover of POTS and other switched services to IDLC facilities. This reallocation should be consistent with an overall route plan.

CONTINUE/ADVANCE IDLC RELIEF & CUTOVER POTS:

- Where total universal facilities are sufficient but are fully utilized by other services and additional facility relief is required, continue or advance the placement of IDLC for relief.
- Cutover switched access lines from universal facilities to new IDLC to relieve universal facilities for unbundled loops consistent with forecasted demand requirements for unbundled loops and other non-switched services.

DEVELOP OR MODIFY RELIEF PLANS TO INCLUDE UNIVERSAL CARRIER:

- Where total universal facilities are not sufficient to support forecasted unbundled loops and non-switched services, but additional facility relief is required, modify relief plans to include universal carrier system capacity. For NGDLC it is possible to add universal capacity by only adding metallic channel shelves in the CO.
- Additional IDLC may also be required and POTS/other lines may still require cutover from universal facilities to allow full use for unbundled loops and non-switched services.

CONVERT EXISTING IDLC TO UNIVERSAL

- Where total facilities are sufficient to meet total 2 year demand, but universal facilities are not sufficient to meet demand for unbundled loops and non-switched services, convert existing IDLC to UDLC to meet demand.

- Converting IDLC with sufficient spare capacity to meet demand for unbundled loops and non-switched services will result in lower conversion costs and minimize labor required for conversion and for future service activation.

RT COLLOCATION IMPACTS

- Due to the uncertainty of where and whether CLECs will request RT collocation, no increase in loop electronics enclosure size to provide space for CLEC collocation is recommended at this time unless specific collocation request information is known.
- It is recommended that consideration be given to increasing RT site size at the time of site acquisition if that increase can be accomplished with minimal economic impact.

NETWORK REARRANGEMENTS

- Several unbundled loop types require specific loop facility types that may not be available in all locations. Examples of these include Unbundled Digital Loop ADSL & HDSL, Unbundled Digital Loop ISDN, Unbundled Copper Loop, etc. The existence of these unbundled loop types impacts network rearrangement alternative planning for both discretionary and non-discretionary rearrangements.
- Discretionary rearrangements involving existing unbundled loops that are facility type dependant should be avoided except where economics associated with the rearrangement are overwhelming. CLEC notification and new facility alternative provisioning expenses may impose costs that more than offset the efficiencies gained through the rearrangement.
- Non-discretionary rearrangements, public requirements or non-discretionary replacements, of facilities supporting facility dependant unbundled loops will require CLEC notification and impose limitations on the new facility provided.
- Procedures for CLEC notification and new facility provisioning requirements are being developed and will be published in OSPE M&Ps as soon as they are completed.

3. Specific Unbundled Loop Facility Requirements

3.1. Unbundled Voice Loop (UVL)

The voice grade UVL is a dedicated analog transmission facility from BellSouth's main distribution frame (MDF) to a customer's premises.

Unbundled Voice Loops (UVL) are the same loops that we use to provide basic telephony, except that rather than terminating on a BellSouth switch, they are wired to an CLEC collocation space for transport to the CLEC's switch. These loops include all of the network elements from the MDF to and including the Network Interface Device (NID).

These loops can be ordered in two varieties. Service Level One (SL1) will be a non-designed circuit and can only be provided on 2-wire circuits with loop-start signaling. SL1 will not offer any switch-based (MLT) testing. Additionally, BellSouth will not provide any test access points (SMAS, etc.) on SL1 loops. Service Level Two (SL2) will be a designed (2-wire or 4-wire) circuit and BellSouth will provide a Design Layout Record (DLR). SL2 will be similar to SL1 in that switch-based testing would not be provided by BellSouth. However, BellSouth does plan to provide test access points (SMAS, etc.) on its SL2 loops.

For end user addresses served by copper loops or by Universal Digital Loop Carrier (UDLC) these loops will be architecturally identical to loops providing BellSouth service between the MDF and the end user. For end user addresses that are served by integrated digital loop carrier (IDLC), we will change the feeder facility to a facility that can be wired to the CLEC space via a line and station transfer (LST) if alternate feeder facilities are available.

For the approximately 2,950 feeder/distribution interfaces (cross-connect boxes) that do not have access to universal DLC or copper facilities, we will provide a facility that can be used for unbundled loops.

3.2. Unbundled Digital Loop (UDL)

The UDL will be a dedicated digital transmission facility from BellSouth's MDF to a customer's premises.

This service offering includes 56/64 kbps (and sub-rates) DDS, ISDN BRI, DS1, ISDN PRI; and three new facilities designated as 2-wire or 4-wire HDSL compatible and 2-wire ADSL compatible (UDL-2W/ADSL, UDL-2W/HDSL and UDL-4W/HDSL). BellSouth is not required to build new copper facilities to support ADSL & HDSL compatible services.

3.3. 2W ISDN loops

2W ISDN loops are the same loops that we use to provide basic rate ISDN, except that rather than terminating on a BellSouth switch, they are wired to a CLEC collocation space for transport to the CLEC's switch. These loops include all of the network elements from the MDF to and including the Network Interface Device (NID). For end user addresses served by copper loops or by Universal Digital Loop Carrier (UDLC) 2W ISDN loops will be architecturally identical to loops providing BellSouth service between the MDF and the end user. For end user addresses that are served by integrated digital loop carrier, we will change the feeder facility to a facility that can be wired to the CLEC space via a line and station transfer (LST) if alternate feeder facilities are available. For the approximately 2,950 feeder distribution interfaces (cross-connect boxes) that are served by only IDLC, we will provide a facility that can be used for unbundled loops.

3.4. 4W DS1 & PRI digital loops

4W DS1 & PRI digital loops are the same loops that we use to provide customer DS1 or primary rate ISDN, except that rather than terminating on a BellSouth switch or another DS1 link, they are wired to a CLEC collocation space. These loops include all of the network elements from the DSX-1 to and including the Network Interface Device (NID).

3.5. DS3 private line loops

DS3 private line loops are the same loops that we use to serve customer DS3, except that rather than connecting to another DS3 link, they are wired to a CLEC collocation space. These loops include all of the network elements from the DSX-3 to and including the Network Interface Device (NID). These DS3s will be provisioned as a local channel from the transport portion of the access tariff.

3.6. 2W ADSL qualified loops

2W ADSL qualified loops are copper loops extending from the central office to an end user location. The ADSL loops will conform to Revised Resistance Design parameters. These must be non-loaded loops. These facilities will be provided with no DLC, load coils or repeaters. Bit rate performance on these loops is dependent upon the Customer Premises Equipment (CPE), therefore, BellSouth does not guarantee a particular bit rate associated with these loops.

3.7. 2W & 4W HDSL qualified loops

2W & 4W HDSL qualified loops are copper loops extending from the central office to an end user location. High-bit rate Digital Subscriber Lines (HDSL) is a transport technology that can be either 2W-EE or 4W-EE. The loop facility consists of only metallic facilities. Bit rate performance on these loops is dependent upon the Customer Premises Equipment (CPE), therefore, BellSouth does not guarantee a particular bit rate associated with these loops. The HDSL loops must conform to CSA design parameters and can only be served using copper pairs.

3.8. Unbundled Copper Loop (UCL)

UCL is offered in two versions, UCL/S (Short) and UCL/L (Long). Both versions will be offered as a dedicated metallic transmission facility from BellSouth's MDF to a customer's premises including the NID.

UCL/S will be made up of non-loaded Resistance Design (RD) copper with a maximum total length of 18 kft and up to 6 kft of bridged tap. (The DC electrical path should not exceed 18 kft.) The DC resistance of a single pair should not exceed 1300Ω. The insertion loss of a pair meeting the RD guidelines shall not exceed 46 dB at 40 kHz, measured between 135-ohm terminations.

UCL/L will be any non-loaded loop longer than 18 kft. If loaded copper pairs are available to serve the requested address and the CLEC is willing to pay for loop modifications, the load coils will be removed. The DC resistance of a single pair should not exceed 2800Ω. These loops are commonly referred to as "dry copper" loops because they do not have any intervening equipment such as load coils, repeaters, etc., between the end user premises and the serving wire center. BellSouth will ensure that the UCL has electrical continuity and provides balance relative to tip and ring. These loops are not designed or intended to provide any particular service. The loop may be attached to a variety of equipment at both the CLEC's collocation space and the end user premises. BellSouth does not guarantee a particular bit rate or service associated with these loops.

4. Facility alternatives for basic unbundled loops in areas served by IDLC

From LEIS, more than 2,950 distribution areas have only integrated digital loop carrier (IDLC) feeder facilities out of approximately 107,000 total DAs. Approximately 370K lines are served in these distribution areas. This is a significant reduction from the 4,600 DAs and 680K lines that were counted in this category in April 1999. The proactive steps identified in Section 2.0 are the preferred method of provisioning to meet unbundled loop demand. However, if unbundled loop requests are received in these areas prior to the pre-provisioning of universal facilities, the following architecture alternatives may be used to provide unbundled loop access. They are generally listed in increasing order of costs, but this can vary based on local conditions and availability of resources.

1. Allocate metallic feeder pairs or universal digital loop carrier facilities to this distribution area if spare capacity is available in the feeder route or carrier serving area (CSA). For 2W ISDN the universal digital loop carrier facilities may be made available using the Conklin BRITEmux or Fitel-PMX 8UMux.
2. Utilize spare capacity of existing integrated network access (INA) system or other existing IDLC that is terminated on a digital cross-connect system (DCS). This will allow the unbundled loop channel to be routed to a channel bank where it can be de-multiplexed for delivery to a CLEC or for termination in a DLC channel bank for concentration.
3. Utilize side-door capability of switch peripheral if any existing IDLC is terminated on a peripheral with those capabilities. Side-door capacity should be assumed to be available if the planned side-door capacity of that peripheral is not already in use.

   In the DMS-100 SMS 1 DS1 port is generally the planned side-door capacity, but more ports may be available for side-door if the 6 system termination limit of the SMS is used and more DS1 port are left unused. For example, an SMS terminating one TR-008 Mode I system and five TR-008 Mode II systems would use between 14 and 20 DS1 ports depending on the need for protection DS1s. Since the SMS can only terminate six TR-008 systems, all of the DS1 ports not used for the systems can be used for unbundled loops or other non-locally switched services. An SMS with less than six systems installed or planned should generally be assumed to have one side-door port of capacity unless otherwise documented.

4. If spare capacity is available on a switch peripheral that is capable of side-door/hairpin, move an IDLC system to the side-door capable peripheral. See item 3 above for definition of spare capacity.
5. If growth will trigger activation of additional capacity within 1 to 2 years, activate new universal digital loop carrier (UDLC) capacity to the distribution area. If growth channel banks are available in the CSA, activate UDLC capacity using existing capacity. If no spare channel banks are available in the CSA,

activate NGDLC unless the DLC enclosure is a cabinet already wired for older DLC systems.

6. If growth will *not* trigger additional capacity within 2 years, convert some existing IDLC capacity to UDLC.

5. Loop Concentration

Loop concentration refers to services that convert 2 or 4 wire DS0 or basic rate ISDN services to DS1 formatted services for interconnection with a CLEC.

6. Unbundled loop concentration

Unbundled loop concentration (ULC) will allow a CLEC to concentrate loops onto DS1s for the purpose of transporting the loops back to CLEC switch. Individual unbundled loops will terminate at the Main Distribution Frame (MDF) in the BellSouth end office. They will then be cross-connected from the MDF to the concentrator. The ULC will then concentrate the loops onto one or more DS1 interfaces, depending on the total number of loops and the desired concentration level. At this point, the concentrator would deliver two or more DS1 prime interfaces to the DSX at that central office. From the DSX, a CLEC would be able to cross-connect either to their collocation space or to a DS1 interoffice transport offering. The format/protocol of the DS1 loops will depend on the type of loop concentration that the CLEC requests. The loop concentration types currently being developed include TR-008 Mode 1 and Mode 2 along with TR-303 loop concentration. The concentrator will be provided by the use of channel banks and/or digital loop carrier in central offices.

7. Unbundled subloop concentration

Unbundled subloop concentration (USLC) will allow a CLEC to concentrate loop distribution elements provided by the CLEC onto multiple DS1s for the purpose of connecting the loop distribution elements (at a concentrated level) to BellSouth's feeder system. This concentration will take place at an existing BellSouth Remote Terminal (RT) where spare capacity exists. BellSouth will transport the concentrated DS1 circuits back to the serving wire center (SWC) for termination in a CLEC's collocation space. The USLC offering can be ordered with or without a protect DS1. BellSouth will not provide a Central Office Terminal (COT) for this offering. The hand-off to the CLEC is at the DS1 level.

The 96 pairs associated with each USLC system will be terminated in a BellSouth cross-connect facility. This cross-connect facility will be connected to a CLEC's facility to allow the CLEC to connect its distribution facilities to the BellSouth provided USLC system. The CLEC is responsible for running its distribution cable in close proximity of the BellSouth cross-box and for providing the needed cabling between the BellSouth cross-box and the CLEC cross-box. BellSouth will connect the CLEC cable to the BellSouth cross-box. Only BellSouth personnel will be allowed to work in the BellSouth cross-box.

Unbundled Sub-Loop Concentration (USLC) will always be associated with a Service Inquiry (SI).

USLC consists of a `digital carrier system remote terminal' located in a BellSouth Remote Terminal. The RT is connected to the CLEC via two, three or four DS1s; a protection DS1 is optional. The DS1 facilities will be provisioned from the RT to the central office. The DS1 facilities can then be routed to the CLEC collocation space in the serving central office.

USLC is offered as a 96-channel system and is limited to a Lucent SLC Series 5 DCBA configured as an EFPB TR008 Mode 1/ Mode 2 or feature package FP303. EFPB TR008 Mode 1 requires four DS1s and Mode 2 requires two DS1s. Feature Package FP303 must have a minimum of two DS1s and can grow by increments of one DS1 to a maximum of four per system. The CLEC may opt for a protect DS1 line for each 96-channel system.

8. Subloops

FCC rules require that loops be unbundled at all technically feasible locations. Two loop segments are proposed in subloop unbundling requests.

8.1. Unbundled subloop feeder

USLF is a dedicated transmission facility that BellSouth provides from a BellSouth Central Office to a BellSouth cross-connect facility. This offering will allow a CLEC to order the feeder portion of an unbundled loop and connect it to a CLEC provided distribution facility. The USLF can be configured in the same manner as UVL and UDL loops. The following is a list of the offerings:

USLF-2W/V	2-wire voice, loop start, ground start, reverse battery
USLF-4W/V	4-wire voice, loop start, ground start
USLF-2W/I	2-wire ISDN (Basic rate ISDN)
USLF-2W/UDC	2-wire UDC (IDSL version of Basic rate ISDN)
USLF-2W/UCL	2-wire copper loop
USLF-4W/UCL	4-wire copper loop
USLF-4W/D0	4-wire DS0 (DDAS 2.4, 4.8, 9.6, 29.2, 56, 64)
USLF-4W/DI	4-wire DS1 and ISDN Primary rate
USLF-DS3	Unbundled DS3 as Feeder

The hand off point for this service will be at a BellSouth cross-connect point. The USLF offering will need to be set up in advance of any service order activity and therefore will always be preceded with a SI. DS1 and DS3 USLF will be handed off at the DSX panel at a RT. This location will be different from the handoff for DS0 loops, which are handed off at the BellSouth FDI.

The USLF pairs will be terminated in a BellSouth cross-connect facility (similar to USLC). This cross-connect facility will be connected to a CLEC's facility to allow the CLEC to connect its own distribution facilities to the BellSouth provided USLF. The CLEC is responsible for running its distribution cable in close proximity of the BellSouth cross-box and for providing the needed cabling between the BellSouth cross-box and the CLEC cross-box. BellSouth will connect the CLEC cable to the BellSouth cross-box. Only BellSouth personnel will be allowed to work in the BellSouth cross-box.

8.2. Unbundled Subloop

The Unbundled Subloop (USL) is a dedicated transmission facility that BellSouth provides from a customer's premises to a BellSouth cross-connect device. The facility is also referred to as the loop distribution portion of BellSouth's network. This facility will include a Network Interface Device (NID) at the customer's location for the purpose of connecting the loop to the customer's inside wire. The USLs can be configured as 2-wire (2W) or 4-wire (4W) facilities.

USL-D/INC consists of the distribution loop from a BellSouth cross connect point to, and including, the customer premise NI. This is usually referred to as the F2 facility but it could include F3 and above. The CLEC will place a cable to the BellSouth or cross-connect point to provide continuity to the CLEC's feeder facilities. This creates a tie cable between the CLEC facilities and the BellSouth facilities and will allow the CLEC to provide their feeder facilities to interface with our USL.

There are two possible physical configurations for USL:

1. The cross-connect point is located in an external (outside) BellSouth cross-connect box. These cross-connect boxes typically have stubs terminated on binding posts but some are harness type boxes where the cables are directly spliced to the binding post terminations. This configuration is called Unbundled Subloop - Distribution (USL-D).
2. Another possible configuration is inside a building. A CLEC places a feeder facility in the main equipment room and requests USL from BellSouth to get to the riser terminals. This only applies for that riser cable inventoried in LFACS as distribution facilities. This configuration is called Unbundled Subloop - Intra-building Network Cable (USL-INC).

BellSouth will provide USL-D/INC where possible. Through the firm order Service Inquiry (SI) process, BellSouth will determine if it is feasible to place the required facilities where the CLEC has requested access to USL-D/INC. If existing capacity is sufficient to meet the CLEC demand, then BellSouth will perform the set-up work as described in the next paragraph. If any work must be done to modify existing BellSouth facilities or add new facilities (other than adding the cross-connect panel in a building equipment room as noted below) to accommodate the CLEC's request for USL-D/INC, BellSouth will use its Special Construction (SC) process to determine the additional costs required to provision the Unbundled Sub-Loops. The CLEC will then have the option of paying the one-time SC charge to modify the facilities to meet the CLEC's request.

9. Dark Fiber

Unbundled Dark Fiber (UDF) is available in all BellSouth states. In Georgia, the PSC was specific in stating that BellSouth is not required to construct the fiber if it is not available. In Kentucky, the PSC was specific in stating that if BellSouth has plans to use the fiber in a three year planning period, there is no requirement to provide it. In all other states, BellSouth is not required to place the fibers for UDF if there are none available.

As of November 2000, there are only 10 UDF serving arrangements working in BellSouth. Each service arrangement requires four fibers either from a CLEC collocation space in a BellSouth CO to a customer premises or from a CLEC collocation space in one CO to his collocation space in another CO. No forecast of dark fiber serving arrangements has been projected by the ICS Product Manager for Unbundled Dark Fiber.

Since the expected magnitude of dark fiber sales is very small, no general fiber cable sizing changes based on UDF are recommended at this time unless actual UDF demand is known. This recommendation will continue to be revisited as dark fiber forecasts change over time.

10. RT Collocation

In Common Carrier Docket No. 96-98 (319 Remand), the FCC directed BellSouth and other Incumbent Local Exchange Carriers (ILEC's), that collocation rules now apply to any *technically feasible point* from Central Offices (CO's) to the smallest Feeder Distribution Interfaces (FDI's). This includes any accessible interconnection point on the loop, except closed splices. The FCC defined an accessible interconnection point, as any point on the loop, where a technician can access the wire or fiber within the cable without removing a splice case to reach the wire or fiber within. Such points may include, but are not limited to: poles, terminals, pedestals, Network Interface Devices (NIDs), minimum points of entry, single points of interconnection, main distribution frames, RTs, and FDI's. Attachment 2 is a statement of BellSouth's RT collocation policy as file in GA PSC testimony.

- Due to the uncertainty of where and whether CLECs will request RT collocation, no increase in loop electronics enclosure size to provide space for CLEC collocation is recommended at this time unless specific collocation request information is known.
- It is recommended that consideration be given to increasing RT site easement size somewhat beyond what is needed for BellSouth alone at the time of site acquisition if that increase can be accomplished

with minimal economic impact. There will be no point in acquiring easements larger than required to meet BellSouth needs where the property owner or rights grantor refuses BellSouth the right to assign rights to others.

11. Line Sharing

In the Advanced Services Docket (CC Docket No. 98-147) the FCC ordered BellSouth and other incumbent local exchange carriers (ILECs) to unbundle the high frequency portion of the local loop and make available a new unbundled network element (UNE) for its CLEC customers. BellSouth will provide two separate types of line sharing UNEs. One where the line sharing UNE originates at the CO and one where the line sharing UNE originates at a RT.

The end user must currently have his analog voice service from BellSouth for the CLEC to buy this UNE. CLECs will use these UNEs to provide xDSL-based services for their end user customers. The remainder of the loop will continue to provide the end user voice grade service from BellSouth.

If the voice end user customer terminates the voice service, the line sharing UNE must be removed for that customer. The CLEC must be notified that the line no longer is eligible for line sharing. If the CLEC wishes to continue providing xDSL service to this end user they may purchase the full stand-alone loop network element. The CLEC has first priority to receive the loop to serve this customer.

11.1. CO Based Line Sharing

The central office based line sharing offering is a UNE offering intended to allow CLECs access to the upper spectrum of the local loop to provide xDSL data services. This offering originates at the central office and terminates at the NID at the end user's location. The low frequency portion of the loop spectrum (from 300 Hertz to at least 3000 Hertz, and potentially up to 3400 Hertz, depending on equipment and facilities) will provide voice service from BellSouth. Line sharing requires an unloaded, 2-wire copper loop serving the end user. The line sharing loops must not have load coils, range extenders, or similar devices. BellSouth will maintain control over the loop and splitter equipment in the central office.

BellSouth will use jumpers to connect the CLEC's connecting block to the splitter. The splitter will route the high frequency portion of the circuit to the CLEC's xDSL equipment in their collocation space. ***Line sharing is available only on BellSouth provided locally switched POTS lines.***

A passive signal filter or splitter is installed at the customer's premises as CPE and is the responsibility of the customer (or CLEC).

The CO splitter directs the voice band signals through a pair of copper wires to the switch, and the high frequency signal though another pair of copper wires to the xDSL equipment in the CLEC's collocation space.

BellSouth must provide this UNE to only a single requesting carrier, for use at the same customer address as the analog voice service provided by BellSouth. We will not provide this UNE if we are not currently providing analog voice service to the customer.

To ensure that line sharing does not significantly degrade analog voice service, BellSouth will provide this service only to carriers seeking to provide xDSL-based service that uses only the upper range of the spectrum. Currently, ADSL is the most widely deployed line sharing technology meeting that requirement. As additional xDSL-based technologies demonstrate that they can co-exist on the same loop as analog voice service without significantly degrading voice service BellSouth will permit requesting carriers to deploy those technologies.

11.2. RT Based Line Sharing

The same line sharing requirements that apply at the CO apply at the RT. RT based line sharing will require some type of interconnection between BellSouth and the CLEC at an RT site. RT based line sharing will be similar to unbundled subloop distribution except that a splitter will be used to direct the high frequency signal to/from the CLEC and the voice band signal to/from BellSouth.

Service definitions, splitter configurations, interconnection arrangements, and procedures for RT line sharing are being developed.

12. Poles, Ducts, Conduit

BellSouth will provide CLECs equal and non-discriminatory access to poles, ducts, conduits, and entrance facilities that BellSouth owns or controls, not to include maintenance spares. Rental agreements will be negotiated with each CLEC similar to the structure rental agreements currently used with CATV companies and inter-exchange carriers.

13. Rights-of-Way

BellSouth will provide CLECs equal and non-discriminatory access to Rights-of-Way that BellSouth owns or controls. These will be handled on a case-by-case basis through normal rights-of-way processes. Methods and procedures are being developed by OSP Engineering Support for additions and changes to these processes.

14. Unbundled Loop Impacts on Diversity Planning

Service reliability payments to CLECs in the event of extended service outages caused by facility failures in routes with diversity are an additional factor to be considered in setting priorities for projects to be funded with limited diversity budget levels. These penalties can be imposed under the BellSouth Voluntary Self Effectuating Enforcement Mechanisms (VSEEMs). Currently these penalties have not been activated, but Georgia PSC is expected to activate these penalties in January 2001. These penalties will be activated in every state where BellSouth receives long distance relief. When prioritizing prospective diversity projects, CLEC service volume should be reviewed to establish maximum VSEEMs penalty level impact potential as one of the prioritization benchmarks.

Attachment

RT Collocation Policy Filed as Testimony in GA PSC

15. Testimony Question and Answer

Q. WHAT IS BELLSOUTH'S POLICY REGARDING COLLOCATION IN REMOTE TERMINALS?

A. As I stated in my direct testimony, BellSouth permits the collocation of any type of equipment necessary for interconnection to BellSouth's network or for access to unbundled network elements in the provision of telecommunications services. BellSouth's policy regarding collocation at DLC remote terminals is this: If sufficient space exists within the DLC remote terminal, BellSouth will allow the CLEC to collocate its equipment, including the Digital Subscriber Line Access Multiplexer ("DSLAM"), regardless of whether BellSouth has installed its own equipment or DSLAM at that remote terminal location. Second, if sufficient space does not exist within the DLC and BellSouth *has not* installed its own equipment or DSLAM at that DLC remote terminal location, then BellSouth will file a collocation waiver request with this Commission for that DLC remote terminal site. Third, if sufficient space does not exist within the DLC and BellSouth *has* installed its own equipment or DSLAM at that DLC remote terminal location, then BellSouth will take whatever action is required to augment the space at that DLC remote terminal such that the CLEC can install its own equipment, including DSLAM, at that DLC remote terminal.

ATTACHMENT

PROPRIETARY

DECLASSIFIED

CONFIDENTIAL

RL: 00-01-021BT

PRIVATE/PROPRIETARY:
No disclosure outside BELLSOUTH except by written agreement.

file code: 204.0000
filecode: **204.000**

subject: ADSL Planning Directives

type: Information Letter

date: **February 15, 2000**

date: February 15, 2000

related letters: 915-800-019PR

other: None

to: Attached Distribution List

entities: BellSouth Telecommunications, Inc.

from: D. A. Kettler, Executive Director/NVP - Science & Technology

description: Planning recommendations for the deployment of ADSL, remote DSL access multiplexers and remote access multiplexers.
This RL replaces RL: 99-06-001BT.

* * *

NOTATION SYSTEM "PDF"
ENTITY SYSTEM "http://belsweb.bst.bls.com/filenet/document/get?library=Central+Libr
Click here if you wish to print/view this document.

This letter transmits our recommendations for the planning and deployment of ADSL technologies. While many of the long range planning decisions for ADSL are being driven by headquarters organizations, there are many current planning and deployment decisions that field planners and capacity managers will need to resolve. ADSL capabilities will need to be deployed in the near term at thousands of digital loop carrier sites. The rapid ADSL deployment that will be required over the next few years to meet high speed data demand and competition is a very important step for our company. The use of these directives will permit you to optimize the design of our high-speed network.

Questions from your organization may be directed to Jim Jackson at (205) 977-5032 or to John Jackson at (205) 977-5043.

Original signed by D. A. Kettler

D. A. Kettler
Executive Director/NVP –
Science & Technology

Attachment

ADSL Planning Directives

1. Distribution List

Network Operations North

T. G. Barber
J. H. Becker
W. E. Beauchamp
C. J. Benyo
J. E. Blitchington
J. W. Boone
W. M. Brittain
R. E. Burns
D. G. Cooper
R. A. Davis
A. R. Edmonson
B. D. Franks
T. L. Fuson
T. L. Garner
J. E. Graves
G. T. Green
J. M. Hester
J. B. Hollingsworth
T. R. Loyd
J. W. Lucas
G. M. Ludgood
K. R. McCollum
S. McElhannon
T. J. Mitchell
J. W. Murrah
Michael Pietropola
P. A. Pitts
R. T. Quillen
M. E. Roach
L. E. Shumpert
J. H. Simpson
R. D. Smith
E. Sowell
D. C. Spain
S. J. Susky
R. A. Taylor
G. A. Toole
M. C. Walker
C. L. Wallace
C. C. Wright

Network Operations-South

A. F. Alleguez
C. W. Basden
J. Benedict
E. L. Broussard
R. Christian
R. L. Cooper
G. A. Couper
B. K. Cruit
P. S. Davis
C. A. deLassus
D. R. Dixon
L. J. Durel
F. B. Fetzer
J. A. Fuller
B. C. Greenlief
C. B. Hales
A. J. Hardiman
M. F. Heard
T. B. Higgins
J. S. Kenerly
G. H. Lewis
M. G. LoCastro
B. Macias
G. W. Mainer
S. A. Miller
S. A. Mulcahy
C. A. Muniz
A. D. Nelson
L. E. Petruzzelli
O. J. Primelles
R. R. Puerto
V. Rubiera
H. T. Rubin
R. E. Serrano
C. H. Sharpe
J. L. Sibert
J. G. St. Amant
P. K. Stowe
P. E. Tankersley
S. Veal
C. A. White

Network Strategic Planning

D. M. Baeza
J. T. Beason
W. M. Bolt
H. F. Cash
W. J. Charles
J. Chen
S. Conley
J. T. Cushing
D. L. Estes
K. R. Frank
K. D. Franklin
L. W. Gleason
G. R. Godfrey
H. G. Henderson
J. B. Johnson
H. J. Kafka
L. M. Kinsey
K. W. Marlin
S. E. Market
R. L. McLaughlin
W. J. McNamara
J. W. Moore
L. R. Moseley
C. J. Noll
B. S. Parker
T. C. Peak
G. C. Prather
J. R. Satterfield
J. R. Shores
D. R. Spears
D. P. Swanson
M. Threlkeld
S. C. Thompson
M. L. Waldrop
J. W. White
C. C. Yost
E. M. Zier***OS PLanning & Management***

P. S. Caldwel
W. P. Cochrane
D. P. Dodd
D. L. King
K. Summers

Supply Chain Management
J. R. Ellis
W. A. Hightower
T. D. Houghton
R. E. Latham
M. J. Merkler
H. Z. Pepperman
J. A. Rolsten
C. L. Tsai
R. R. Tunez***Performance Improvement***
J. J. Murphy
Rodger Parsons

Services
W. N. Stacy
J. W. Moore***Regulatory***
J. P. Kephart
G. R. Sanders***Regional Operations Centers***
M. D. Gaines
J. M. Hargrove
R. L. Horton
L. T. Keaton
C. E. Moering
D. L. Pickens

Interconnection Services
Eric Small***SMU***
J. G. Wilson ***Finance***
R. H. Bowman
B.K. Tolbert***Documentation*** (2 copies)

Executive Summary

The pace of ADSL deployments for the next few years will need to continue at a rapid pace to provide high speed data services to a broad cross section of BellSouth customers. ADSL capabilities will need to be deployed in the near term at thousands of digital loop carrier sites. Initial ADSL deployments will use digital subscriber line access multiplexers (DSLAMs) or remote access multiplexers (RAMs). By mid 2001, NGDLC systems with ADSL channel units are expected to be available for deployment. These new capabilities are an important factor in your ADSL design decisions.

The rapid ADSL deployment that will be required over the next few years to meet high speed data demand and competition will provide many opportunities to maximize value and minimize investments if carefully planned and deployed. Failure to carefully plan and deploy ADSL equipment will result in higher costs, increased labor requirements, and a lower quality of service for customers.

Summary of the planning considerations included in this directive:

- Loops qualified for ADSL
  - Non-loaded 1300 Ohm resistance design
  - Carrier Serving Area design
  - Not on same pair with ISDN, P-phone, DDS/SynchroNet, program audio, DAML
- DSLAM functionality must be moved to DLC RT site to provide ADSL on DLC loops
  - When activating Remote DSLAM or Mini-RAM, all copper ADSL lines in the affected FDIs must be cut-over to the Remote DSLAM or Mini-RAM -or
  - If copper ADSL capacity in FDIs is greater than the 1-2 year forecasted ADSL demand, all lines requesting ADSL should be moved from DLC to copper feeder to provide ADSL rather than installing Remote DSLAM or Mini-RAM
  - Mini-RAM configurations are available in 8 line capacity and will be available in a 16 line version in the first half of 2001.
  - Remote DSLAM configurations currently available for large ADSL requirements
    - 192 Line MESA2 cabinet

        - 144 Line MESA2 cabinet with OC3 multiplexer
        - Hut & CEV packages with 48, 96, & 144 Lines capacity
        - 96 Line 52B cabinet
    - Terminate Remote DSLAM pairs in FDI where practical to provide maximum flexibility
    - Splice Remote DSLAM to DLC derived pairs where not practical to terminate pairs in FDI.
        - Splice to vacant capacity to minimize moving lines
        - When cut-through card is replaced with splitter to activate the 1st ADSL line on that slot, all services on that card that use spectrum above 4kHz must be moved to non-ADSL DLC capacity.
    - Practical Mini-RAM limit in a cabinet is 2 Mini-RAMs, 16 -32 ADSL lines, depending on space, power, heat dissipation capacity, and the availability of the PMR16 solution.
- Sizing and Relief Steps for Remote Solutions
    - If the AMR8 or PMR16 solutions will serve 2 year demand (maximum of 32 lines), these solutions should be used.
    - If Mini-RAM solutions will not serve 2 year demand, and a cabinet based solution will be used, use the ADJ96 if it will serve the 2 year demand.
    - If neither Mini-RAM nor ADJ96 solutions will serve demand through 2001, and a standalone cabinet based solution will be used, size the remote solution to serve 5 year demand.
    - If Mini-RAM solutions will not serve 2 year demand, and a structure based solution will be used, size the remote solution to serve 2 year demand.
    - If Mini-RAM solutions have been deployed and actual plus 6 month forecasted demand exceeds Mini-RAM(s) capacity; size cabinet based solutions to cutover Mini-RAM(s) and serve 2 year demand if an ADJ96 will serve that demand. If the ADJ96 will not serve the cutover plus 2 year demand, size the remote solution to serve cutover plus 5 year demand. Size structure based solutions to cutover Mini-RAM(s) and serve 2 year demand.
    - If ADJ96 or larger cabinet solutions have been deployed and actual plus 6 month forecasted demand exceeds capacity, following the long range plan for the CSA, an additional housing should be established. If the ADSL capacity is provided at the new site it should be sized to cutover ADSL lines for the FDIs that site will serve and to serve the 5 year forecasted demand. If the new ADSL capacity is added at the same site it is not necessary to add any capacity for cutover of existing ADSL.
    - If STR48 or larger solutions have been deployed and the actual plus 6 month forecasted demand exceeds capacity, additional ADSL shelves should be added at the structure, sized to serve the 2 year demand. When an additional shelf is added to a STR48 solution for growth the connection to the ATM network must be converted to DS3 feeder.
    - Use new ADSL capabilities in both Alcatel and Marconi NGDLC systems beginning in the third quarter of 2001.

Introduction

This document is provided to highlight ADSL planning and deployment issues that can impact costs, customer service perception, and work-force requirements.

While many long range planning decisions for ADSL are currently being driven by headquarters organizations, there are a number of current planning issues and deployment options that need to be considered by field planners and capacity managers. Additionally, it is expected that more of the longer range planning process will transition from headquarters to field organizations over time. This document will provide a brief overview of the ADSL architecture alternatives and will identify issues and their impacts.

ADSL Services

BellSouth ADSL service is intended as an industrial offering that is made available to Network Service Providers for provision of high-speed data service to their customers. The service establishes a point-to-point Virtual Circuit between two customer-designated locations. The actual data throughput that the end user achieves depends on the transmission characteristics of the loop and the inside wire that serves his/her location. The DSLAM limits the maximum data throughput in both directions

Two basic service classes are currently offered. These two service classes are industrial, which provides best effort residential service at one specified peak rate, and business, which provides multiple service category options with differing bit rates and Quality of Service (QoS) options. The table below summarizes the service offerings available and the provisioning parameters.

Advertised Rate	*Downstream*		*Upstream*		*USOC*
	Minimum	*Maximum*	*Minimum*	*Maximum*	
1.5Mbps X 256kbps	256kbps	1.5 Mbps	128kbps	256kbps	ADL11
1.5Mbps X 256kbps	256kbps	1.5 Mbps	128kbps	256kbps	ADL12
192kbps X 192kbps	192kbps	1024kbps	192kbps	768kbps	TBD
384kbps X 384kbps	384 kbps	384 kbps	384 kbps	384 kbps	ADL22
1.5Mbps X 512kbps	1.5 Mbps	1.8 Mbps	512 kbps	768kbps	ADL31
2-4Mbps X 640kbps	2.0 Mbps	2.0 Mbps	640 kbps	896 kbps	ADL41
4-6Mbps X 640kbps	4.0Mbps	6.0 Mbps	640 kbps	896 kbps	ADL51
768kbps X512kbps	768 kbps	1024 kbps	512 kbps	768kbps	ADL61

USOCs ADL11 and ADL12 are known as the Industrial Class service. The remaining USOCs are known as the Business Class services. The ADL++ USOC is for provisioning and billing purposes; it is not an assignable USOC. The ADL11 is the USOC for the full-rate, or G.dmt, ADSL and the ADL12 is for the G.lite ADSL.

Since all of the business class services involve guaranteed ADSL modem data rates, service inquiries and circuit design processes are used for these services. See 915-800-019PR and associated job aids for engineering and provisioning processes for these services.

ADSL Architectures

Asymmetrical Digital Subscriber Line (ADSL) is a data-over-voice transmission system that operates over a copper cable pair. US and international standards are in place for ADSL. ADSL equipment is available in two versions. Full rate ADSL, described by the standard document T1.413 and ITU recommendation G.dmt, provides for up to 8 Mb/s transmission rates from the network toward the subscriber and up to 800 kb/s from the subscriber toward the network. Universal ADSL, ITU recommendation G.lite provides for up to 1.544Mb/s transmission rates from the network toward the subscriber and up to 500 kb/s from the subscriber toward the network.

Both of these systems use frequency division multiplexing (FDM) to provide separate channels for voice, downstream data, and upstream data. Within the frequency spectrum allocated to data, up to 256 discrete tones are used as subcarriers for data at up to 32kb/s each. Tones are selected for use and symbols per tone are assigned based on the transmission impairments present on the cable pair when the system starts up. Additionally, symbols per tone adjustments are made during operation if line conditions change. This method of operation allows the system to operate at the maximum rate possible based on the loop conditions that it encounters. This means that ADSL data rates will be different for different loop lengths and for different noise conditions. The noise sources with the largest impact on ADSL operation are crosstalk from T1 and HDSL in the same binder group and AM radio interference. Figure 1 illustrates the frequency allocations for voice and both directions of transmission for data.

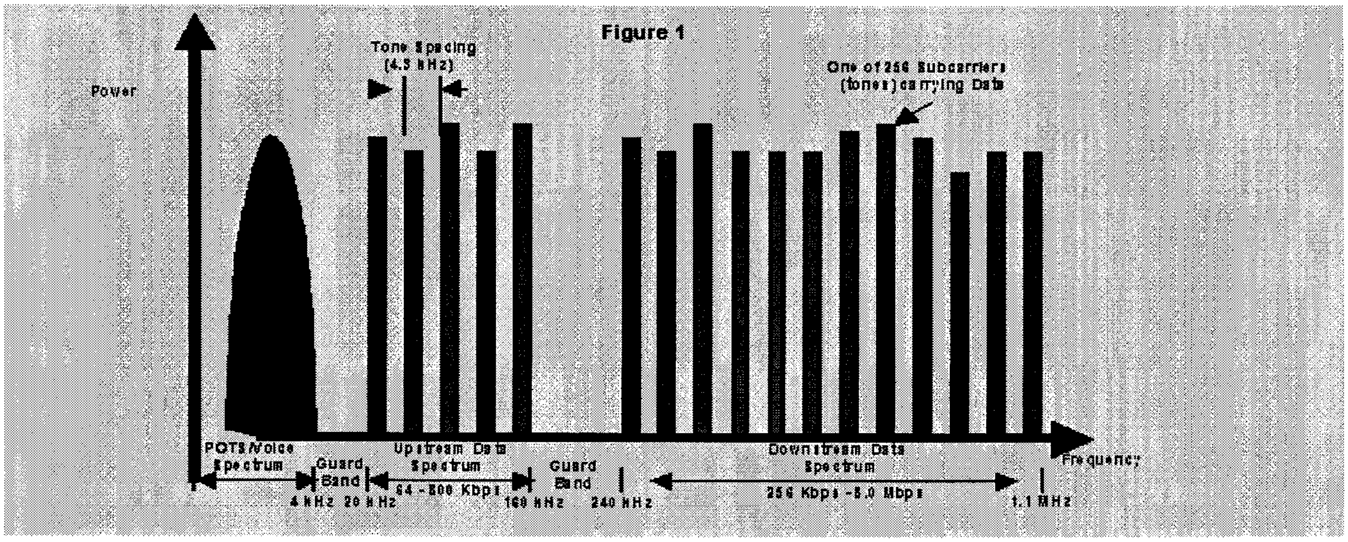


Figure 1

The ADSL system illustrated in Figure 1 is the full rate system. Universal ADSL, G.lite, is the same type of transmission system, but uses only 128 tones instead of the full rate system's 256. Universal ADSL also transmits at a lower power level.

ADSL will generally work at some data rate within our service offering on any non-loaded loop meeting 1300 Ohm resistance design or carrier serving area design rules. Since ADSL uses spectrum well above the voice spectrum, it can not be used on loaded cable because the loading inductance has the effect of making the bandpass of the cable DC to 3kHz. Furthermore, ADSL can not work on loops with ISDN, P-Phone, DDS/SynchroNet, program audio, and any service provided via DAML since they all use spectrum above 4kHz.

The network architecture for ADSL deployed on loops that are copper from the CO to the end user is illustrated in Figure 2.

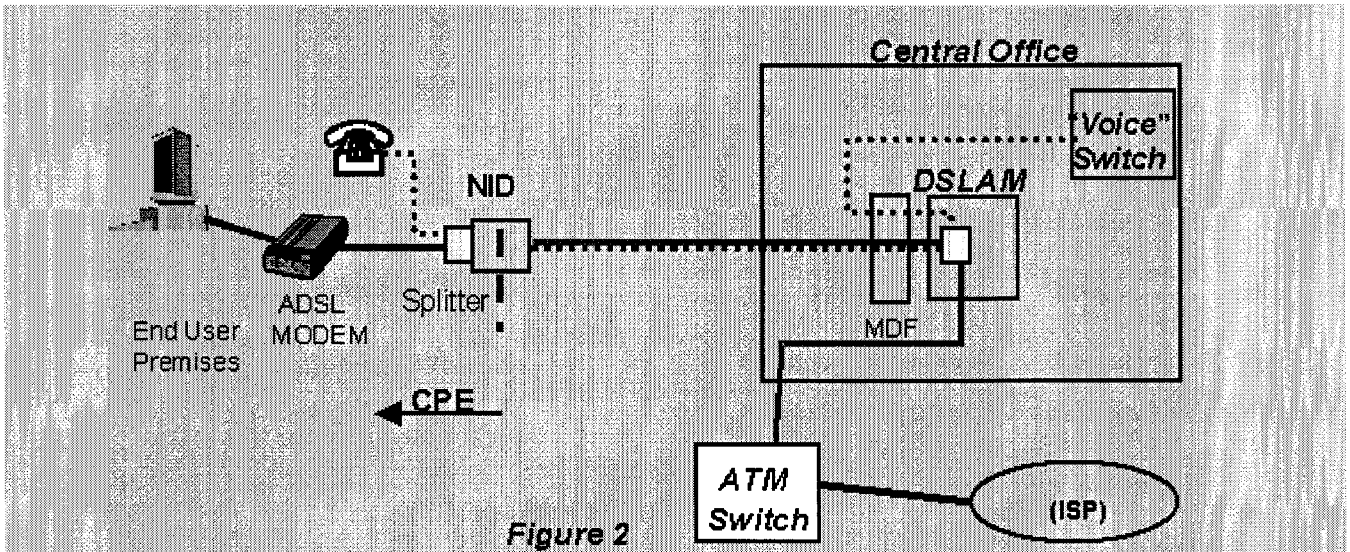


Figure 2
ADSL on copper loop from the Central Office

The digital subscriber line access multiplexer (DSLAM) in the CO is the equipment shelf that houses the splitter, the ADSL modem, and ATM multiplexer function. The splitter provides a low pass filtering function so that only signals in the DC to 4kHz band are sent to the circuit switch providing the customer's telephone service. The ADSL modem terminates the DMT transmission system and provides the input and output interfaces to the high-speed data buses. The data buses are where the ATM cells for all of the customers on the DSLAM are statistically multiplexed onto a DS3 or OC3 interface for connection to the ATM switching network.

Between the DSLAM and the end user premises, the voice and data signals are multiplexed as illustrated in Figure 1.

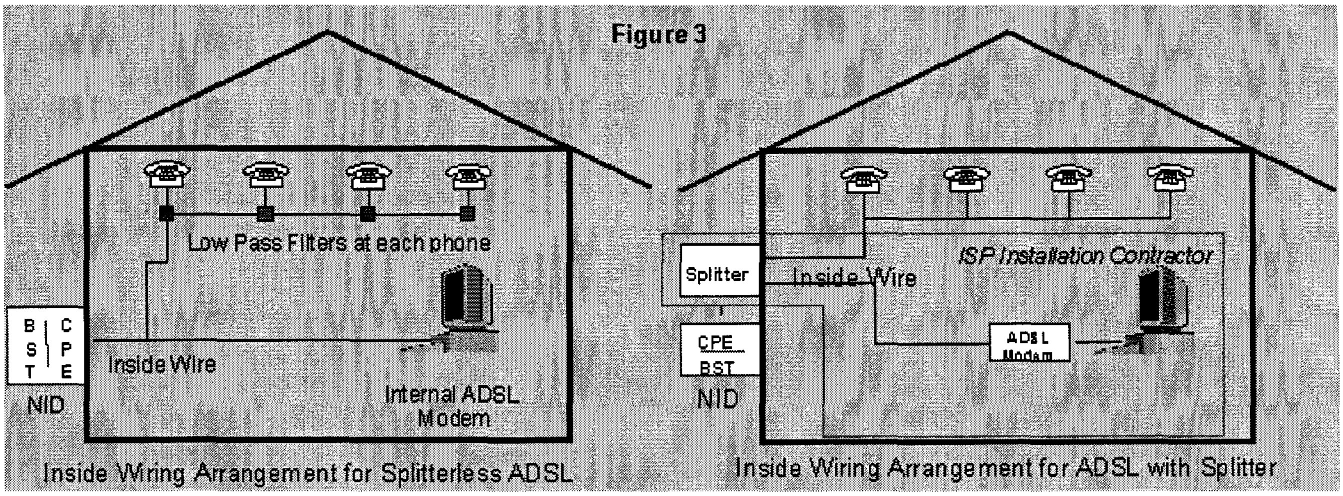
At the end user premises there is a splitter on the customer side of the network interface device. That splitter provides a low pass filtering function so that only signals in the DC to 4kHz band are sent to the customer's telephone sets. Separate inside wire pairs or separate inside wiring runs are required for voice services and ADSL between the splitter and the ADSL modem when using the full rate ADSL equipment currently being deployed. When the universal ADSL equipment becomes available later this year, the splitter at the NID will no longer be required and there will be no need to have separate inside wire pairs for voice and data. For universal ADSL both voice and data signals will be delivered to all of the RJ11s on the inside wire. However, each telephone or other voice band device will need to have a small low pass filter inserted in series at the jack. The ADSL modem at the end user premises terminates the DMT transmission system and provides the input and output interfaces to the user's computer or other data appliance. BellSouth has also begun a limited offering of splitterless operation of full rate ADSL service.

This is offered now in some metros and is planned to be offered region wide by mid year 2000. There is no difference in service order process for splitterless ADSL compared to ADSL with a splitter located at the NID and therefore no impact to service order processing. This is a self-install done by the customer that saves the "Truck Roll" and also is done at the customer's convenience without having to wait on a Service Technician to visit the home. The splitterless full rate is done today only with Efficient Networks Inc. SpeedStream brand modems due to the ease of installing the software and setting up the service.

NSPs are notified that, if there is a burglar alarm on the line, this splitterless self-install operation may not be possible due to the fact that it may cause the alarm to malfunction if there is not a way to insert a low pass filter in the burglar alarm transmission path.

The differences in end-user wiring arrangements are illustrated in Figure 3.

Figure 3



One of the reasons for the development of the Universal ADSL standard was the desire for an alternative that would not require re-configuration of the end user's inside wire. That is the reason that universal ADSL is sometimes referred to as "splitterless ADSL". This was in an attempt to make it possible for ADSL installation not to require a field visit by the ISP's installation contractor. As illustrated in the universal ADSL portion of Figure 3, this may be possible if the user can install the filters at each telephone. The filters are available with modular jack connections for most applications. Users may need assistance for connections to their inside wiring that are not made in modular jacks. These might include wiring in older homes or connections of intrusion/fire alarm equipment. This assistance is the responsibility of the end user and the ISP or ISP installation contractor.

Digital Loop Carrier Architectures for ADSL

Functionally, the network architecture for providing ADSL services over loops utilizing digital loop carrier changes primarily by moving the DSLAM functionality from the CO to the DLC remote terminal site. This is accomplished either by placing DSLAM shelves at RT sites as Remote DSLAMS or by placing smaller remote access multiplexers (RAMs or Mini-RAMs) at the RT and hubbing these back to the CO DSLAM. Hub shelves and CO DSLAM configurations are described in detail in *"ADSL Capacity Management Network Service Description"* available on the intranet at *http://and.bst.bls.com/ape/*
This allows the ADSL modem to be connected to the copper loop beyond the DLC. Figure 4 illustrates this configuration.

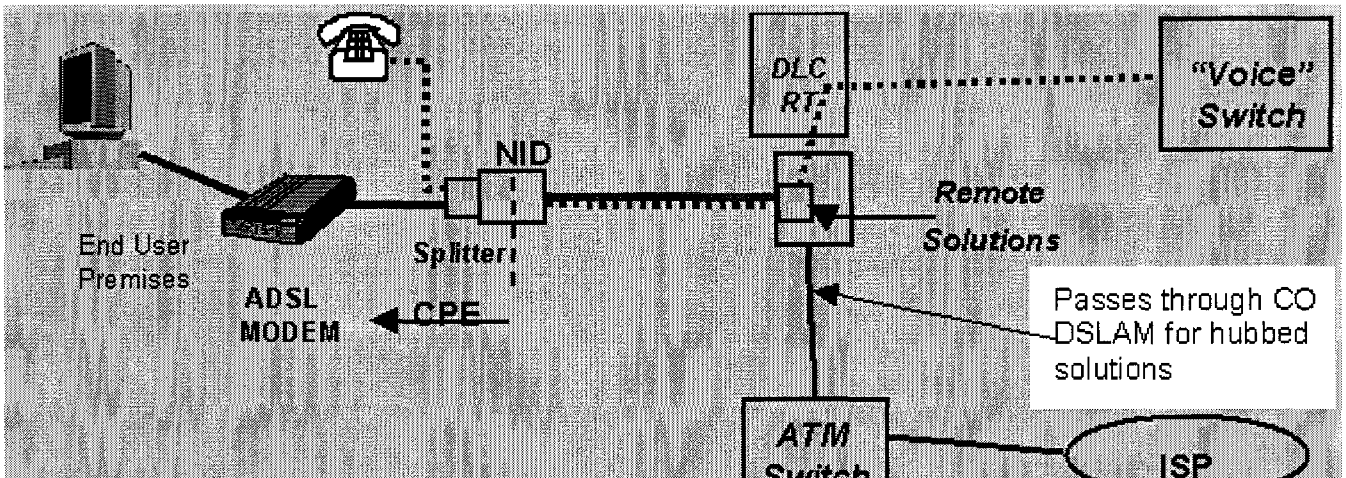


Figure 4
ADSL on DLC feeder loop

ADSL Remote Solutions CAUTION!

For all remote solution alternatives it is required that ***all copper served ADSL lines*** in the FDIs served by the DLC site where the remote solution is being added ***must be cutover to the remote solution.*** If this is not done before new ADSL lines are added from the remote solution, the copper ADSL lines in the same sheath/binder group with the new ADSL line anywhere in the distribution plant will go out of service or at least there will be a dramatic reduction in the data rate that can be achieved. The already attenuated signal on the copper served ADSL line will be overpowered by the near end crosstalk from the ADSL modem in the remote solution.

If ADSL capable copper feeder facilities sufficient to meet 2 years demand is available at an FDI that is also fed by DLC, the copper facilities should be used to support ADSL and the remote solution deferred. The process details for this arrangement are provided in "OSPE Methods and Procedures for BellSouth ADSL Service", 915-800-019PR. Operations systems have been updated to accommodate this alternative.

Remote Solutions

Nine remote solutions are available or being developed. They are:

1. RD192 - This is MESA2 Cabinet that is equipped with 4 ADSL shelves that can provide up to 192 ADSL lines. The recommended connection from the ATM network to the RD192 is a DS3.

2. RD144 - This is a MESA2 Cabinet that is equipped with a SONET multiplexer and 3 ADSL shelves that can provide up to 144 ADSL lines. A DS3 from the SONET multiplexer connects the ADSL shelves to the ATM network.

3. STR144 - This is a configuration that installs in a customer premises, CEV, CEC or hut and consists of 3 ADSL shelves that can provide up to 144 ADSL lines. The connection from the ATM network to the STR144 is a DS3.

4. STR96 - This is a configuration that installs in a customer premises, CEV, CEC or hut and consists of 2 ADSL shelves that can provide up to 96 ADSL lines. The connection from the ATM network to the STR96 is a DS3.

5. STR48 - This is a configuration that installs in a customer premises, CEV, CEC or hut and consists of 1 ADSL shelf that can provide up to 48 ADSL lines. The connection from the ATM network to the STR48 is 4 IMA DS1s hubbed through a CO DSLAM. The STR48 remote solution is only supported when the following 2 criteria are met:
   1) The 12-month forecasted ADSL demand does not exceed the maximum capacity of 48.
   2) The next relief job to add ADSL capacity will convert the STR48 to a DS3 fed STR96 or STR144.

6. ADJ96 - This is a Lucent 52B Cabinet that contains 2 ADSL shelves. Each shelf is an individual network element (system). This configuration can provide 96 ADSL lines. The recommended connection from each shelf to the ATM network is hubbed through a CO DSLAM using 4 IMA DS1s, however, heavy penetrations of business class services may require connecting the ADSL shelves directly to the ATM network with a DS3.

7. AMR8 - This is the Alcatel mini-RAM. This device installs in an existing DLC cabinet or equipment bay and can provide 8 ADSL lines. The AMR8 is connected to a CO DSLAM with 1-4 IMA DS1s.

8. PMR8 - This is the Pulsecom RAM-1100. This device installs in an existing DLC cabinet and can provide 8 ADSL lines. The PMR8 is connected to a CO DSLAM with 1 DS1. Since there is only one DS1 for ATM traffic, this alternative has no capacity for business service since multiple DS1 IMA is not available. The planned availability of the PMR8 is second quarter 2000.

9. PMR16 - This is the Pulsecom RAM-1400. This device installs in an existing DLC cabinet and can provide 16 ADSL lines. The PMR18 is connected to a CO DSLAM with 1-8 IMA DS1s. The planned availability of the PMR16 is mid 2001.

For those solutions using multiple DS1s, ATM Inverse Multiplexing (IMA) is employed at the DSLAM and remote solution to create a single virtual pipe to maximize utilization of the available bandwidth. This is done in the DSLAM and remote equipment and does not require any special equipment separate from those units.

Remote Solution	***Housing Type***	*Backbone Feed*
AMR8 (8 Lines)	Alcatel mini-RAM	1-4 DS1's IMA
PMR8 (2Q00) (8Lines)	Pulsecom 1100 mini-RAM	1 DS1
PMR16 (mid 2001)(16 Lines)	Pulsecom 1400 mini-RAM	1-8 DS1's IMA
ADJ96 (96 Lines)	Lucent 52B Cabinet	4 DS1's IMA Per Shelf (2 Shelves Equipped)
RD144 (144 Lines+OC3 Mux)	MESA2 Cabinet	DS3 (3 Shelves Equipped)
RD192 (192 Lines)	MESA2 Cabinet	DS3 (4 Shelves Equipped)
STR48 (48 Lines)	Existing Structure	4 DS1's IMA
STR96 (96 Lines)	Existing Structure	DS3 (2 Shelves Equipped)
STR144 (144 Lines)	Existing Structure	DS3 (3 Shelves Equipped)
Marconi DISC*S NGDLC ADSL Channel Unit (Mid 2001)	Various	DS1s
Alcatel Litespan NGDLC ADSL Channel Unit (Mid 2001)	Various	As required for ADSL traffic. Via integrated SONET multiplexer

NOTE: All solutions with DS3 options also have OC3 options, however, it is not expected that DS3 capacity will be exceeded in the foreseeable future. See bandwidth capacity management section.

RD192 and RD144

The MESA2 cabinet mounted DSLAM configuration is called a Remote DSLAM. RD192 and RD144 are examples of this type of remote. Practice 915-800-016PR contains outside plant engineering methods and procedures for these configurations. Three alternatives are provided for connecting the Remote DSLAM cabinet to the existing cable at the DLC remote terminal site. The first of these methods is to terminate the Remote DSLAM cabling in existing or additional feeder-distribution interface (FDI) cross-connect fields. This configuration allows any DLC derived feeder facility to be wired through the Remote DSLAM cabinet so that the ADSL signal can be added to the facility already providing the end user's voice service. Figure 5 illustrates the configuration of this alternative.

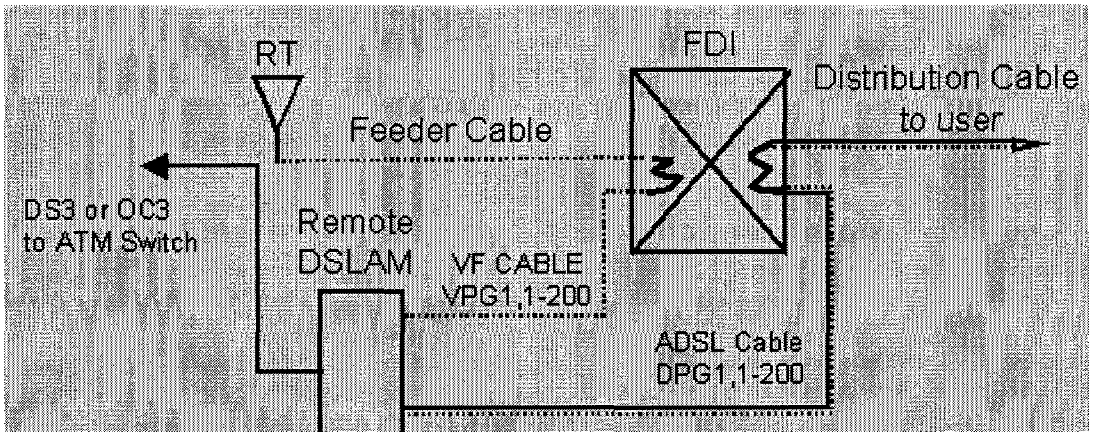


Figure 5
Remote DSLAM Configuration When Collocated with FDI

Another alternative for connecting the Remote DSLAM to the existing cable is to splice the DSLAM cable in series with some or all of the channel bank capacity available in that DLC remote terminal enclosure. Unless all DLC capacity, 192 lines or less, can be spliced to the Remote DSLAM, existing lines requesting ADSL service must be moved to the portion of the DLC capacity that is "ADSL capable", at the time of the ADSL service request. It is recommended that the Remote DSLAM be spliced to vacant DLC capacity if available to avoid moving two lines on each service request (one to vacate an "ADSL capable" channel and another to move the line requesting ADSL service to the "ADSL capable" channel). Where growth will require future channel bank placements, consideration should be given to advancing the addition of channel bank capacity so that vacant capacity is available to be spliced to the Remote DSLAM equipment. The trade-off to be considered here is 2 LST per ADSL order versus one. Therefore, the cost trade-off is the cost of an LST per ADSL order compared to the cost of advancing a channel bank. However, it is not technically necessary to splice the Remote DSLAM to only vacant DLC capacity.

When the Remote DSLAM is spliced to working DLC channels a "cut-through card" in the Remote DSLAM provides continuity so that existing services will continue to work properly. When the cut-through card is replaced with a splitter card to activate an ADSL customer, all four lines associated with the Remote DSLAM slot where that splitter is placed will be routed through the splitter and ADSL circuits. This will not affect basic telephone service because the splitter will provide continuity and the start-up protocol for the ADSL equipment calls for the ADSL electronics to remain silent until an ADSL user modem sends a start-up signal. However, services that use frequencies above 4 kHz must be moved to non-ADSL channels at the time that the cut-through card is replaced with a splitter since the splitter low pass filter will not pass frequencies above 4kHz. This would include ISDN, P-Phone, DDS/SynchroNet, program audio, and any service provided via DAML.

The third alternative for splicing Remote DSLAM capacity is to add a tandem cross connect at the DLC site along with the Remote DSLAM. Remote DSLAM and other "special" capabilities such as universal DLC, Mode I vs Mode II, etc., can be provided only to that cross connect. The out (F2) count from that cross connect can be used as the feeder to all of the FDIs served by the DLC site where the Remote DSLAM is located. While this alternative can be expensive to initially implement, it can reduce monitoring and provisioning expense by reducing the need to monitor multiple FDIs for these "special" facility types. The ADSL plan should not be expected to completely fund this alternative.

STR144 and STR96 and STR48

Each shelf of the STR144 or STR96 terminates on 800-type tie-blocks. These tie-blocks consist of 48-(POTS) in

& 48 (POTS+ADSL) out positions. A special patch cord is used to patch the ADSL signal from these tie-blocks to the protector block of the assigned derived PG pair.

ADJ96

The ADJ96 is similar to the STR96 solution. The cables from the 2-DSLAM shelves transition into 100-pair cables that terminate on two 800-type tie-blocks inside the adjacent DLC cabinet. A special patch cord is used to patch the ADSL signal from this tie-block to the protector block of the assigned derived PG pair. Each DSLAM shelf is an independent network element when deployed using 4 DS1s to connect back to the CO DSLAM.

When there are two DLC cabinets at the site, the 100-pair cables should be multiple in both cabinets. This simplifies the capacity monitoring since both cabinets have full access to the 96-ADSL lines. The first system should be turned-up and the second system should be deferred until it is needed for relief.

Mini-RAM

The other alternative for getting DSLAM functionality out to the DLC RT site is a miniature remote access multiplexer (Mini-RAM). The currently available Alcatel Mini-RAM consists of a 3.5 inch high shelf that can house 8 lines of ADSL capacity and is intended to be mounted inside the DLC remote terminal enclosure. A smaller, 1.75 in high version, of the Mini-RAM made by Pulsecom is expected to be available by the second quarter of 2000. A 16 line Mini-RAM made by Pulsecom is also expected to be available by mid 2001.

The Mini-RAM will be connected back to the CO DSLAM using one to four DS1s, T1s, or HDSLs. The Pulsecom 8 line Mini-RAM uses only one DS1, T1, HDSL connection back to the CO DSLAM in its initial phase, but the 16 line version will be able to use up to 8 DS1s. Figure 6 illustrates Mini-RAM functionality at a DLC remote terminal site.

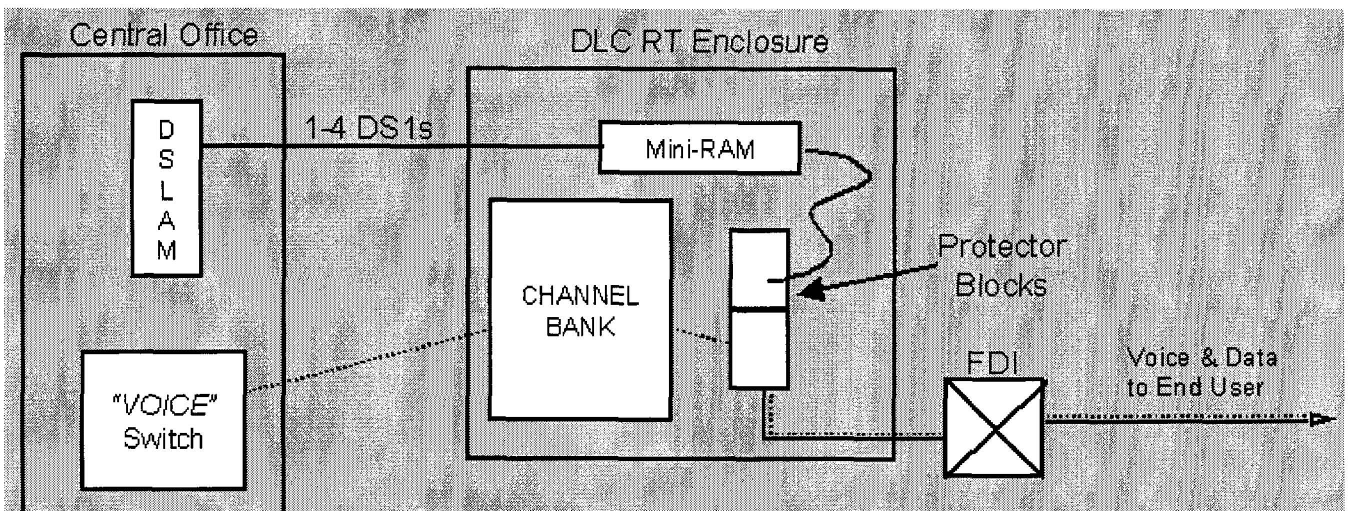


Figure 6
Mini-RAM Functional Diagram

Connecting the Mini-RAM to the existing cable is accomplished through the use of a cable assembly specially designed for this application. The cable assembly plugs into the Mini-RAM connectors on one end and the other end fans out into 8 connections to allow the mini-RAM to be connected to any line served by the DLC in that enclosure. That connection is accomplished by removing the protector unit from the desired line at the protector block inside the enclosure and inserting the Mini-RAM connector cable in the appropriate position on the protector block. The protector for that line is then contained within the special connector cable and the connector cable makes the voice and data connections to and from the Mini-RAM. This arrangement of placing the Mini-RAM connector cables across the face of protector block will limit the number of such connections that can be practically managed in a remote terminal enclosure. Power availability in the cabinet and heat dissipation capability are also limiting factors. The team developing these alternatives has estimated that no matter how much space is available in a cabinet, it is generally not practical to administer more than 2 Mini-RAMs or 16-32 ADSL lines in this manner. The administration and records keeping information for this arrangement are also included in OSPE practice 915-800-019PR.

Sizing and Relief Steps for Remote Solutions

Like any other network element, ADSL remote solutions should be sized to meet expected demand. Demand projections made with the assistance of Consumer and Business ADSL product managers have been sent to the OSPE districts that are scheduled for deployment of remotes in 2000. Demand projections are provided by allocation area (AA). In addition, RT site data has been provided for all RT sites within the AA. It should be noted that the expected demand for the entire AA appears in the "2001 AA Demand" column for each RT site. In the adjacent column, there is a column provided for the expected RT site demand to be entered by the Loop Capacity Manager (LCM). Based on average ADSL penetration rates from ADSL business cases, the table below provides a way to extend the 2001 demand projection to a 5 year (2004) forecast.

	2002	*2003*	*2004*
2001 Demand Multiplier	146%	186%	214%

1. If the AMR8 or PMR16 solutions will serve the 2 year demand (maximum of 32 lines), these solutions should be used.
2. If Mini-RAM solutions will not serve the 2 year demand, and a cabinet based solution will be used, use the ADJ96 if it will serve the 2 year demand.
3. If neither Mini-RAM nor ADJ96 solutions will serve 2 year demand and a standalone cabinet based solution will be used, size the remote solution to serve 5 year demand.
4. If Mini-RAM solutions will not serve demand through 2001, and a structure based solution will be used, size the remote solution to serve 2 year demand.
5. If Mini-RAM solutions have been deployed and actual plus 6 month forecasted demand exceeds Mini-RAM(s) capacity; size cabinet based solutions to cutover Mini-RAM(s) and serve 2 year demand if an ADJ96 will serve that demand. If the ADJ96 will not serve the cutover plus 2 year demand, size the remote solution to serve cutover plus 5 year demand. Size structure based solutions to cutover Mini-RAM(s) and serve 2 year demand.
6. If ADJ96 or larger cabinet solutions have been deployed and actual plus 6 month forecasted demand exceeds capacity, following the long range plan for the CSA, an additional housing should be established. If the ADSL capacity is provided at the new site it should be sized to cutover ADSL lines for the FDIs that site will serve and to serve the 5 year forecasted demand. If the new ADSL capacity is added at the same site it is not necessary to add any capacity for cutover of existing ADSL.
7. If STR48 or larger solutions have been deployed and the actual plus 6 month forecasted demand exceeds capacity, additional ADSL shelves should be added at the structure, sized to serve the 2 year demand. When an additional shelf is added to a STR48 solution for growth the connection to the ATM network must be converted to DS3 feeder.

It is intended, in all of the alternatives above that provide capacity for the cutover of existing ADSL, that the cutover be accomplished at the time that the additional capacity is added. Vacated hardware and circuit packs are then available for redeployment at other sites. The primary drivers of this cutover are the reduction in network element capacity required in element management systems and network management systems along with the reduction in hardware and circuit packs required to provide service.

For areas where no forecast is available from the ADSL Plan managers, the table below provides a means for projecting ADSL demand for primarily residential areas. Forecasts for areas that are primarily business should be developed jointly with local business sales organizations.

Year	*1*	*2*	*3*	*4*	*5*
% Living Units Taking ADSL	1.16%	4.32%	6.82%	9.95%	12.70%

If the sizing algorithms above yield a requirement for a cabinet based solution larger than the RD144 or RD192, the long range plan for the CSA should be evaluated to determine whether the CSA will be divided and a new site established in the future. If a new site will be established in the future, the remote at the current site should be sized to satisfy only the demand until that new site is established. If the CSA is not to be split to satisfy narrowband or other broadband demand, use either a RD144 or RD192 to serve ADSL demand unless there are severe restrictions on acquiring additional easement at the current location and the remote would use the last available space. It will be a very rare situation where ADSL will trigger the addition of a structure at an existing cabinet based RT site.

The reason for avoiding placement of MESA2 based RD144 and RD192 if possible through 2001 is that much higher density equipment configurations are expected to be available by that time. This will allow approximately 3 times the capacity to be provided in the same space or the same capacity to be provided in about 1/3 of the space.

CSAs that have been selected for IFITL overbuild should not be equipped with large ADSL remote solutions. Mini-RAMs can be used to serve high speed data demand until IFITL capabilities are installed and customers can be cutover.

Sufficient space should be reserved in DLC cabinets to serve 1-2 years forecasted narrowband demand rather than using needed channel bank space to place Mini-RAMs.

NGDLC ADSL Capabilities

Both Alcatel Litespan® and Marconi DISC*S® NGDLC systems will have ADSL channel units in the future. It is expected that these alternatives will be tested, approved, and fully documented by mid year 2001. This should include all operations system interfaces required for service activation and service assurance. Therefore, Remote DSLAMs or Mini-RAMs should not be needed for sites served by NGDLC after mid 2001. Furthermore, for NGDLC sites to be equipped for ADSL between now and mid 2001, ADSL remotes should be limited to mini-RAMs if the ADSL demand through mid 2001 can be met by 16-32 lines of Mini-RAM capacity. This will permit us to move the ADSL lines to the NGDLC platform in 2001 and avoid large start-up costs for remote DSLAM cabinets now.

*DISC*S ADSL Implementation*

The DISC*S ADSL implementation requires a Data Aggregation Unit 1 (DAU1) for each channel shelf equipped for ADSL. The DAU1 can be placed in any channel slot on the channel shelf, but it does reduce the total capacity of the shelf by one slot to 94 lines. When a customer requests ADSL service, the channel unit serving that customer must be replaced with one of two possible ADSL channel units. The DCU205 will be used if the customer requesting ADSL is the odd line in the channel unit and the DCU206 will be used if the customer is the even line. There are no wiring rearrangements required at the RT or at the FDI unless the channel shelf is completely full and line & Station transfers (LSTs) are required to vacate a channel slot for the DAU1. DS1s from the DAU1s will be transported back to the CO over the SONET system.

Litespan ADSL Implementation

The Litespan ADSL implementation requires that the bank controller unit (BCU) be replaced with an ATM bank controller unit (ABCU) in each channel bank assembly equipped for ADSL. The Litespan ADSL channel units can support 2 lines of both ADSL & POTS. When an existing POTS customer requests ADSL, the ADSL customer must be moved from the existing quad POTS channel unit to an ADSL channel unit. This will require an LST for each ADSL line. The capacity of the Litespan channel bank assembly will be reduced by 2 lines for each ADSL channel unit used. ABCUs can be daisy-chained together so that only one ATM transport link is required from the RT to the CO.

Other Remote Solutions Planning Considerations

Carrier Serving Areas (CSAs) where available space for ADSL remote solutions has been exhausted, but narrowband demand can still be served for 1-2 years from the existing DLC enclosure require other factors to be considered. The long range plan for the CSA should be consulted to determine how future narrowband demand will be served when selecting ADSL alternatives. If the alternative selected to serve ADSL demand is to add an ADSL remote solution at another location in the CSA, that site should be selected and adequate easement acquired to allow future narrowband demand relief from that site. The housing placed should be sized to serve 10-15 year narrowband services demand and to cutover existing ADSL services in the FDIs to be served from that site and to serve year end 2001 ADSL demand. If this situation arises after ADSL is available on NGDLC, placing a new NGDLC enclosure at the new site to serve ADSL demand and provide narrowband services relief would generally be the most cost effective solution. If an additional ADSL remote solutions site is established in this fashion, transmission issues will dictate cutover of all ADSL lines in FDIs to be served from the new site that are served from the original ADSL remote site for this CSA to the new ADSL remote. This is because the different level ADSL signals from remotes at different locations will generate more near end crosstalk than can be tolerated.

ADSL capability to an FDI can be provided from only one RT site even though multiple RT sites might serve a common FDI.

Derived pairs (forward feeding or back feeding) from multiple ADSL capable RT sites can not share a common cable sheath even though the RT sites do not serve a common FDI.

Fiber Distribution and ADSL

High-speed data capability using an ADSL user-network interface is a planned capability for Marconi fiber distribution systems. It is expected that the capability to upgrade Marconi's existing FITL-A product to provide ADSL service will be available by year end 2000. Marconi's MX fiber distribution system is also expected to be ready for deployment by year end 2000 and will have ADSL capability.

Network Rearrangement Impacts on ADSL

Network rearrangements impact for ADSL are similar to those experienced for ISDN. If rearrangements are being planned that would move customers from ADSL capable facilities, careful consideration should be given to the alternatives available for dealing with those situations.

1. If the facility rearrangement is discretionary, enough ADSL capable facilities should be left in place to serve existing plus forecasted 2 year ADSL demand.

2. If the facility rearrangement is non discretionary, like a road move or damaged cable, and another ADSL capable facility, such as pairs from another ADSL qualified copper cable, can be made available, provide sufficient ADSL capable facilities to serve existing plus forecasted 2 year ADSL demand.

3. If the facility rearrangement is non discretionary, like a road move or damaged cable, and no other ADSL capable facility is available, contact the ADSL Plan Manager in the PCU to acquire funding for ADSL remote capacity sized per the recommendations provided earlier in this document.

4. If there is no ADSL funding available and the local management team decides to proceed with a remote solution to avoid customer dissatisfaction issues, the remote should be sized to cutover the existing ADSL services but not to provide for growth. In addition, Ken Hartsfield 205 977-5062 should be notified immediately so that the taper code involved can be marked as no longer ADSL qualified so that no additional ADSL service orders will be issued.

5. If there is no ADSL funding available and the local management team decides NOT to proceed with a remote solution a list of the telephone numbers involved should be forwarded to the DSG so that the appropriate ISP/NSP can be notified. In addition, Ken Hartsfield 205 977-5062 should be notified immediately so that the taper code involved can be marked as no longer ADSL qualified so that no additional ADSL service orders will be issued.

FCC Line Sharing Order

On November 18, 1999, the FCC issued an order that established "line sharing" principles that require BellSouth and other incumbent local exchange carriers (ILECs) to share the spectrum of the facilities with other services. In particular, the order requires that BellSouth allow another service provider to provide xDSL based services on the cable facility that BellSouth is using to provide telephony. Many details and procedures remain to be finalized before line sharing can begin. It is currently too early to change any of our planning processes. As planning impacts of line sharing are clarified, more information will be provided.

ADSL Capacity Management

The three categories of ADSL resource for which capacity management is required are:

- Equipment ports
- Logical resources
- Bandwidth

Equipment Ports

The Central Office DSLAM is hardware restricted to a maximum of 576 ports (12 shelves x 12 cards x 4 ports each) or 144 physical ports (3 shelves x 12 cards x 4 ports each) for the DS1 hub bay. The hardware monitoring of the baseband ports will be done via circuit capacity management. The Loop Capacity Managers (LCMs) in the District, using the LEIM database and future NMS/NRS reports will do capacity management and the hardware monitoring of the DS1 ports. The District will be responsible for notifying circuit capacity management when another DS1 hub shelf is required.

The LCM will assign DS1 ports on the Hub shelf in sequential order. The LCM shall request a new shelf no later than when the 8th card of the last available hub shelf has been pre-assigned. Included in this request from the LCM shall be an estimate of the total number of hub shelf DS1s needed, including existing capacity, within the next twelve-month period. This estimate is needed only in "ranges", but is essential in order to assist the Circuit Capacity Manager (CCM) in making overall decisions regarding the CO DSLAM architecture. The LCM shall consider the estimated mix of Remote ADSL solutions proposed in the wire center and choose, between the following "ranges", the one that best reflects the needs for the next twelve months. The LCM shall provide this information to the CCM, along with the request for an additional Hub shelf (or shelves).

Ranges -

"less than or equal to 128" DS1s

"greater than 128 and less than or equal to 192" DS1s

"greater than 192 and less than or equal to 256" DS1s

"greater than 256" DS1s

CO DSLAM relief processes are outlined in detail in the *"ADSL Capacity Management Network Service Description"* available on the intranet at *http://and.bst.bls.com/APE/.*

NOTE: There is a software limit of 128 DS1s that can be assigned to Hub shelves on any one CO DSLAM. It is important to note that if the LCM forecasts "less than or equal to 128" DS1s and the CCM places three Hub shelves on a single CO DSLAM, then only 128 DS1s can be assigned (even though there are 144 ports existing).

The "BellSouth Equipment Request for Central Office Installation for OSP" form described in RL: 98-06-018BT shall be used to make this request to the CCM. This form shall be sent to the CCM rather than the Turf Installation Vendor as described in the RL.

The ADSL remote solutions hardware port utilization will be monitored in the Districts by the LCM's using the LEIS/LFACS database and NMS capacity alerts, and future NRS/NMS reports.

ADSL plug-in spare levels at central stock, plug-in distribution centers (PDCs), COs, and field work centers should be kept in accordance with sparing guidelines published February 1, 2000.

Logical Resources

Current ADSL services are not expected to be limited by virtual circuit (VC) resource limitations. However, NMS alarm levels for logical resources have been set to warn of any unanticipated capacity issues. Circuit Capacity Management and PCU ATM planners will monitor these resources.

The following tables outline the capacities of the various pieces of equipment.

ADSL Equipment	*VC Limitations*
LT	10 per Port ADSL Line side
DS1 LT	N/A-Slave to the NT Card
DS1 NT	1000 or 10 per Port ADSL Line Side
DS3 NT	2000 VC's and 128 DS1's
OC3 NT	2000 VC's and 128 DS1's
DS3 fed DSLAM	2000 VC's and 128 DS1's
OC3 fed DSLAM	2000 VC's and 128 DS1's
Mini-RAM	80 = 10 per Port (8)
RAM Shelf	480 = 10 per Port (48)

ATM Switch Card Type	*VC Port Limitations*	*VC Card Limitations With Bulk Statistics*	*VC Card Limitations W/O Bulk Statistics*
Switching Processor	N/A	N/A	N/A
DS1	2000	6000	DS3
DS3	2000	6000	8000
OC3	4000	6000	8000
OC12	16,000	16,000	16,000

Bandwidth

Circuit Capacity Management and ATM planners in the Product Commercialization Unit will be responsible for monitoring bandwidth utilization and initiating relief steps.

General bandwidth requirement calculation:

- The maximum Burst Bit Rate (BBR) of any user on a DSLAM, MiniRAM, or single shelf DSLAM cannot exceed the available bandwidth in the feeder
- The sum of all the individual Engineered Bit Rates (EBRs) on either a DSLAM, MiniRAM, or single shelf DSLAM cannot exceed the total bandwidth of the feeder

These calculations will be performed by NMS at ADSL service activation to assure that alarm thresholds have not been exceeded.

The following table provides BBR and ERB for current services.

Service Class	Advertised Rates	CO DSLAM *EBR* (kbps)	Remotes *EBR* **	*BBR* (kbps)
Consumer	1.5 x 256	30.7	89.6	89.6
Business	384 x 384	448	448	448
Business	768 x 512	38.4	128	1024
Business	1.5 x 512	67.2	224	1824
Business	192 x 192	38.4	128	1024
Business	2.0-6.0 x 640	225	750	4000

** Refers to all network elements subtended from CO DSLAM as well as all DS3 fed non-subtended remote network elements.
The relief alternatives for remote solutions when bandwidth utilization reaches 80% to 90% fill will be as follows:

Remote Solution	*Initial Backbone Feed*	*Recommended Relief Backbone Feed*
AMR8	1-DS1 IMA	4-DS1's IMA
ADJ96	4-DS1's IMA per shelf	1-DS3 for both shelves
RD144	DS3	OC3
RD192	DS3	OC3
STR48	4-DS1's IMA per shelf	1-DS3 per shelf
STR96	DS3	OC3
STR48	DS3	OC3

It is not anticipated that any of the remote solutions will have enough traffic to exhaust a DS3 feed, and therefore require a DS3 to OC3 upgrade for the foreseeable future.

The following table provides a summary of the NMS reports and alarm levels to allow Circuit Capacity Management and Loop Capacity Management to initiate timely relief.

Report Type	*Alarm Level 1*	*Threshold*	*Alarm Level 2*	*Threshold*	*Type Stop*
Total DSLAM Sub Network Report	Major	50%	Critical	65%	Soft
Remote Terminal Utilization Report	Major	50% for mini-RAM's 75% for all others	Critical	65% for mini-Ram's 85% for all others	Hard @ 100%
BaseBand Port Utilization Report	Major	60%	Critical	75%	Hard @ 100%
C. O. DSLAM Percent fill Utilization Report	Major	50%	Critical	65%	Hard @ 100%
C. O. DSLAM Total BaseBand Lines Report	N/A	N/A	N/A	N/A	N/A
C. O. DSLAM Total Lines Report	N/A	N/A	N/A	N/A	N/A
C. O. DSLAM Total DS1 Port Activity Report	Major	75%	Critical	85%	Hard @ 100%
C. O. DSLAM Engineered Bandwidth Percent fill Report	Major	60%	Critical	75%	Soft

For detailed capacity management process description see *"ADSL Capacity Management Network Service Description"* available on the intranet at *http://and.bst.bls.com/ape/.*

BellSouth Telecommunications, Inc.
FPSC Dkt No. 990649A-TP
AT&T and MCI's 1st Request for Production of Documents
December 31, 2001
Item No. 3e
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Page 1 of 1

ATTACHMENT

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entities:	BellSouth Telecommunications, Inc.
from:	D. A. Kettler, Executive Director/NVP — Science & Technology
description:	Discussion of planning processes and issues for the deployment of Integrated- Fiber-In-The-Loop (IFITL)

*   *   *

We have been working very closely with several organizations over the last few months to facilitate important economic decisions for the implementation of Integrated-Fiber-In-The-Loop (IFITL). IFITL refers to fiber distribution systems that have been equipped to provide integrated voice, video, and high-speed data services. Currently this technology is being installed in broadband overbuild projects to replace existing copper networks, as upgrades to selected FITL locations, and in new subdivisions in selected markets. This letter documents planning considerations for the establishment of new Fiber Serving Area (FSA) boundaries and planning processes to optimize the cost of IFITL design.

IFITL/FITL platforms are part of our strategic core initiative to position the network for future services. By the end of the year these deployments are expected to pass approximately a half million households with accelerated installations in 2000. It is important that we aggressively deploy these new platforms with efficient planning and take proactive steps to reduce our overall costs.

Original signed by D. A. Kettler

Questions from your organization may be directed to Jim Jackson at (205) 977-5032, or Sherry Woodruff at (770) 493-3741.

D. A. Kettler

Executive Director/ NVP

— Science & Technology

Attachment aa

Attachment ab

1. Introduction

Integrated-Fiber-In -The -Loop, or IFITL, is the term used for fiber distribution systems that have been equipped to provide integrated voice, video, and high-speed data service. (Refer to At tachment 1 for an architecture overview.) Currently this platform is being deployed in broadband overbuild projects to replace existing copper networks, as upgrades to selected FITL locations, and in new subdivisions in selected markets. This document is provided to highlight Integrated-Fi ber-In-The-Loop (IFITL) planning processes and recommendations that can impact market selection and network costs. While the Consumer Multimedia Services(CMS) group ultimately is responsible for the coordination and selection of target markets for video and high-speed data , additional planning and deployment issues will need to be addressed by district planners to aid in the selection of Fiber Serving Areas (FSAs) for final approval. This letter addresses FSA plan ning recommendations and processes for information exchanges between Network Planners and CMS in targeted IFITL markets. Other references for specific implementation criteria include :

915-710-125BT (Outside Plant Engineering Methods and Procedures for RELTEC (now Marconi) DISCS Systems

RL: 99-01-017BT (Video Equipment for the RELTEC (now Marconi) DISCS Fiber In The Loop System)

RL: 99-04-014BT (Video Design for DISCS Aerial FITL Facilities)

RL: 99-07-001BT (PC Data Design over DISCS FITL Facilities)

2. Market Selection for IFITL

Market Selection for IFITL

CMS manages a detailed program to help BellSouth Entertainment, Inc. (BEI), Consumer Ser vices, and the Product Commercialization Unit (PCU) target markets for enhanced service offer ings, expense reduction and revenue generation. In markets targeted for "overbuilds" of the exist ing copper cable, household demographics such as Internet usage, potential video revenues, wireless video coverage, and houses per street mile are analyzed along with LATIS/LAD (Loop Activity Tracking Information System/ Loop Activity Data) network expense history and available facilities. The Consumer Business Unit aids in the identification of markets where competition poses a threat to BellSouth's customer base as well as setting target demographics for high-speed data and enhanced telephony services. Cost and franchise acquisition requirements for additional video service coverage opportunities on fiber based facilities are linked with BellSouth Entertain ment's Wireless Video Service coverage.

High-speed data deployment is a key strategy for BellSouth and is funded and planned by the PCU/ AND (Advanced Networking Division). Close coordination between the PCU and CMS, with local network input, is required to insure that the return on investment is maximized for ADSL electronics (used for data in copper-served areas) and IFITL data electronics. Some areas may have data demands high enough to justify placing ADSL prior to the timeframe in which IFITL can be implemented. (If IFITL for the area is selected at a future date, ADSL electronics will be relo cated and used elsewhere.) Efforts to coordinate these strategies are an important part of the plan ning process.

Atlanta and South Florida were the first markets approved for IFITL overbuilds of existing copper loops. Targets of 100,000 homes for each area were set for 1999, with additional deployments and new markets in 2000 and beyond. Currently new markets under consideration for future deploy ments include:

Birmingham	Charleston	Charlotte	Jacksonville
Memphis	New Orleans	Nashville	Orlando
Raleigh	West Palm Beach		

Growth deployments for FITL may also play a key role in market selection. Efforts are in place to look for benchmarks for video service consideration. Economic studies have shown that it takes 25,000 homes to justify starting a video operation in a market given the current cost of equipment and the sales/maintenance support needed. This means that when the inventory of FITL homes passed is projected to reach that threshold, an Analog Hub Office (AHO) should be examined for video activation. An AHO will serve the wire centers within a 20 mile radius, however, a video fran chise acquired by BellSouth Entertainment is required in order to provide service to end users. The threshold for activating a wire center for video is 2,000 - 3,000 homes served with FITL, and a Re mote Terminal should serve at least 400 homes to justify the cost of video electronics.

Although CMS uses LEIS reports to screen for FITL deployments, district self identification is en couraged for areas meeting the required thresholds in the markets listed above. Further investiga tions into franchise acquisitions and business case analysis will be required for markets meeting ini tial benchmarks. While no new video market activation has been approved, CMS has developed video activation plans for BST's top tier markets. The AHOs or Head Ends currently deployed or planned are:

Top Tier Markets	AHO / Head End
Atlanta	7 Executive Park (Atlanta Head End Lawrenceville Central Office Jonesboro Central Office (future AHO)
Miami	Palmetto Central Office
Ft. Lauderdale	Keller (Head End) Oakland Park Central Office
West Palm Beach	Green Acres Central Office
Birmingham	Vestavia Hills (Valley Central Office)
Charleston	North Central Office
Charlotte	Caldwell Central Office
Jacksonville	World Golf Village Clay Central Office
Orlando	1965 Stanhome Way (Orlando Head End)
Memphis	Chickasaw Central Office
Nashville	Nashville Main Central Office
New Orleans	6767 Bundy Road (New Orleans Head End) Covington Central Office
Raleigh	Morgan Street Central Office

3.0 Fiber Serving Areas and Planning Considerations for Overbuild Markets

Once CMS selects a market to examine for specific plan details, a priority list of allocation areas for IFITL overbuild candidates will be generated. Additional information must be processed to determine a list of final FSAs for engineering design. FSA planning is a combination of Carrier Serving Area (CSA) design and Distribution Area (DA) design for fiber distribution facilities. (The feeder <u>and</u> distribution connection points are located with the Remote Terminal (RT) equipment.) Where practical, FSA boundaries should be extended to 12 KF to maximize the number of living units served from RT housings. For areas outside target "overbuild" markets, FSA planning is im portant in keeping with the strategic core initiative to move towards NGDLC/ FITL platforms to position the network for future services. Limits should be established for metallic distribution addi tions to the existing infrastructure in order to avoid the perpetuation of metallic networks and to maximize fiber distribution deployments. In areas with new residential developments, existing CSA boundaries should be restricted to the current terminal service areas and planned extensions. (See Sections 2.02 and 2.03 of the current Loop Technology Deployment Directives (LTTD) for additional information on FSA planning for growth areas.)

Generally speaking, targets for fiber "overbuilds" are mature areas that can be evaluated for FSA design distances and densities in order to gain maximum efficiencies for the telephony, video, and data equipment to be placed at a remote terminal site. While the new FSA areas do not need to match existing CSA or DA boundaries, some consideration for these designs is important for cut over strategies, the reuse of integrated DLC switch ports, and plant retirements. In the design phase of this process, these considerations can become critical elements for effective administra tion of the new and the old networks.

In order to maximize the serving areas to 12 KF, allocation area boundaries may need to be adjusted to plan for efficient equipment utilization. Conversely, it may also be appropriate to scale the de sign distance of an FSA to optimize structure placement. For example, using a design criteria of 10 KF to fully utilize 2 cabinets may be more desirable than to use 12 KF and be forced to place a CEV or a third cabinet that will have a low utilization. (See structure capacities for "FITL-A" deployments in Table 1.)

3.1 FSA Planning Cutover Exceptions

Multifamily units present an important consideration for establishing "overbuild" FSA bound aries. Many apartment management organizations have entered into exclusive contracts with video service providers that would prohibit the sale of BellSouth video. It is probable that high-speed data exclusions will also occur in the near future. Target allocation areas provided by CMS for pos sible FSA approvals will need to be examined for multifamily units that should be excluded for this reason. LEIS reports can provide address information detailing "apartment", "floor", or "unit" en tries which can help in the identification of multifamily developments. Unfortunately, single family residential units under private contracts (referred to as "encumbered" for the purpose of this docu ment) are not apparent from record inventories. All multifamily units and possible encumbered developments (if known) should be passed on to CMS for BEI negotiations with the property man agers.

Areas provided by CMS for possible FSA design will also need to be examined for remote ADSL solutions that have already been deployed. Close coordination must occur between ADSL and IFITL planners to insure that remote ADSL investment is coordinated with areas selected for IFITL overbuilds.

It is also important to note that pockets of industrial or business areas may not be appropriately served from ONUs with the current product limitations and may require the continued support of the existing copper network. Currently the maximum approved size for the Marconi ONU is a 24-line unit supporting POTS, ISDN, DDS, and coin. The current ONU can also support a single DS1, but this service arrangement is not compatible with video and data implementation, and has obvious limitations. Marconi's next broadband ready platform, MX, will have expanded service capabilities that will be useful in some business applications. Current plans are to begin field trials in January 2000. Based on successful field evaluations, the MX platform could be generally avail able as early as April 2000. (The new MX platform will also support ADSL interfaces for high-speed data rather than the PC Data ethernet interface in the current FITL-A product. ADSL components are targeted for introduction into the FITL-A product in March 2000.)

Many districts have developed local LEIS retrieves that may aid in data collection for FSA screen ings. The Atlanta team is using a retrieve written by one of their managers to support multiple plan ning functions, including the identification of multifamily units and business lines. For interested parties, the file can be copied by typing "cp /u/staff/byjchhc/fitl.asgn.tpr ." at the LEIS prompt. After running the retrieve, transfer the file to an EXCEL directory and open it as "delimited", "other" using the pipe (|) symbol. The report includes 5 separate files that can be transferred to different sheets in the workbook. The report includes tables designed to help identify existing carri er service types ("pgs_type"), the number of lines per address, serving terminal information, USOC codes and existing remote terminal information.

3.2 Development of FSA Boundaries

Business plan management for IFITL deployments will necessitate close coordination between CMS and network planners to determine the final selection for overbuild approvals. The alloca tion areas provided as priority targets should be examined for final FSA boundary documentation. The geography and the targeted number of living units associated with each FSA should be clearly documented during the planing process. It is strongly recommended that network planners use a land base system (such as MapInfo or ArcView) to aid in scaling serving area boundaries and to provide a clear documentation of proposed FSA geography. The multifamily and business identifi cation will also be important for final FSA approval. Planning roles and responsibilities should be determined at the local level, but typically include Infrastructure Planners and Outside Plant Loop Capacity Managers.

Items that may help in establishing FSA boundaries include:

1.	Current AA boundaries and target AAs
2.	The location of all existing RT structures (easements)
3.	FITL developments
4.	Franchise boundaries

Allocation areas will be the targets provided by CMS. It is important to design FSAs to provide the best match for selected AA geographies. Some AAs may be so large that more than one FSA will be necessary to accommodate the 12 KF limit or to economically match RT enclosure capacity. Other AAs may be small enough to be combined with all or part of another AA to provide the best resource utilization. Existing RT sites can help define CSA limits (for cutover considerations) and possible structure or easement availability. Existing FITL deployments may provide a way to reach homes with video and data upgrades at a much lower cost per unit. Franchise boundaries (provided by CMS) are also extremely important for final FSA selection. Some municipalities may have spe cial requirements for franchise acquisitions that are excluded from countywide negotiations.

In order to aid initial FSA screenings, CMS created information files for the number of residential units in a geographical area. This file, referred to as the "points" file, will be established for the area under study and located on the CMS LAN (Local Area (computer) Network). Initially avail able in MapInfo, plans are underway for the files to also be available in ArcView. Once an area is partitioned, the "points" file can provide an approximate number of residential units by using addresses geocoded to the land base. By using the land base measurement tool and the "points" file, initial FSA carve outs can be documented for approximate distance and density for further evaluation. New FSA boundary files and files that will provide a theoretical IFITL RT location to optimize the distance limitations for the FSA will need to be created. The recommended names and table structures for these files can also be located on the CMS LAN. (The CMS tactical planner will provide LAN file locations when a market is selected for this process.) The information is listed in general descriptive terms below:

Table Name	Table Structure
fsa_"wirecenter abbreviation" mile,	(number of residential living units, living units per square
(example: "fsa_tukr" for Tucker)	FSA identification name, year of market target)
I_site_ "wirecenter abbreviation"(example: "I_site_tukr" for Tucker	(address (if existing RT site), FSA identification name)

Since the FSA will be administered as a remote terminal, it is recommended that the FSA naming convention follow the same convention as a CSA (Example: 1102B would represent the FSA name and would also refer to the RT). Once the geography is detailed into FSAs using the points file, additional reports from LEIS will be needed to verify or change living unit counts to validate the number of homes to be served by each FSA. It may also be appropriate to re-scale the areas under review to maximize structures once the living unit count has been scrubbed. The encumbered units or multifamily developments excluded by BEI will also need to be reflected in this count. Network planners should populate the fields underlined above. The approved FSA configurations may ulti mately generate changes in AA boundaries and planning documentation.

IFITL (Video/PC Data/Telephony)

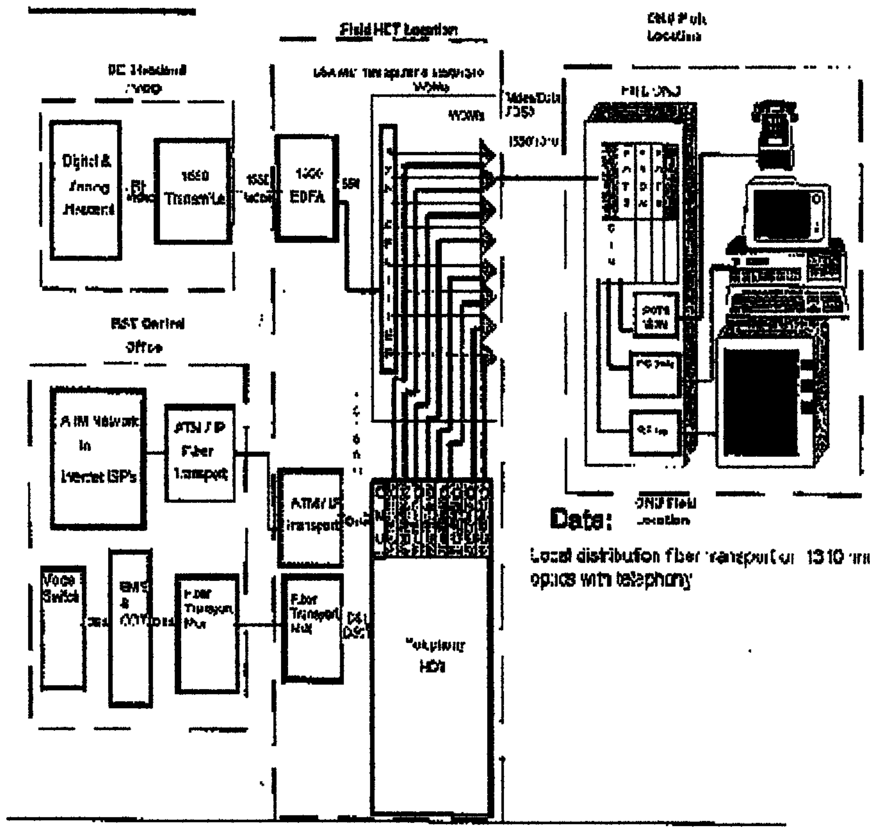
Telephony:

Transport on 1310 nm optics (full duplex) 24 DS0's per ONU supporting POTS ISDN, DDS, & coin

Video :

Transport on 1550 nm optics with 50 to 750 MHz bandwidth, capable of carrying Analog & Digital channels; ONU RF output can be split 4 ways.

Shared Components Equipment common to all services



Data:

Local distribution fiber transport on 1310 nm optics with telephony

[illegible]

Table 1

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

ONU / Structure Sizing

ONU designs for IFITL should follow the current LTDD information contained in Table N1for FITL networks. Data about second line penetration and the mix of aerial and buried plant in tar geted FSAs can help provide better approximations for ONU requirements and structure sizing. The aerial/buried mix and the single family/multi-family mix of an area will largely determine the average number of living units per ONU. Buried single family applications should typically be de signed for 6-8 living units per ONU, with aerial design approaching 12 living units per ONU. The number of living units attained is often effected by the 500-foot drop limitation, which is especially important for high-speed data circuits. (This 500-foot drop limitation assumes that the customer will have approximately 100 feet of inside wire.) Forecasts for structures and system requirements can be developed by dividing the total number of living units in an FSA by the average living units per ONU to derive the number of ONUs that will be needed to support the overbuild. (ONUs to meet small business demand and vacant ONU positions for growth should also be included.) The number of systems (HDTs) can be determined by dividing the number of ONUs by 56 for ONUs provisioned as 12 lines ONUs or by 28 for ONUs provisioned as 24 line ONUs. (Every 24 line ONU uses two of the available 56 HDT positions under FITL-A. Expanded bandwidth capability for FITL-A is currently targeted for late 2000 and would allow 56

24-line ONUs per HDT.)

An extremely high second line penetration may require the use of some 24 line ONUs which will limit the total number of living units per HDT under the approved Marconi FITL-A product. Net work is encouraged to take some risks in ONU fills in order to maximize the number of living units for the structures placed since:

1.	It is anticipated that some of the second lines in use for computers will convert to a high-speed data offering.
2.	The areas selected are usually established neighborhoods that have already experienced some second line growth.
3.	The expanded bandwidth future offering by Marconi will enable the conversion of 12 line ONUs to 24 line ONUs, allowing 56 ONUs per HDT.(Using either 12 or 24 line ONUs).

Example: For a subdivision with buried facilities, assume 6 houses served as an average per ONU. Assume the second line penetration is 1.5 for the area (6 X 1.5 = 9.0 average lines per ONU).

Using ONU-12s, and reserving 6 of the 56 of the ONU positions for growth:

6 X 50 = 300 homes per HDT

Using 1/2 ONU-12s and 1/2 ONU-24s, and reserving 6 of the 56 positions for growth:

6 X 25 = 150 homes (ONU-12s)

6 X 25/2 or 6 X 12 = 72 homes (ONU-24s take up 2 positions)

Total = 222 homes per HDT

This difference will have a significant impact on structure sizes for FSAs, and the cost for network provisioning. (Note: All new ONU housings should be the larger 24 line housings, but the configu ration for bandwidth as a 12 line or 24 line ONU should be carefully considered.)

MESA-2 cabinets are the only standard cabinet housings that can not be upgraded for video and high-speed data. All standard FITL configurations for new shipments of Marconi's MESA-4 and MESA-6 cabinets are "broadband ready" with the appropriate cabling and termination equip ment, and have space set aside for video and data equipment additions. (Reserved space may re quire the use of preterminated fiber shelves. Field splice options require additional space and can limit ONU capacities in some cabinets. The space reserved for fiber termination equipment is shown in the Marconi Ordering Guide dated 6/99 or later.)

BellSouth is actively working with suppliers to enhance product development for IFITL systems. As previously discussed, a field trial for the next generation of Marconi's fiber platform (MX) is currently planned for January 2000 and may be generally available as early as April 2000 (assuming a successful trial). Cabinet configurations for this product line will allow significantly more ONUs to be served from a single cabinet (168 for MESA-4, 280 for a MESA-6) than with FITL-A. Expanded bandwidth capabilities, slated for late 2000, will allow an additional 56 ONUs from each cabinet by allowing a single common shelf to serve multiple optical shelves. Expanded bandwidth will also be introduced for FITL-A later in 2000 and will allow a full complement of 8 24-line ONUs per optical shelf or 56 24-line ONUs per HDT. This expanded housing capacity will allow a single RT site to serve a larger area or will allow a smaller housing to be deployed for a previously designed area. BellSouth is also working with other suppliers for a second approved product line. New information will be released as soon as the specifics for new products become available.

3.4 Fiber Feeder

IFITL planning does not change the recommended fiber sizing for the feeder network. The LTDD recommends 6 fibers per 1000 living units or equivalent business lines. With the current approved IFITL equipment, four fibers (typically shared) are used to support telephony, two fibers (typically shared) are designated spares, one fiber is dedicated for video transport (for up to 4 HDTs), and one fiber is dedicated for data (for up to eight HDTs). The sharing of the telephony and spare fi bers, usually among several ADM nodes, is dependent on feeder termination capacity required by demand at each site. Fiber cable laterals from the feeder route to each RT site should be sized for a <u>minimum</u> of 12 fibers. (Refer to Table 1 for fiber requirements for HDT capacities in standard structures.) Routes that do not contain fiber or routes that have no available fibers will need to be evaluated for infrastructure placements. Opportunities to mine fibers from the existing network for capital efficiencies should be a primary consideration. Examples may include asynchronous mux replacements combined with ring planning or mux upgrades from OC3 to OC12. Network planners will need to document the capital necessary for fiber placements or facility rearrange ments to fully capture the business case funding requirements.

3.5 FSA Planning Summary

The following planning recommendations are a summary of the processes discussed for FSA carve outs.

1. Run mechanized LEIS reports for CMS targeted AAs to look for apartments and high

business concentrations. Communicate with CMS for BEI involvement to investigate contracts for multifamily developments or possible exclusions from overbuild considerations.

2. Geocode existing RT sites on a land base program and document existing FITL-Areas.

3. Gather current franchise information.

4. Communicate FSA geography and FSA information tables to CMS.

5. Identify fiber placements or facility rearrangement costs to provide the necessary fiber in frastructure.

CMS will process the FSA information and facilitate a consensus for the final selections.

4.0 IFITL Overbuild Switch Recommendations

Switch impacts are also important planning considerations for IFITL overbuild areas. Generally speaking, IFITL systems should be terminated on the serving switch in the same manner as the DLC systems replaced, and copper plant on integrated TR303 systems. Please refer to the recom mendations for switch provisioning listed below:

IFITL that is replacing TR-008 UDLC should reuse the TR-008 COTs (SLC 96). This will probably require some spare TR-008 COT capacity so that cutover can be started to vacate addi tional COTs.

IFITL replacing copper feeder or UDLC with COTs that do not support TR-008 (SLC5, FDLC) should interface the switch as TR-303 IDLC.

IFITL replacing TR-008 IDLC on a 5ESS should reuse the DCLU or IDCU TR-008 termina tions used by the current IDLC. Again, this will probably require some additional TR-008 switch capacity to begin cutover to vacate existing terminations.

IFITL replacing TR-008 IDLC on a DMS100 should reuse the SMS TR-008 terminations used by the current IDLC with the following exception. If TR-008 switch terminations are needed for growth in the wire center within the next ~3 to 5 years, the lowest long term costs are achieved by terminating IFITL-As TR-303 and using the TR-008 capacity to satisfy that growth demand. The purchase of new TR-303 capacity was not specifically budgeted for IFITL, but will yield lower long-term costs if it can be accomplished within budget plan limits.

A SMA will support 7 systems at a cost of approximately $175,000 per SMA in a DMS100. An IDCU for the #5ESS is engineered on system size (T1 requirements) but will typically support 7 systems at a cost of approximately $255,000 per IDCU. This cost makes reuse of the existing IDLC configurations an important consideration for business case financials. One suggestion for switch port reuse that has been implemented in the Atlanta market is to "double assign" the existing inte grated switch ports for systems being cutover to IFITL. Since no additional traffic is placed on the switch peripheral until working lines are cutover from the field, and lines will be cut from the old systems as new lines are cut to the new IFITL systems, traffic can be maintained at acceptable levels. Cutover coordination is important however, because typically the working lines do not precisely match old and new system assignments. Another option may be to reuse part of the TR008 system ports involved in IFITL cutover to satisfy normal switch growth additions and order some TR303 capacity for IFITL-Areas to replace TR008 growth requirements. Timing will be important for this option, since the IFITL cutover will need to be complete before growth systems can be as signed.

Once a strategy is developed for switch provisioning, loop planners (IP/LCMs) should furnish the required TR-303 system growth forecasts for the approved FSAs to Switch Capacity Managers. These forecasts should include number and line capacity of systems as well as an indication of the expected percentage of the lines that will be business lines. An Excel help sheet is located on the Technology Directives Web page (http://home.snt.bst.bls.com/group/techdirect/loop.htm) to aid in forecasting TR303 systems for IFITL overbuild areas.

Video FITL Deployments for 'New Build' Areas

Under the conditions in Section 2.0, areas that are not currently deploying video services over the fiber distribution systems can qualify for new market consideration. In addition to equipment installations, franchises must be negotiated for the areas under consideration.

Once analog video equipment installations and franchise acquisitions have been established for a wire center, jobs servicing new units with fiber distribution should typically be engineered as IFITL. (Equipped for high-speed data services and video.) An exception to that strategy would be for encumbered units that may be excluded from BEI video service offerings by contract. Another pos sibility is that funding may be suspended for an area under business plan management. The CMS Video Loop Coordinator (VLC) must provide "official" approval for all new IFITL jobs in order to address these issues during the design phase. All designed IFITL jobs should be launched to the

CMS OPEDS workbasket that will be set up for approved markets.

Data FITL Deployments (Without Video)

For areas that do not fall within benchmarks for video services, FITL deployments also have the ability to support high-speed data. (Sometimes data service is referred to as "DFITL", as opposed to "IFITL" which refers to both video and data.) The PCU has control of the business plan for BST data, and has funded equipment in targeted central offices for data networking. In addition to ADSL offerings provided over copper loops, the PCU also has control of the funding required for the data equipment necessary to provision fiber distribution systems for high-speed data. Marconi is working on a card that will support data and telephony (without the video) for these applications. Typically, if a central office is equipped to offer ADSL, an engineer should anticipate funding to establish DFITL once the new cards become available, however negotiations should proceed for official approval during the design process. The current ethernet architecture supporting PC Data will be capped with existing deployments when the new MX' platform, which supports an ADSL interface, becomes available next year, as previously discussed. ADSL components are also tar geted for introduction into the FITL-A product in March 2000 per new commitments by Marconi.

NOTE: Feeder fibers for voice or telephony system and associated spares are typically shared among several ADM ring nodes based on feeder demand at each site and are not dedi cated for a particular RT site. OC-12 would only be required for Mode 2 configura tions if ONUs are at or near 100% utilization. Typical ONU utilization will be 50-70%. A minimum 12-fiber cable should be placed to each RT site.

This table is based on 12-line ONUs placed in the network. Mixed combinations of 12-line and 24-line ONUs may result in fewer EDFA or 10 Base T Ports used. This table represents the maxi mum requirements necessary for various numbers of HDTs that will fit in standard cabinets or structure configurations.

It should be noted that the fully configured MESA cabinets do not have sufficient battery capacity to provide 8-hour reserve. Future power-down capability of video/data is being pursued. A field trial of a DC-Genset supporting a MESA-6 is in process and we are investigating AC generators capable of handling powering requirements for multiple cabinets, CEVs, and Huts.

ATTACHMENT

PROPRIETARY

DECLASSIFIED

CONFIDENTIAL

filecode: **205.0200**

subject: Fiber to the Cell Site Loop Strategies Update

type: Information letter

date: **November,1999**

related letters: RL: 99-09-024BT, RL: 98-12-033BT, RL: 98-11-015BT, RL: 98-09-019BTRL: 98-09-014BT, RL: 97-09-025BT, RL: 97-02-013BT, RL: 97-02-012BT

other: 915-711-008BT, 915-711-009BT

to: Attached Distribution List

entities: BellSouth Telecommunications, Inc.

from: D. A. Kettler, Executive Director/NVP - Science & Technology

description: Fiber Based DS1 Service Offering Update - MegaLink(r) Light Service

*　　　　*　　　　*

This Information Letter provides the latest planning update available regarding the delivery of MegaLink® Light Service; a new fiber based premium DS1 tariff offering. Although filed as a general tariff, the primary market for this service will be Wireless Carrier DS1s located at cell sites. This document should be considered an update to the fiber to the cell site information contained in RL: 98-09-014 BT and to the DS1 information in the Loop Technology Deployment Directives (RL: 98-09-019BT).

The guidelines for MegaLink® Light are based solely on the provision that incremental funding to provide the service will be available when fiber is not mandated as an economic choice to provision for DS1 service, and that the customer will be responsible for supplying power at the service location. In order to minimize resource requirements, specific deployment recommendations for variations of three supplier alternatives are included in this document. Specifically, this directive provides recommendations for use of the Lucent FiberReach OC-1 multiplexer, the Alcatel StarSpan 24 line ONU and an option for use of the Fujitsu FLM6 multiplexer. The target audience for this letter is Infrastructure Planners, Loop Capacity Managers, Outside Plant Engineering Managers, Project Managers, and Engineers.

Questions from your organization regarding these recommendations should be directed to Jim Jackson at (205) 977-5032 or Sherry Woodruff at (770) 493-3741.

Original signed by D. A. Kettler

Attachment

Distribution List

1.

Network Operations-North

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Interconnection

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SMU

J. G. Wilson

Financial & Human Resources

R. H. Bowman
B. K. Tolbert

Documentation (2 copies)

Attachment

Megalink Light Service

2. Introduction

The proposed MegaLink® Light Service is a premium DS1 service distinguished from other basic DS1 services by exclusive use of fiber facilities in the local loop. The primary goal of this service is to eliminate the interruption of DS1 services typically attributed to the provisioning of metallic local loop facilities. Any nodal protection or facility diversity afforded from this service is the result of a decision by BellSouth to use existing architectures for economic reasons and is not an inherent requirement of the service. MegaLink® Light service is available to all customers "where existing loop facilities are fiber based" (a multiplexer on site provides DS1s). In addition, Interconnection Services (ICS) has committed funding to provision new locations under the conditions listed in section 2.3. At the time of this publication, BellSouth Business Systems (BBS) has not elected to fund new construction for this service, however the powering requirements are such that traditional business customers are not expected to exhibit an interest in this offering. The tariff carries a 10% local channel premium, and provides for rebates on service outages directly attributable to failures in the BellSouth network.

2.1. Purpose

MegaLink® Light Service is primarily intended to serve remote wireless sites, i.e. cell sites, via the most economically efficient fiber facility architectures available. It is also intended to serve all Wireless Service Providers (WSPs) sharing a given tower. As such, the BellSouth equipment used to provision the service should be housed in a BellSouth-provided enclosure separate from the WSPs' equipment huts. *It will also be the responsibility of the customer to make -48 or +24volt power available for BellSouth use as needed.* Decisions to use BellSouth power will be at the discretion of Outside Plant Engineering as the result of other architecture considerations, and is not a requirement of the tariff. It should also be noted that because of bonding and grounding considerations, service installations provided at a cell tower are dedicated to that location *exclusively*.

2.2. Audience

The target audience for this letter is Infrastructure Planners, Loop Capacity Managers, Outside Plant Engineering Managers, Project Managers, and Engineers.

2.3. Target Area

All Wireless Service Providers (BellSouth Mobility, GTE Wireless, AT&T Wireless, PrimeCo, Powertel, Nextel, etc.) are targeted for the service offered under this plan throughout the BellSouth region.

2.4. Time Frames

The tariff for MegaLink® Light is expected to be approved in the November 1999 time frame coincident with product rollout.

2.5. Capital/Expense Dollars

Currently ICS has allocated $1.7 million dollars for 1999 and $11.3 million for 2000 to provision new service locations for MegaLink® Light. The business plan for this service is "BPMGLT" and the program code is "MGLT". No Funding has been provided by BBS at the time of this publication. Attachment 1 provides some equipment costs for the various products recommended for service provisioning.

3. Implementation Plan

3.1. Study Methodology

Competitive Access Providers are currently attracting market share from WSPs who are dissatisfied with the quality of service provided by standard MegaLink® deployments. The intent of this new offering is to provide an architectural solution for WSPs similar to the fiber solutions provided by competitors. In order to drive costs down to acceptable levels, non-standard serving arrangements were considered. Most significantly, as a requirement of this service offering, the customer is responsible for providing +24 or -48 volt power for BellSouth use.

4. Deployment Recommendations

In order to achieve the lowest provisioning costs possible, three supplier architectural solutions are suggested for MegaLink® Light Service. Depending on the imbedded equipment base of a wire center, one solution may have distinct advantages over another solution. *It should noted that with the exception of the Lucent FiberReach Multiplexers deployed with OC 3 optics (figures 1.1 and 1.2), TIRKS does not currently support the configurations listed below.* Local agreements with provisioning centers will be required until TIRKs enhancements are completed. Updates on additional approvals will be distributed, as they become available.

4.1. Supplier Alternative #1 - Lucent FiberReach OC-1

The FiberReach Multiplexer, hosted off a Lucent DDM-2000 provides one solution for reducing deployment costs for fiber installations. (Refer to RL: 97-02-012BT for product approval and 915-711-008BT for OSPE M&Ps.) Examples of some of the FiberReach configurations are detailed in figures 1.1 - 1.5. Because of customer provided power arrangements, only one, or *two consecutive*, cell site nodes are permitted on any ring configuration. (A customer node located between two cell site nodes would be isolated if power were to fail simultaneously at both cell site nodes.)

Special lower cost cabinet configurations for cell site applications have been designed for the Lucent 52F Cabinet and the Marconi T1 Backhaul Cabinet. They are equipped to accommodate the FiberReach Multiplexer and provide up to 12 DS1s in standardized RDSC codes. (Refer to RL: 98-12-033BT and RL: 98-11-015BT for information on the T1 Backhaul cabinet, and RL: 99-09-024BT for information on the 52F cabinet.) Installed cost for a cell site location provisioned for 4 DS1s should be in the $13,000 range. (See Attachment 1 for equipment cost.) It should also be noted that in order to use the TIRKS supported configuration with OC3 optics, existing DDM2000 OLIUs may need to be upgraded (from 27G-U to 22G3-U) to support the insertion of a FiberReach node.

4.2. Supplier Alternative #2 - Alcatel Starspan

The Alcatel (formerly DSC) Starspan system, which utilizes a High Density Fiber Bank (HDFB) located at a Remote Terminal (RT) to support a fiber fed ONU, is also recommended as a possible provisioning solution. (See figure 2.1.) This architecture is generally the most economic way to provide up to 6 DS1s, however, the approval for the Starspan fiber distribution platform was rescinded last year, and will be *reinstated for the MegaLink® Light application only*. A request for one time approval (5049) will be necessary for installations until documentation can be completed for a field modification kit.

Existing Alcatel Litespan HDTs with copper distribution shelves will support the installation of HDFBs in vacant structure or bay space. The HDFB connects to a Litespan Common Control Assembly like a copper channel bank assembly, using one half the vertical space. The copper and fiber assembly banks can be mixed, with the total not to exceed nine. Each HDFB provides 16 optical interfaces with the associated cards available in 2 versions. Optical cards for two fibers will support an ONU up to approximately 30KF from the HDFB (long reach), and the single fiber version will support an ONU up to approximately 12KF (short reach). (The fiber loop makeup will determine the exact length based on a guaranteed loss budget for the single fiber card of 5.4db. The 30 KF distance for the dual fiber card is due to signal degradation rather than db loss. For the single fiber card, these calculations were based on a cable loss of 0.5db/km, one splice every 1500 feet, splice loss of 0.2dB, and a connector loss of 0.5db.) Alcatel is also working to comply with BellSouth standards to support the installation of HDFBs in a HDT located at the Central Office.

There are a total of 58 data buses available in a HDFB to distribute to the associated ONUs (1 bus = channel unit slot). An ONU-24 contains 6 slots, which can provide either DS1s or DS0s, the services normally required at cell sites. Each of the slots supports 1 DS1 or 4 DS0s, and can be used in any combination. As stipulated by this service offering, the customer must provide the power source for the ONU. (Refer to RL: 97-09-025BT for information on the Starspan system.)

4.3. Supplier Alternative #3 - Fujitsu FLM-6 Multiplexer

The FLM-6 multiplexer, manufactured by Fujitsu, may also provide an architectural service alternative for fiber service to cell sites. For a typical cell site application, the FLM-6 would extend from an existing FLM150 on an OC3 Ring. The FLM6 can also be installed as a remote field terminal working from a FLM6 in the CO. (See figures 3.1 and 3.2.) Like the Lucent FiberReach, the FLM6 is a SONET based multiplexer, but it lacks the capacity (only 4 DS1's) and is used in a point to point architecture. A maximum of two FLM-6's can be mounted side by side to provide a total capacity of 8 DS1's in the Lucent 52F or the T1 RelTec Backhaul cabinets recommended for MegaLink® Light applications. Forecasts for more than 8 DS1s using the FLM6 would force additional cabinet requirements, and would compromise the economics for this alternative. As stipulated by this service offering, the customer must provide the power source. (Refer to RL 97-02-013BT for product approval, and 915-711-009BT for OSPE M&Ps.) Protect fibers are not a requirement for the FLM6 for MegaLink® Light, and a two fiber allocation per FLM6 multiplexer will help lower the cost to provision. Also note that the use of the FLM6 hosted from a FLM150 will designate the associated muldem group specifically for DS2 extensions exclusive to other applications. Refer to RL: 98-12-033BT for information on the T1 Backhaul cabinet, and RL: 99-09-024BT for information on the 52F cabinet configurations.)

5. Critical Success Factors

Funding for this plan is based on the economics for the three supplier architectures described. Failure to use cost effective deliveries for MegaLink® Light service will jeopardize the financial success of this offering. A new class of service *(MLL3N)* has been created for MegaLink® Light and should be noted on an inquiry with service codes of either DHDV or DHDM, which represent a cellular MegaLink® DS1, with either AMI or B8ZS line coding, respectively. ICS has provided a business plan (BPMGLT) that will provide incremental funding to provision new locations for fiber that pass the criteria below. Currently no funding has been allocated by BBS.

The anticipated demand for MegaLink® Light service is expected to far surpass the resources allocated for this product rollout (in terms of capital and headcount to design and build the fiber network). In order to provide the best utilization of those resources, the ICS marketing team will work with individual providers to establish a priority list for each carrier, by Metro, for cell sites that are currently fed by copper facilities. The priority lists will be for a maximum of 10 sites per Metro and will be negotiated based on strategic sites for the customer, service trouble history, total number of DS1s, and co-location impacts. Each Engineering Turf will receive a letter from ICS authorizing the 1999 sites for deployments. Future service requests (2000) for existing sites that have not been placed on a metro priority list will be subject to the screening process described below in section 2.3.1. Orders received for 1999 service *for existing sites* that do not appear on an Engineering Turf letter should be referred back to the ICS marketing team for resolution. (The engineer should indicate in remarks that the location was not on their 1999 priority list for the district.) All MegaLink® Light orders *for new locations* (i.e. cell sites where BST currently has no facilities) will be a target market for the service passing the screening for new sites detailed in section 2.3.2.

5.1. Existing ICS Locations:

The marketing strategy for the success of this service is dependent in part on the ability to market MegaLink® Light to all the tenants using shared tower arrangements. The capital ICS is willing to invest per cell site is therefore sensitive to the total number of DS1s for all carriers occupying a given tower. When a service inquiry is generated to add (or convert) DS1s under the MegaLink® Light tariff offering, it will be incumbent on the OSP engineer to determine the total number of Wireless Service Provider DS1s at the cell site serving terminal, and the cost to provision the site on fiber. The criteria for Wireless Service Provider DS1 identification will be to screen for circuit IDs containing DHDM, DHDV, DHCM or DHCV. If the provisioning cost *per Wireless Service Provider DS1* is less than $10,000, ICS will provide funding to construct the facilities needed to process the order. If the cost per DS1 is greater than $10,000, ICS will not approve the order without special construction charges passed to the originator of the service inquiry. The charges will be the total cost to provision the cell site for MegaLink® Light minus $10,000 for every DS1 *on the order* (not the total number of DS1s at the cell site). That difference should be reported on the inquiry for special construction when the service order does not qualify under the $10,000 per DS1 rule.

Examples:

1. A service inquiry is received by OPSE converting 2 DS1s at a shared tower for "Carrier A" to MegaLink® Light. A screening of the DS1s at the cell site terminal reveals 3 additional DHDM circuits for a total of 5 DS1's. The cost to provide MegaLink® Light is $40,000. ($40,000 divided by 5 DS1s = $8,000 per DS1) This meets the ICS threshold, so the inquiry would be answered with a due date to allow for the construction of the fiber and electronics, and the job would be charged to the ICS change plan.

2. Same scenario as above with a total of 5 DS1s, but the cost to provision for MegaLink® Light is $60,000, or $12,000 per DS1. This does not meet the ICS threshold; therefore special construction charges would apply if the customer wants to pursue the order. The charges should be calculated as the total cost to provision the cell site for MegaLink® Light ($60,000) minus $10,000 for every DS1 *on the order* (2). ($60,000-$20,000 = $40,000) The engineer will need to show $40,000 for special construction on the service inquiry and wait for approval before proceeding with an authorization.

In example #1, ICS is willing to risk additional capital and will try to sell MegaLink® Light to the other carriers at the site. In example #2, ICS will require the customer to provide additional capital based on his service volume alone.

Since there is a premium charge associated with this offering, it should also be noted that only circuits ordered as MegaLink® Light should be cutover to fiber installations. New DS1 circuits *not* ordered as MegaLink® Light Service should be provided on available fiber facilities only after all existing copper facilities have been utilized. (Standard MegaLink® DS1s provisioned on a fiber multiplexer at a cell site will not have the service assurance or guarantees associated with MegaLink® Light.)

5.2. New ICS Locations:

New locations are a strategic market for MegaLink® Light service because of future bandwidth requirements predicted by carriers for wireless data. Within 2 - 3 years, additional DS1 requirements are expected for this industry as the data market evolves. OSPE should use the DS1 deployment guidelines to determine the economical choice for DS1 service. When fiber is the first choice, the powering option for

MegaLink® Light orders can further reduce the cost to provision the site. If fiber is not the prescribed solution, the ICS change plan will provide additional funds for locations ordering MegaLink® Light that can be provisioned for $50,000 or less. Since new cell site locations are expected to have multiple carriers with increased demand requirements, ICS is willing to risk capital to position the network for growth. (This includes existing towers that are served by an alternate provider, and will be "win back" service for BST.) The OSP engineer will be responsible for determining the cost to provide fiber facilities in answering a service inquiry for MegaLink® Light service, and to use the $50,000 benchmark to decide if the facility will be funded by ICS. If the cost exceeds the ICS target, then special construction charges will apply for the difference between the total requirements and the $50,000 limit.

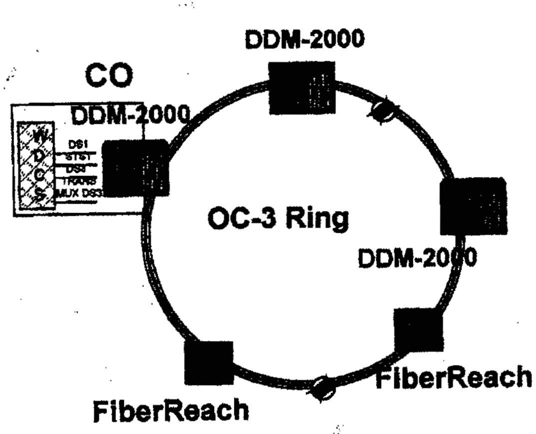
5.3. BBS Locations

Because of the customer powering requirements, BBS is not expected to exhibit an interest in this service. If a request is made for a BBS MegaLink® Light circuit at a location where a BellSouth powered multiplexer exists, the service order can be processed using the available facilities. Since BBS has provided no funding for this service, all other requests must be processed under special construction. Charges should include the total cost to provide a fiber based multiplexer, with the customer providing either the -48 or +24 volt powering. If the multiplexer to be placed is initially designed as an incrementally low cost capital alternative to support other services in addition to MegaLink® Light, BellSouth powering should be installed, but should not be included in the special construction charges for the customer.

In the event that special construction charges are negotiated and approved, a multiplexer with customer provided power should only be used for the delivery of MegaLink® Light service. *Existing* copper facilities should be the first choice for other service provisioning. Comparisons for economic relief alternatives utilizing the multiplexer for other services should include the cost of BellSouth power in order to avoid service outages due to local power failures. Charges associated with special construction for MegaLink® Light will be part of normal growth provisioning, and should not be charged to the "BPMGLT" business plan funded by ICS.

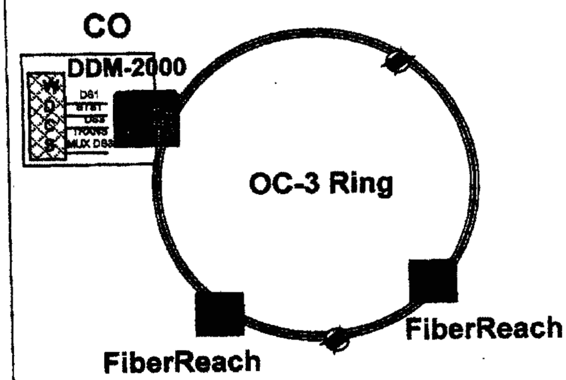
Service Architectures for the Lucent FiberReach Shelf

Service Architectures for the Lucent FiberReach Shelf



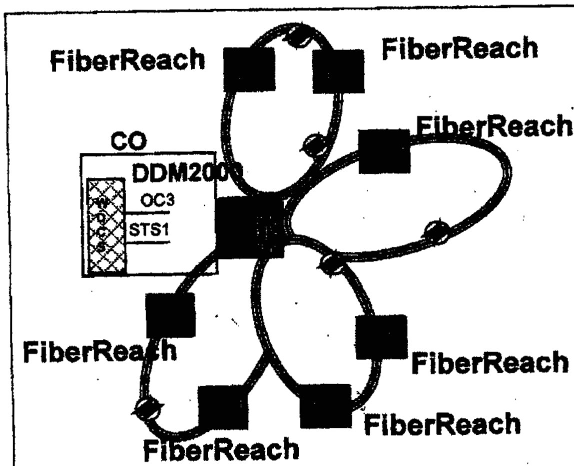
FiberReach as node on an OC3 Ring
(OC 3 optics)

Figure 1.1



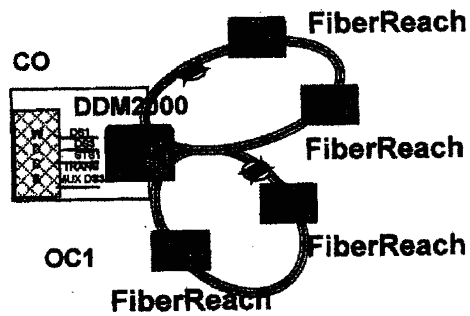
FiberReach as node on an OC3 Ring
(OC 3 optics)

Figure 1.2



Up to 6 Separate OC1 Rings using middle speed slots in DDM 2000 CO Mux (OC 1 optics)
(Caution: this alternative requires a DCS interface for an OC3 or STS1 handoff in the CO)

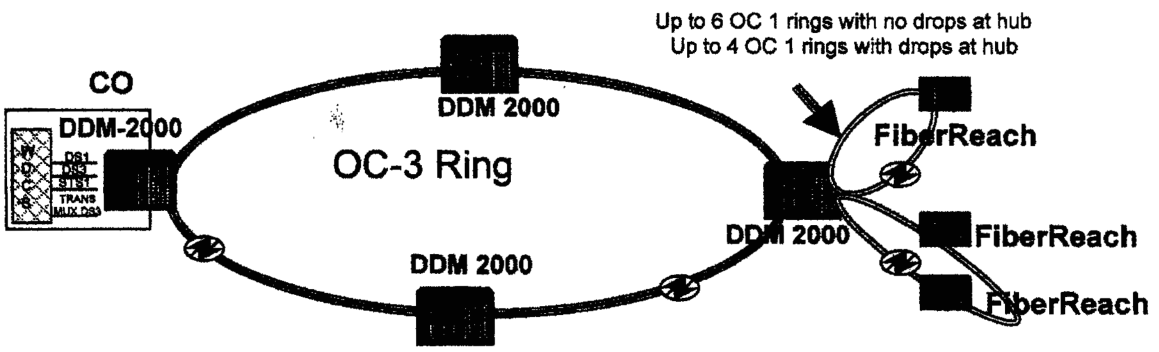
Figure 1.3



Up to 2 Separate OC1 Rings using high-speed slots in DDM 2000 CO Mux (OC 1 optics)

Figure 1.4

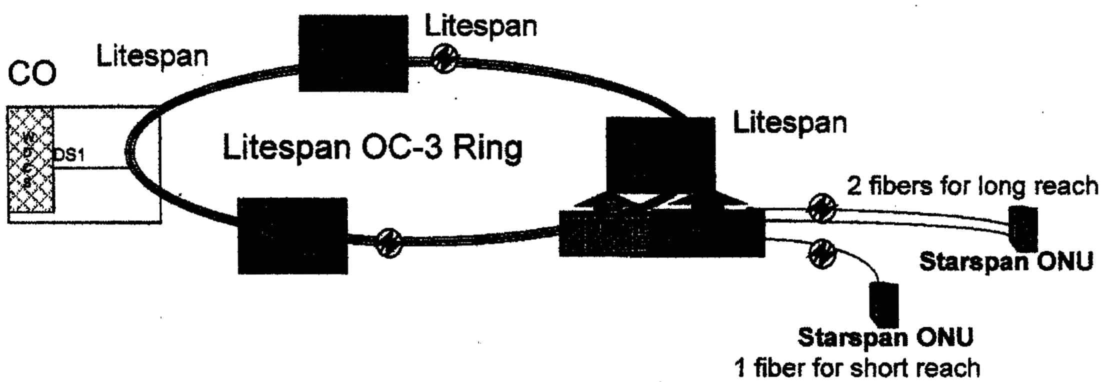
Service Architecture for the Acatel ONU 24



FiberReach extended from DDM2000 node on a ring

Figure 1.5

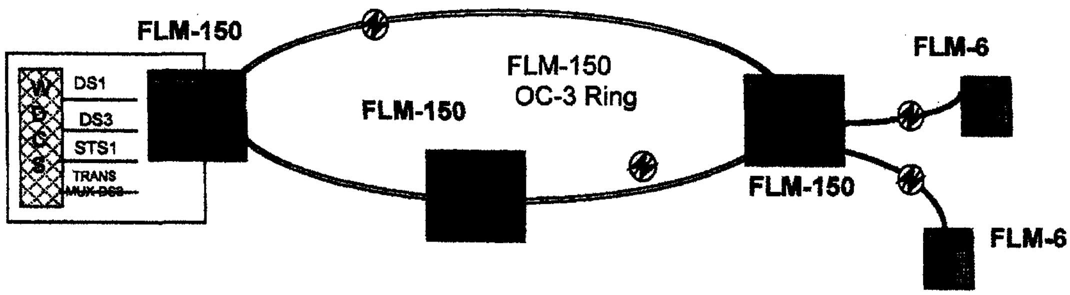
Service Architecture for the Acatel ONU 24



Alcatel Litespan Ring with Starspan hosted from a RT

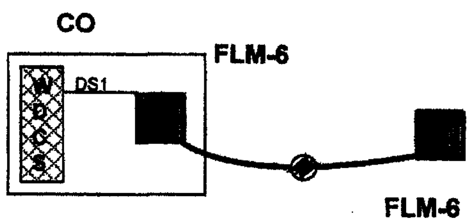
Figure 2.1

Service Architectures for the FLM6 Multiplexer



FLM6 extended from a FLM150 ring configuration

Figure 3.1



FLM 6 remote extended from a FLM 6 in the CO

Figure 3.2

Typical Installed Costs - 4 DS1s

FiberReach using 52 F cab	cell site only	Co & RT (assumes existing shelf wired in CO)
OC3 optics	$12,532	$23,601
OC1 optics	$10,704	$20,209

FLM 6 in CO to FLM 6 arrangement in T1 Backhaul cabinet	cell site only	Co & RT (assumes existing FLM6 shelf in CO)
FLM 6	$ 7,425	$10,087

Incremental Starspan costs with existing CO and RT HDT	ONU cell site only	CO, RT & ONU
Alcatel HDFB in RT using short reach OLIUs	$ 2,276	$ 6,351
Alcatel HDFB in RT using long reach OLIUs	$ 2,736	$ 7,272

Assumptions/ Notes:

1. These cost figures represent installed costs using a standard requirement of 4DS1s for various products to help provide cost comparisons.

2. FiberReach and FLM6 costs are provided assuming the associated CO shelves are existing in the CO. (MBOS cost to provision a CO bay with 6 DDM2000s is approximately $10,900; installed cost for a CO bay containing a shelf capable of supporting 4 FLM6 multiplexers is estimated at approximately $4000.)

3. Starspan ONUs solutions should only be considered for existing or planned Alcatel HDT remote terminal locations. (It would not be cost effective to establish a new field structure to deploy this architecture for MegaLink(r) Light Service alone.)