

Business Service and Repair I-600-696-8079 I-800-696-88799 I-600-454-98885

SouthWest 7ToleConnect

Prepaid Residential Servicesi Fics. Sales & Cust. serv. 1-800-550-7540) (Pare Español Llame Gratis AI) Repair Services 1-800-550-7540

Universal Telephone

Business Office Residential Services Repair Service

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1-888-522-5224 1-888-522-5224

1-800-RECONEX

Business Office New Sales Customer Service

1-800-732-6639 1-800-27**5-8**223

TALK_.com

Customer Service web address

ww.swbell.com

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1-888-988-6888 www.talk.com

...... You now have a choice of local telephone service providers. At the time this directory was published, the following companies, in addition to Southwestern Bell, offer local service in the Lake of the Ozarks Area and requested that their listings appear in the Southwestern Bell directory.

Detailed information about the availability of local service from companies other than Southwestern Bell may be obtained directly from these companies.

Residence Services Customer Service Repair Service CorporateOffices	i-800-417-5500 i-888-490-0055 i-888-742-0055	Establishing or Changing Repair Service Billing Information	-800-936-5223 -800-936-5223 -800-936-5223
intermedia COM MUNICATIONS Business Customers Repair Service	1-800-250-9999 1-800-250-9999	Pion	number serves all business needs. .800.860.8401. NEX nmunications
MaxCom		Max-Tel Communication, Inc.	
Business Office Business Services	-800-888-3157	Residential Services Business Office Customer Service Repairs	817-427-2149 1-800-583-2289 1-800-583-2289
Navigator Telecommunication	s, LLC		
Business Office		Designed Office	
Business Service	i-888-662-8835	Business Office Business Services	1-800-555-1414
Residence Service Repair Service	1-888-682-8835 1-888-562-8835	Residence Repair Services	1-800-477-1992 1-800-909-6939

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Que c. tecorporated Que c Business Office Residential Business Service and Repair	-800-696-8079 -800-696-8079 -800-454-9685	1800-RECONEX Because Everybody Needs & Phone- Business Office New Sales Customer Service	I-800-732-6639 I-800-275-8223
SouthWest TeleConnect Prepaid Residential Servicesi Res. Sales & Cust. serv. (Para Español Llame Gratis Al) Repair Services	i-800-550-7540 i-800-550-7540	TALK.com ^{**} Customer Service web address	1-888-988-6988 www.talic.com
Universal Telephone BusinessOffice Residential Service Repair Service	I-668-522-5224 I-888-522-5224	•	

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You now have a choice of local telephone service providers. At the time this directory was published, the following companies, in addition to Southwestern Bell, offer local service in the Linn Area and requested that their listings appear in the Southwestern Bell directory.

Detailed information about the availability of local service from companies other than Southwestern Bell may be obtained directly from these **companies**.

Residence Services Customer Service Repair Service Corporate Offices	1-800-417-5500 1-888-490-0055 1-888-742-0055	COMM SOUTH Establishing or Changing Repair Service Billing Information	I-800-936-5223 1-800-936-5223 1-800-936-5223
Eusiness Customers Repair Service	1-800-250-9999 1-800-250-9999	Pio	ne number serves all pur business needs. 1.800.860.8401. DREX ommunications
MaxCon	a	Max-Tel Communication, Inc	
Business Office Business Services	1-800-868-31 57	ResidentialServices Business Service Customer Service Repairs	81 7-427-2149 1-800-583-2289 1-800-583-2289
		nepairs	1 000 000 2200
Navigator Telecomm	unications, LLC		

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I-800-732-6639

I-800-275-8223

I-888-988-6988

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You now have a choice of local telephone service providers. At the time this directory was published, the following companies, in addition to Southwestern Bell, offer local service in the Marshall/ **CarrolitorI/Slater** Area and requested that their listings appear in the Southwestern Bell directory.

Detailed information about the availability of local service from companies other than Southwestern Bell may be obtained directly from these **companies**.

Residence Services Customer Service Repair Service Corporate Offices	1-800-417-5500 1-888-490-0055 1-888-742-0055	COMM SOUTH Establishing or Changing Repair Service Billing Information	I-800-936-5223 I-800-936-5223 I-800-936-5223
interme COMMUNIC Business Customers Repair Service	1-800-250-9999 1-800-250-9999	Pio	ne number serves all our business needs. 1.800.860.8401. DIEEX communications
MaxCon Business Office Business Services	I-800-888-3157	Max-Tel Communication, Inc Residential Services Business Service Customer Service Repairs	817-427-2149 i-800-583-2289 i-800-583-2289
Navigator Telecomm Business Office Business Service Residence Service Repair Service	unications, LLC I-888-662-8835 I-888-662-8835 I-888-562-8835	Business Office Business Service Residence Service Repair Service	I-800-555-1414 I-800-477-1992 I-800-909-6939

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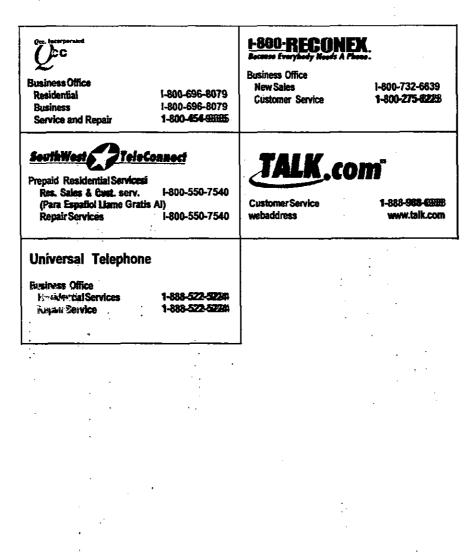
You now have a choice of local telephone service providers. At the time this directory was published, the following companies, in addition to Southwestern Bell, offer local service in the Mexico/Montgomery City Area and requested that their listings appear in the Southwestern Bell directory.

Detailed information about the availability of local service from companies other than Southwestern Bell may be obtained directly from these companies.

Residence Services Customer Service Repair Service Corporate Offices	1-800-417-5500 1-888-490-0055 1-888-742-0055	Establishing or Changing Repair Service Billing Information	1-800-936-5223 1-800-936-5223 1-800-936-5223
intermed COMMUNICAT Business Customers Repair Service	1-800-250-9999 1-800-250-9999	Pio	e number serves all ir business needs. 1.800.860.8401. MEX ommunications
MaxCom		Max-Tel Communication, Inc.	
MaxCom Business Office Business Services	1-800-888- 3157		817-427-2149 1-800-583-2289 1-800-583-2289
Business Office	1-800-888-3157	Communication, Inc. Residential Services Business Service Customer Service	817-427-2149 1-800-583-2289

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You now have a choice of local telephone service providers. At the time this directory was published, the following companies, in addition to Southwestern Bell, offer local service in the Missouri Parkland Area and requested that their listings appear in the Southwestern Bell directory.

Detailed information **about** the availability of local service from companies other than Southwestern Bell may be obtained directly from these **companies**.

Residence Service Repair Service Corporate Offices	1-800-417-5500 1-888-490-0055 1-888-742-0055	Establishing or Changing Repair Service Billing Information	1-800-936-5223 1-800-936-5223 1-800-936-5223
interme communic Besiness Customers Repair Service	L-800-250-9999 1-800-250-9999	P_{i0}	ne number serves all our business needs. 1.800.860.8401. DREX communications
MaxCon	h	Max-Tel Communication, Inc	
Business Office Business Services	1-800- 888 -8857	Residential Services Business Service Customer Service Repairs	817-427-2149 1-800-583-2289 1-800-583-2289
Navigator Telecomm	unications, LLC		<u> </u>
Business Office Business Service Residence Service Repair Service	i-888-662-6835 i-888-662-8635 i-888-562-8635	Business Office Business Service Residence Service Repair Service	1-800-555-1414 i-800-477-1992 I-800-909-6939

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You now have a choice of local telephone service providers. At the time this directory was published, the following companies, in addition to Southwestern Bell, offer local service in the Moberly Area and requested that their listings appear in the Southwestern Bell directory.

Detailed information about the availability of local service from companies other than Southwestern Bell may be obtained directly from these companies.



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You now have a choice of local telephone service providers. At the time this directory was published, the following companies, in addition to Southwestern Bell, offer local service in the Nevada Area and requested that their listings appear in the Southwestern Bell directory.

Detailed information **about** the availability of local service from companies other than Southwestern Bell may be obtained directly from these companies.

Residence Services Customer Service Repair Service Corporate Offices	I-800-417-5500 I-888-490-0055 1-888-742-0055	Establishing or Changing Repair Service Billing Information	1-800-936-5223 1-800-936-5223 1-800-936-5223
intermedi COMMUNICATH Business Customers Repair Service	1-800-250-9999 1-800-250-9999	Pio	e number serves all or business needs. 3.800.860.8401. NEX mmunications
MaxCom		Max-Tel Communication, Inc.	
Business Office Business Services	⊢800-888 -3157	Residential Services Business Service Customer Service Repairs	817-427-2149 1-800-583-2289 1-800-583-2289
McLeodL	ISA.	Navigator Telecommuni	cations, LLC
Business Office Business Services Residence Services Internet Services	1-800-743-0321 1-800-743-0321 1-800-743-0321	Business Office Business Service Residence Service Repair Service	I-888-662-8835 I-888-662-8835 I-888-562-8835

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Business Office Business Service I-800-555-1414 Residence Service I-800-477-1992 Repair Service I-800-909-6939	Business Office Residential Business Bu
LEOP-RECONEX Excess Environments A reason Business Office New Sales 1-800-732-66229 Customer Service 1-800-275-8223	SouthWest TeleConnect Prepaid Residential Servicesi I-800-550-7540 Ras. Sales & Cust. serv. I-800-550-7540 (Para Español Llame Gratis Al) I-800-550-7540
Customer Service web address	Universal Telephone Business Office Residential Services I-888-522-5224 Repair Service I-888-522-5224

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You now have a choice of local telephone service providers. At the time this directory was published, the following companies, in addition to Southwestern Bell, offer local service in the **Perryville**/ Ste. Genevieve Region and requested that their listings appear in the Southwestern Bell directory.

Detailed information about the availability of local service from companies other than Southwestern Bell may be obtained directly from these companies.

Residence Services Customer Service Repair Service Corporate Offices	-800-417-5500 -888-490-0055 -888-742-0055	CONM SOUTH Establishing or Changing Repair Service Billing Information	i-800-936-5223 i-800-936-5223 i-800-936-5223
Business Customers Repair Service	1-800-250-9999 1-800-250-9999	\mathbf{P}_{i0}	ne number serves all our business needs. 1.800.860.8401. DIEEX communications
MaxCon Business Office Business Services	i-800-888-3157	Max-Tel Communication, Ind Residential Services Business Service Customer Service Repairs	G. 817-427-2149 1-800-583-2289 1-800-583-2289
Navigator Telecommu Business Office Business Service ResidenceService Repair Service	Inications, LLC 1-888-662-8835 1-888-662-8835 1-888-562-8835	Business Service Residence Service Repair Service	I-800-555-1414 I-800-477-1992 I-800-909-6939

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You now have a choice of local telephone service providers. At the time this directory was published, the following companies, in addition to Southwestern Bell, offer local service in the Poplar Bluff Area and requested that their listings appear in the Southwestern Bell directory.

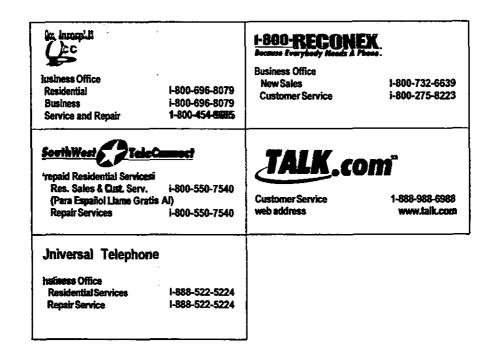
Detailed information about the availability of local service from companies other than Southwestern Bell may be obtained directly from these **comnanies**.

Residence Services Customer Service Repair Service Corporate Offices	I-800-417-5500 I-888-490-0055 1-888-742-0055	CoMM SOUTH Establishing or Changing Repair Service Billing Information	i-800-936-5223 i-800-936-5223 1-800-936-5223
Eusinens Oustonners Repair Schulde	1-800-250-9999 1-800-250-9999	\mathbf{P}_{ic}	the number serves all our business needs. 1.800.860.8401 DICCOMMUNICATIONS
MaxCon	a	Max-Tei Communication), In	c.
Business Office Business Services	1-800-888-3157	Residential Services Business Service Customer Service Repairs	817-427-2149 1-800-583-2289 1-800-583-2289
Navigator Telecomm	unications, LLC		· · ·
Business Office Business Service Residence Service Repair Service	1-888-662-8835 1-888-662-8835 1-888-562-8835	Business Office Business Service Repair Service Repair Service	I-800-555-1414 I-800-477-1992 1-800-909-6939

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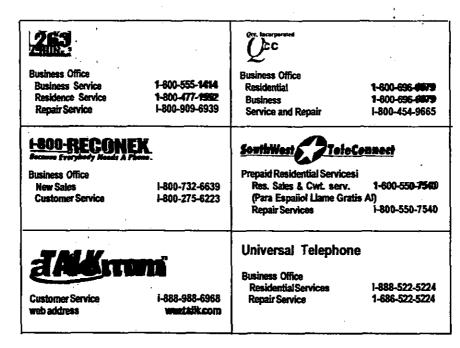
You now have a choice of local telephone service providers. At the time this directory was published, the following companies, in addition to Southwestern Bell, offer local service in the Sedalia Area and requested that their listings appear in the Southwestern Bell directory.

Detailed information about the availability of local service from companies other than Southwestern Bell may be obtained directly from these companies.



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Detailed information about the availability of local service from companies other than Southwestern Bell may be obtained directly from these companies.



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Detailed information about the availability of local service from companies other than Southwestern Bell may be obtained directly from these companies.

Business Mice Business Service Residence Service Repair Service	I-314- 9 61-7070 I-808-772-4724 I-877-777-6917	Residence Services Customer Service Repair Service Corporate Offices	1-800-417-5500 1-888-490-0055 i-888-742-0055
Contraction South Establishing or Changing Repair Service Billing Information	1-800-936-5223 1-800-936-5223 1-800-936-5223	Frontier communications- Business Office Customer Service	314 514-7 383 1-800-414-1973
New Business Service Existing Business Customers, billing &general information	I-877-422-2622 I-800-400-5230	Eusiness Customers Repair Service	1-800-250-9999 1-800-250-9999
Pior	umber serves all usiness needs. 20.860.8401. VEXX munications	MaxCom Business Office Business Services	1-800-888-3157

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Max-Tel Communication, Inc.		Mcleadusa	
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Residential Services		Business Office	
Business ellice	817-427-21489	Business Services	1-800-444-1433
Customer Service	1-800-583-2289	Business Customer Service	1-800-566-111/7/7
Repairs	I-800-583-2289	Internet Services	1-800-444-1433
mpower		Navigator Telecommunication	s,LLC
Rusiness Office		Business Office	
Business Customer	877-395-5533	Business Service	1-888-662-8835
Residential Customer	877-395-5533	Residence Service	I-888-662-8835
Repair	817-395-5533	Repair Service	1-888-562-8835
NERATCINU.			
Business Services	877 - BEXT- TEX	Business Office	
	(877-639-8839)	Business Senrices	1-600-555-1414
Customer Care	877-444.HEEKT	Residence	i-800-477-1992
	(877-444-6398)	Repair Services	1-800-909-6939
Trouble Desk	I-888-655-6398		
ĝes, haceponint			
		Constant Source and Marines & Planes.	
Business Office		Business Office	
Residential	1-800-696-8079	New Sales	I-800-732-6639
Business	1-800-696-8079	Customer Service	I-800-275-8223
Service and Repair	1-800-454-9685		

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You now have a choice of local telephone service providers. At the time this directory was published, the following companies, in addition to Southwestern Bell, offer local service in the **Springfield/Bransson** Area and requested that their listings appear in the Southwestern Bell directory.

Detailed information about the availability of local service from companies other than Southwestern Bell may be obtained directly from these companies.

ALLTEL Communications Business Communications 1-888-792-22/786 or 1-417-888-5300	Residence Services Customer Service Repair Service Corporate Offices	-800-417-5500 1-888-490-6155 1-888- 742-6155
COMM	Dial US	
South		
Establishing or Changing I-800-936-5223		
Repair Service I-800-936-5223 BillingInformation I-800-936-5223	For Emergencies, Repair, Billing or Customer Service call	1-417-681-3625 or 1-800-743-4433
Image: Service I-877-422-2622 Existing Business Customers, billing&general information I-800-400-5230	Business Customers Repair Service	1-800-250-9999 1-800-250-8999
Gae flumher serves \$1, your business needs. 8.800.860.8401.	MaxCom	
ionex telecommunications	Business Office Business Services	i-800-888-3157

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Max-Tel			
Communication, Inc.		McLeadust	
Residential Services		BusinessOffice	
BusinessOffice	817-427-2149	Business Services Residence Services	J-800-743-0321 i-800-743-0321
CustomerStruice	-800-583-2289	Internet Services	H800-743-0321
Repairs	I-800-583-2289		
Navigator Telecommunication	s, 11.C		IY Ü
Buniness Office		Where REAL People Stay in Tou	
BasinessService	I-888-662-8835	BesinessOffice	
Residence Service	1-888-662-9695	Business	I-417-881-6288
Repair Service	1-888-562-8835	Residence	1-417-881-6288
<u> </u>		Repair	I-417-881-6288
Busitrang Office			
Businum Services	I-800-555-1414	Business Office Residential	
Residence	I-800-477-1992	Busicess	I-800-696-8079 I-800-696-8079
Repair Services	i-800-909-6939	Serviceand Repair	1-800-454-9565
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Business Office New Sales	1 050 700 0000	Prepaid Residential Servicesi Res. Sales & Cust. Serv.	
new selet Customer Service	i-800-732-6639 I-800-275-8223	(Para Espainti Liamé Gratis Al)	1-800-550-7540
vugunitei Vei Fiye	1900- <i>21</i> 3-0223	Repair Services	1-800-550-756
			4.448.944.3444



Customer Service web address

1-888-988-6988
www.talk.com

www.swbell.com

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Universal Telephone

Business Office Residential Service Repair Service

i-888-522-5224 I-888-522-5224

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You now have a choice of local telephone service providers. At the time this directory was published, the following companies, in addition to Southwestern Bell, offer local service in the Stanberry Area and requested that their listings appear in the Southwestern Bell directory.

Detailed information about the availability of local service from companies other than Southwestern Bell may be obtained directly from these companies.

Residence Services Customer Service Repair Service Corporate Offices 1-888-742-0055	Comm South Establishing or Changing Repair Service I-800-936-5223 Billing Information I-800-936-5223
intermedia COMMUNICATIONS Business Customers Repair Service I-800-250-9999 I-800-250-9999	County Connected
MaxCom	Max-Tel Communication, Inc.
Business Office Business Services 1-800-888-3157	Residential ServicesBusiness Service817-427-2149Customer ServiceI-800-583-2289RepairsI-800-583-2289
Navigator Telecommunications, LLC	
Business Office Business Service 1-888-662-8835 Residence Service 1-888-662-8835	Business Office Business Service I-800-555-1414 Residence Service I-800-477-1992

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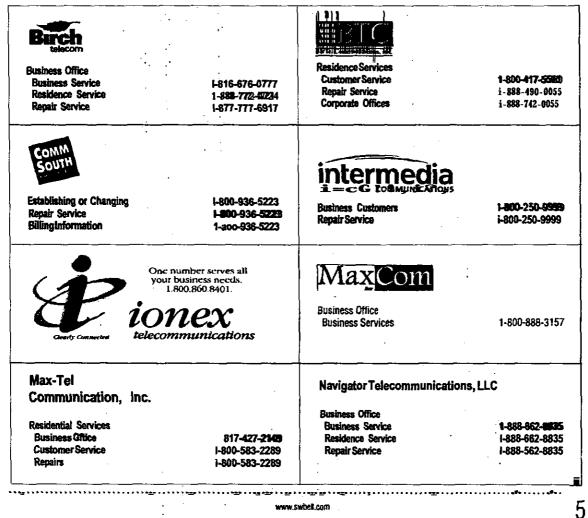
Business Office Residential Business Service and Repair	I-800-696-8079 I-800-696-8079 I-800-454-9685	Business Office New Sales Customer Service	i-800-732-6639 i-800-275-8223
South West A	csi . I-800-550-7540	TALK. Customer Service web address)-888-988-6988 www.taik.cam
Universal Telepho Business Office Residential Services Repair Service	ne 1-888-522-5224 1-888-522-5224		_

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You now have a choice of local telephone service providers. At the time this directory was published, the following companies, in addition to Southwestern Bell, offer local service in the St. Joseph Area and requested that their listings appear in the Southwestern Bell directory.

Detailed information about the availability of local service from companies other than Southwestern Bell may be obtained directly from these companies.



Business Office Business Services Residence Repair Services	1- 800-555-14 1/4 i-800-477-1992 I-800-909-6939	Business Office Residential Business Service and Repair	-800-696-8079 -409-695-4079 -800-454-9685
LBDD-RECONEX Secure Everyboody Monde & Thurse Business Office New Sales Customer Service	I-800-732-6639 I-600-275-8223	SouthWest FeleConsect Prepaid Residential Servicesi Res. Sales & Cwt. Serv. (Para Espailol Lame Gratis Al) Repair Services	1-800-550-7540 1-800-550-7540
TALK.com [®] Customer Service web address	I-888-988-6988 www.talk.com	Universal Telephone Business Mice Residential Service Repair Service	1-888-522-5224 1-888-522-5224

You now have a choice of local telephone service providers. At the time this directory was published, the following companies, in addition to Southwestern Bell, offer local service in the **TMI-State** Area and requested that their listings appear in the Southwestern Bell directory.

Detailed information about the availability of local service from companies other than Southwestern Bell may be obtained directly from these companies.



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Navigator Telecommunications, LLC			
Business Office Business Service Residence Service Repair Service	-888-662-8835 -868-662-8835 -888-562-8835	Business Office Business Services Residence Repair Services	1-800-555-1414 1-800-477-1992 1-800-909-6939
Se Emple		1-800 RECONEX	
Business Office		Business Office	
Residential	-800-696-8079	New Sales	1-800-732-6639
Business Service and Repair	1-800-696-8079 1-800-454-9685	Customer Service	i-800-27 5-822 3
SepthWest YeleCognect Prepaid Residential Services		TALK.com	
Residential Sales and			
Customer Service (PmaEspalini Liame Gratis Al)	I-800-550-7 54 0	Customer Service web address	i-888-988-6988 www.tatk.com
Repair Service	i-800-550-7540	₿	<u></u>
Universal Telephone			
Business Office Residential Service	1-888-522-5224		
Repair Service	-888-522-5224		

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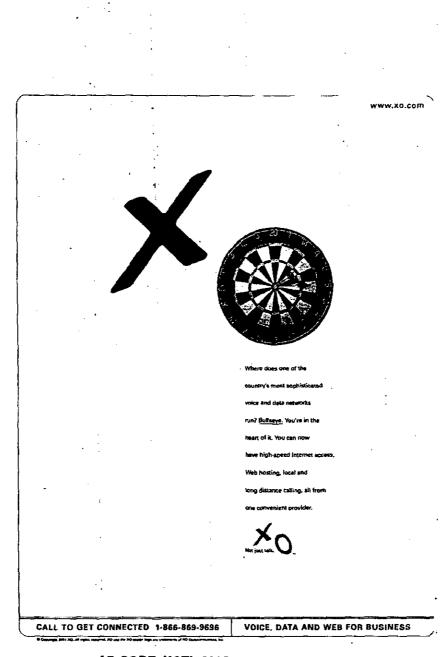
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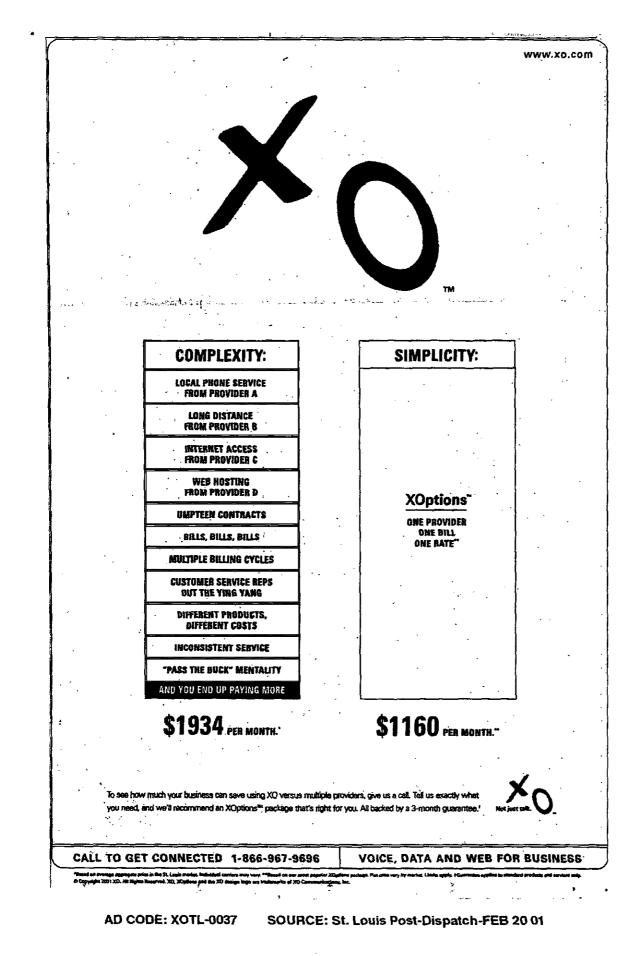
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Schedule 4



AD CODE: XOTL-0028 SOURCE: Crain's New York Business-FEB 12 01

Schedule 4





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It's time

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AD CODE: BIRCTL-0046



AD CODE: BIRCTL-0056

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There's something Birch Telecom wants to tell you: Southwestern Bell is not what you want. Not for service, savings or your business. What you do want, however, is the face-to-face service you get with



Birch. Local, long distance, Internet, even DSL. One easy bill, way less money. And if you need phone systems, we have those too. C'mon St. Louis, 100% of our customers fired Southwestern Bell. Tell the world you're ready to join 'em. **Call 314-961-7070 or check out hirch.com.**

AD CODE: BIRCTL-0062 SOURCE: St. Louis Business Journal-MAY 15 00

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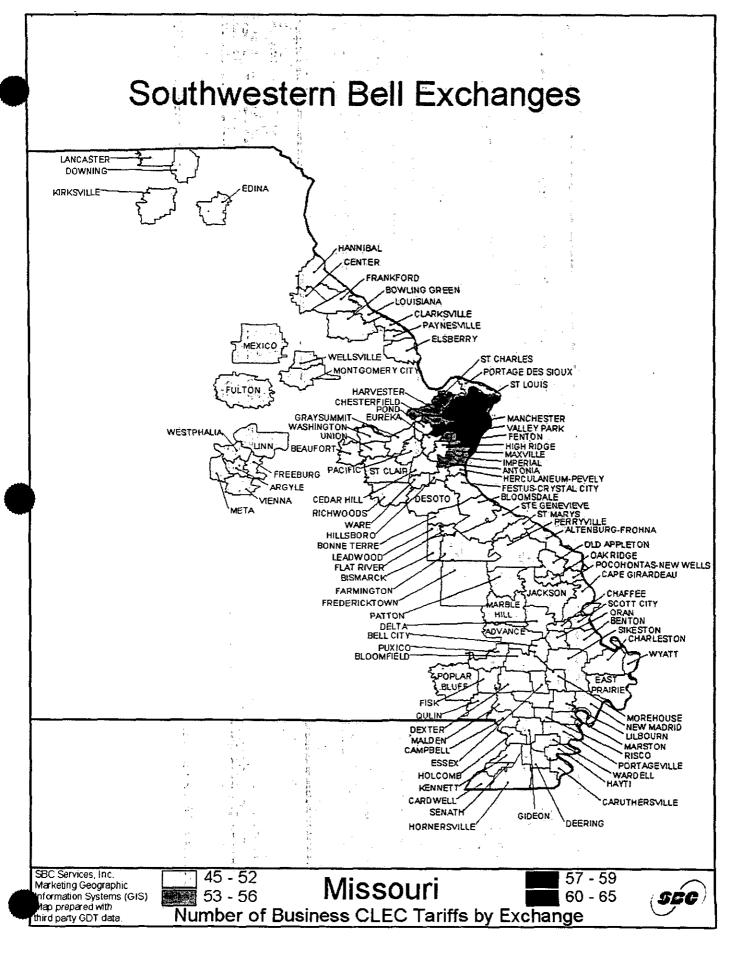


VOICE - DATA - INTERNET - DIRECTORY WWW.MCLEODUSA.COM 314-993-8999 800-444-1433

AD CODE: MCLDTL-0058

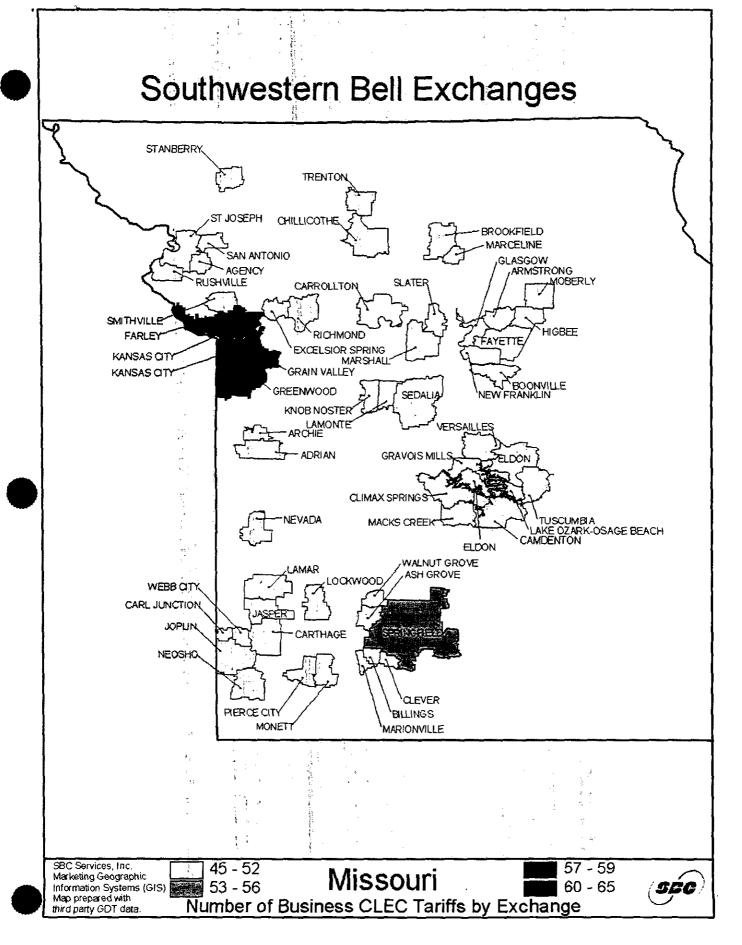
FERNANDEZ

Schedule 5



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Schedule 5



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FERNANDEZ

Schedule 6

Monthly Rate Comparison

		SWBT		McLeod	Birch
Exchange Access Lines -					
Flat Rate 1-Pty					
Rate Group A	\$	16.69	\$	16.00	\$ 16.85
Rate Group B	\$	22.89	\$	21.94	\$ 23.10
Rate Group C-Principal	\$	25.46	\$	24.42	\$ 23.13
Rate Group C - MCA 1	· \$	27.74	\$	28.00	\$ 25.20
Rate Group D - Principal	\$	33.24	\$	31.87	\$ 30.20
Rate Group D - MCA 1	\$	34.69	\$	35.00	\$ 31.50
Rate Group D - MCA 2	\$	36.61	\$	36.95	\$ 33.26
Flat Rate Trunk					
Rate Group A	\$	23.70	\$	20.85	\$ 21.95
Rate Group B	\$	32.45	\$	28.55	\$ 30.05
Rate Group C-Principal	\$	35.80	\$	31.49	\$ 29.84
Rate Group C - MCA 1	\$	39.35	\$	36.45	\$ 32.81
Rate Group D - Principal	\$	43.60	\$	41.42	\$ 39.24
Rate Group D - MCA 1	\$	45.50	\$	45.50	\$ 40.95
Rate Group D - MCA 2	\$	48.00	\$	48.00	\$ 43.20
Caller ID(Name or Number)	\$	8.75	\$	8.08	\$ 8.50
Call Forwarding	\$	6.00	\$	5.70	\$ 6.00
Three Way Calling	\$	4.30	\$	3.80	\$ 4.00
Priority Call	\$	3.70	\$	3.80	\$ 4.00
Auto Rediał	\$	4.30	\$3.8	0 + \$.50 per call	\$ 4.00

FERNANDEZ Schedule 7

Schedule 7

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EVERYDAY, CISCO EXPERIENCES THE ADVANTAGES OF THE NETWORK. IT HELPS WHEN HIRING AND EMPLOYING THE CISCO WORKFORCE, BRINGING A GEOGRAPHICALLY DIVERSE COMPANY TOGETHER. CISCO ALSO EXPERIENCES THE CHALLENGES THAT THE NETWORK CREATES. EACH ONE OF THOSE EMPLOYEES NEEDS TO BE CONNECTED IN A WAY THAT LETS HIM OR HER DO THE BEST JOB POSSIBLE. MOST ENTERPRISES EXPERIENCE THESE SAME CHALLENGES—A FAST-GROWING, DISTRIBUTED WORKFORCE WITH REMOTE USERS, OFFICES, AND SITES ALL OVER THE COUNTRY.

Enterprises want to enjoy the productivity improvements of today's applications. Human resource systems, manufacturing systems, videoconferencing, distance learning, and training applications scale across the enterprise, bringing high-quality applications and experiences to users at corporate headquarters and at remote offices worldwide.

When these applications are delivered beyond the corporate site, users often face low bandwidth rates that limit application performance. This issue becomes greater with the growing number of telecommuters. According to the Gartner Group, telecommuting is expected to reach 60 million users in the U.S. by 2002.

Historically, telecommuters have enjoyed two options for remote access: analog dial modems and ISDN. Analog dial modems enable location independence for road warriors and mobile users to connect to the corporate intranet over telephone lines. Bandwidth rates are limited to 56 Kbps. Alternatively, ISDN has offered telecommuters at fixed locations bandwidth rates up to 128Kbps. ISDN rates scale for Web

browsing and e-mail. However, when telecommuters require access to more intensive applications, ISDN becomes a barrier to productivity and a source of growing cost. Digital subscriber line (DSL) offers an alternative for fixed-location telecommuters. DSL enables high-speed, lower-cost, corporate network access. In fact, Cisco is currently migrating its telecommuters to DSL to reap the benefits of increased productivity, better application access, predictable billing, and the elimination of many long-distance charges.

DSL, an Introduction

Digital subscriber line (DSL) is the access technology of choice for remote offices or teleworkers who need higher-speed access than analog modems or ISDN. DSL is ideal when remote users

> need access to multimedia-based and data-intensive applications including video, voice, animation, and engineering computing.

> DSL technologies enable high-speed transmission from service provider to customer site over most twisted-pair copper wiring; most readily, telephone lines. Contrary to what its name implies, the term DSL refers to modem technology, not to the line itself. A pair of xDSL modems on a standard copper line constitutes a DSL

connection. While many standards have been defined, most xDSL technologies fall into one of four categories: asymmetric DSL (ADSL), single-line DSL (SDSL), high data rate DSL (HDSL), and very high data rate DSL (VDSL).

5069/RG 4/30/99

CISCO SYSTEMS

Schedule 7

"WHEN CISCO NEEDED A COST-EFFECTIVE, HIGH-SPEED SOLUTION FOR OUR THOUSANDS OF TELEWORKERS, WE CHOSE DSL FOR THE PRODUCTIVITY ENHANCEMENT AS WELL AS THE TREMENDOUS SAVINGS OVER ISDN."

—Pete Solvik CIO Cisco Systems

Asymmetric DSL

2

ADSL offers available bandwidth that is unevenly divided with more bandwidth allocated to downstream traffic. Rates range from T1 to 9 Mbps downstream, with 16 Kbps to 640 Kbps upstream. ADSL uses either carrierless amplitude/phase (CAP) modulation or the newer discrete multitone (DMT) technique. ADSL is proving useful in small or home office WAN applications such as interactive video, client/server applications, and telecommuting, where most data flows one way.

Single-Line DSL

A single-line version of HDSL, SDSL transmits T1 or E1 signals over one twisted pair. It can support standard telephone line transmission and T1/E1 simultaneously over the same line. SDSL technology is well suited for a small office equipped with a single telephone line.

High Data-Rate DSL

Several implementations of HDSL are in use today. HDSL typically supports 768-kbps full duplex over a single twisted pair, T1-speed over two pairs, and E2 over three pairs. HDSL can be deployed primarily as a low-cost substitute for full T1 lines in symmetrical, business-oriented WAN applications.

Very-High-Rate DSL (VDSL)

VDSL offers much higher speeds at shorter ranges, up to 52Mbps downstream. VDSL is undergoing tests using several modulation techniques, and probably will be most useful in large-bandwidth applications such as medical imaging, real-time video, or HDTV.

The Choice for Telecommuters

In selecting a telecommuting solution, network managers must evaluate user applications and the ongoing costs of the service and support. The following chart (Table 1) makes recommendations based on user applications. As network managers broaden access to bandwidth-intensive applications and as telecommuting becomes a common workforce model, DSL offers bandwidth rates to realize the productivity enhancements of these new applications.

Table 1 Telecommuter Technologies

Applications	Dial	ISDN	DSL
Mobile use	Χ		
E-mail	X	x	X
Web browsing	X	X	Х
Voice		X	X
Video			Х
Client/server applications			X
Engineering computing			X
Multimedia applications			X

With speeds up to 7 Mbps and "always-on" connections, enterprises deploying DSL can enjoy important new applications, such as manufacturing and human resource systems, collaborative computing, and multimedia streaming, no matter where they are located, with a user experience similar to corporate sites. The performance of DSL will support increasingly robust applications of the new millennium (Figure 1).

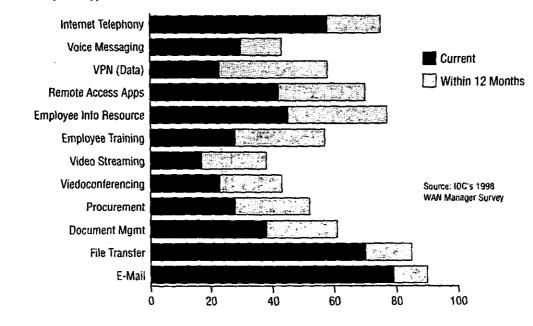


Figure 1 Planned Corporate Applications

Analysts recognize that bandwidth requirements are increasing exponentially. According to the Gartner Group, large offices that use T1 and T3 lines today will require

ultiple T1s to OC-3 lines to support their business by 2003. Branch offices and telecommuters will follow suit, requiring FT1 (fractional T1) upstream and (multiple) nxT1 downstream—as applications and remote capabilities grow.

But even today, the need for speed far outstrips conventional methods for data transmission. Table 2 shows user bandwidth minimums and maximums to enable productivity—not in the future—but today.

Table 2 The Need for Speed

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Peak		Minimum	
Desktop Video or Audio	80 Kbps		
Replicated Data	64 Kbps		
Two Voice Calls	64 Kbps	64 Kbps	
Client/Server Apps	256 Kbps	• 128 Kbps	
Web Resources	64 Kbps	64 Kbps	
Total Allocation	528 Kbps	528 Kbps	

Source: Gardner Group, November 1998

DSL: Economic Advantages

While moving to DSL has marked productivity

provements for robust applications, the decision to ingrate is also compelling based on ISDN pricing and support costs. ISDN is regulated at the state level, and subsequently tariffs differ from state to state, even when ISDN services come from the same provider.

Table 3 ISDN Tariff Variability

\$127.23

Pennsylvania

Multi-State LEC as an Example State Monthly Charge per Line Monthly Allowance Minutes Over (per min.) Florida \$121.66 400 hours \$0.05 \$67.33 Texas Unlimited n/a \$49.22 California None \$0.01 Missouri \$131.76 100 hours \$0.05 Washington \$96.05 Unlimited n/a Oregon \$107.25 Unlimited n/a Virginia \$65.87 None up to \$0.047

Table 3 is an example of one multistate ISDN provider's variable business terms. In each state, rates, base hours, and pr-limit charges bear no relationship to the same company's is in other states. In some areas, distance and time of day

400 hours

\$0.05

create another variable. With a wide variety of ISDN providers in each state, and differing providers from state to state with differing rates, packages, and exceptions, ISDN costs are difficult to estimate. Another variable in calculating ISDN costs is the telephone charges themselves. ISDN is transmitted over B-channels, which are treated as regular phone lines, subject to peak and nonpeak usage charges, mileage charges for local long distance, and long distance charges. If the ISDN pricing package includes free hours, B-channel-per-minute charges apply for any excess time.

The Surprising Economics of DSL

Independent third-party research indicates that DSL is the price performance winner based on the cost of bandwidth per minute (Table 4).

Table 4 Economic Comparisons

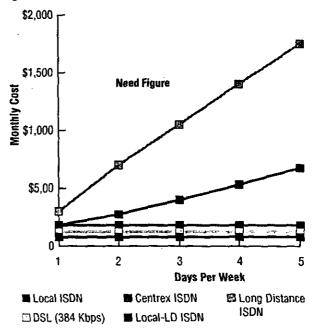
Service	Bandwidth	Cost per Monti
DSL	128 Kbps7 Mbps	\$60-\$800
ISDN	64 Kbps-128 Kbps	\$70-\$350
T1	1.5 Mbps	\$300-\$600
Frame Relay	64 Kbps-1.5 Mbps	\$500-\$600

Source: The Yankee Group, 1998

Telecommuter Economics

Comparing the economics of a telecommuter solution is compelling. Figure 2 shows comparative pricing between a variety of ISDN services—all delivering 128 Kbps—and DSL—delivering a consistent 384 Kbps of bandwidth to telecommuters.

Figure 2 Telecommuter Economics



Page 3 of 6

While ISDN prices have fallen, many ISDN users are subject to per-minute charges stemming from long distance and mileage charges. This drastically raises the average per-user cost of ISDN, especially as telecommuting increases.

The lowest-cost offering, local ISDN with a guaranteed flat rate and no long-distance charges, is indeed, the least expensive. At around 60 percent of the cost of the DSL service in the example, it delivers only a third of the DSL service's 384 Kbps performance, and is only available to users in the local calling area surrounding the headquarters site.

Local long distance ISDN assumes a local call where mileage charges apply (city-to-city or rural-to-metro call, \$.03/minute), with costs rising above the standard DSL rate for each projected day of use.

Long distance ISDN assumes a negotiated long distance rate of \$.18 per minute for long distance or 800 number usage—sometimes this number can go as high as \$.25 per minute. Long distance ISDN can become astronomical, while still providing only 128 Kbps to the telecommuters who need to directly access their corporate networks. These are the users who drive the variability of monthly ISDN telecom costs. Centrex ISDN is available in metropolitan areas at a flat rate, as a substitute for local long distance services to control high-usage costs. In this model, we're assuming a conservative \$200 per month, but this service is often as high as \$400 per month.

Backhaul Trunking Economics

Figure 3 shows another interesting economic case. Telecommuter ISDN lines (two B- channels, basic rate ISDN) come into an enterprise network through primary rate interface (PRI) lines. PRI lines are based on T1 lines. Assuming a three-to-one oversubscription, each PRI can handle 33 basic-rate (128 kbps) users. On a monthly basis, each PRI line costs an average of \$1300. With 3000 BRI users and 90 PRI lines, the costs can rise to roughly \$117,000 a month. When an enterprise uses DSL as its access technology, PRIs and T1s are replaced by ATM DS-3 lines. Each ATM DS-3 line can handle 350 telecommuters. At a cost of \$4000 a month, the backhaul trunking cost of DSL tops out at around \$12,000 a month, little more than a one tenth of the cost of backhaul trunking ISDN into the same enterprise.

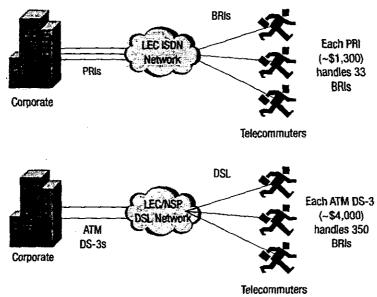


Figure 3 DSL Savings for Backhaut Trunking

The DSL Business Case

The following analysis (Table 5) establishes a strong business case for DSL on bandwidth savings alone for both large interprises and smaller businesses with fewer than 500 imployees. With the payback period running an average of 12 months, businesses, telecommuters, and even occasional at-home, after-work users can quickly start to enjoy the benefits of DSL. Productivity gains from specific applications or data transfer needs, unique to each company, drive this payback to even shorter times.

Table 5 DSL Business Case: Monthly Telecommuter Cost Analysis

2B+D Users	User Cost Savings	Backhaul Savings	Capital Outlay	Recurring Savings	Payback Period (in months)
100	\$5,000	\$1,200	\$90,000	\$6,200	15
250	\$12,500	\$6,400	\$213,750	\$18,900	11
500	\$25,000	\$11,500	\$427,500	\$36,500	12
750	\$37,500	\$17,900	\$641,250	\$55,400	12
1000	\$50,000	\$27,000	\$847,500	\$77,000	11

Assumptions

- \$175 per month ISDN 2B+D service
- \$1,300 per month PRI service
- \$125 per month DSL service (symmetrical 384 Kbps)
- \$325 DSL installation charge

500 CPE

3:1 trunk over-subscription (for both PRI and ATM DS-3)

DSL Operational Savings

From an operational perspective, DSL offers significant opportunities to save enterprises dollars and resources. Flat-rate pricing means no month-end surprises, and DSL is easy to include in budgets. Since DSL service runs over dedicated copper lines that are back-hauled over ATM virtual circuits, security is inherent. Local phone companies administer the service consistently over their entire region, and competitive carriers are entering the space as national providers for even greater coverage.

Cisco Powered DSL Access

A DSL service with the Cisco Powered Network mark means confidence, leadership, and quality that enterprise companies can rely on. Cisco partners with service providers to enable them to offer network services that are business-ready with the same scalability, performance, and policies deployed in private networks around the world.

The Cisco Powered Network program helps businesses find service providers with industry-leading networking services based on Cisco equipment. Eighty-five percent of enterprises in the Fortune 500 already depend on Cisco equipment. Companies deploying DSL can extend this infrastructure to obtain optimal, end-to-end compatibility with their existing networking equipment.

Cisco Powered Networks help companies gain a competitive advantage by powering network services that enable the most efficient deployment of tomorrows' enterprise business applications.

DSL to Gain Competitive Advantages in the New Millennium

The case for DSL is compelling. A DSL-based network for your enterprise's remote users and sites will bring greater productivity and cost savings, and at the same time, support next-century computing for next-century applications.

For More Information

To learn more about DSL, and the Cisco Powered Network service providers offering DSL services, visit www.cisco.com/cpn.



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Schedule 8



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Schedule

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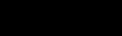
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THE RIGHT WAY FOR YOUR BUSINESS TO CONNECT

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With the increased demand for voice, data and Internet, you need services that are cost-effective, reliable and easy to maintain. Allegiance Telecom has the answer. Our integrated access service delivers high-speed, "always-on" Internet access and allows businesses to cost-effectively meet their voice, data and Internet needs over a single access line.

Multiple functionality in one device eliminates the need to purchase numerous network elements from multiple vendors, thereby reducing overall costs and improving reliability. And partnering with Allegiance Telecom means you will receive one easy-to-understand bill as well as unmatched customer support and responsiveness from a single point of contact. INTEGRATED ACCESS SEPARE-24 CHANNELS IN EACH ACCESS LINE PROVIDE 1.54 MBPS OF CAPACITY AND CAN BE CONFIGURED SEVERAL WAYS TO OPTIMIZE USE.

ONE SIZE DOESN'T FIT ALL

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Our integrated access service provides an integrated network access line with voice and Internet access and is available in a variety of configurations. Through an all-in-one access device for voice, data and Internet, Allegiance Telecom's integrated access service can simplify your business operation.

BENEFITS FOR YOUR BUSINESS

- · High-speed, "always-on" Internet access
- · Flexibility to change mix of voice and data access lines
- · Complete network solution-voice, Internet and equipment

30107

- · Ability to keep existing phone numbers
- · One service, one bill, one number to call
- · Reduction of overall network costs

FERNANDEZ

Schedule 9

Competitive Pricing ISDN PRI Trunk Interface - Missouri

	ISDN PRI Trunk Interface Monthly Recurring Charge	ISDN PRI Trunk Interface Nonrecurring Charge
Allegiance Telecom	\$625.00	\$3,540
Birch Telecom	\$337.00 - \$625.00	\$500 - \$3,540
MCI	\$1,600.00 flat rate usage \$400.00 measured usage	\$2,790
Sprint	\$625.00	\$3,540
SWBT	\$375.00 - \$625.00	\$500 - \$3,540

Notes:

1 - CSV,CSD trunk equivalent charges are not included.

2 - Only SWBT and Birch Telecom tariffs clearly listed term plan pricing

3 - Highest rates for each are month-to month rates.

4 - PRI is eligible for MCI's Local On-Net term discount plan which is also based on term length and committed usage levels.

5- Rates in effective 6/25/01

SCHEDULE 9

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