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New Rec: Carrier Access (CACS-$30) December 14, 1998

Position: Sell Target: $15 Timing: 3 (1=aggressive; 5=cautious)

	Q4 98E	Q1 99E	Q2 99E	Q3 99E	FY 98E	FY 99E
000$						
REVS	14,863	16,210	15,895	15,073	44,827	61,730
EPS$	0.06	0.07	0.07	0.07	0.21	0.29
YY GRO	210%	109%	74%	0%	110%	38%
PE					142	103
PSR					14.6	10.6
Consensus	0.06	0.06	0.08	0.10	0.21	0.37

Shares Out: 21.8 m Market Cap: $654 m FYE: Dec.

Summary: Carrier Access sells multiplexors which convert T-1 lines to single access lines and which convert T-3 lines to T-1 lines. Over 80% of CACS sales are to Competitive Local Exchange Carriers (CLECs.)

The Telecommunications Deregulation Act of 1996 sparked the rapid growth of CLECs in the U.S. CACS has been a beneficiary of this growth. CLEC access lines grew from a very low base to about 1.7 million lines at December 1997, and should more than double in 1998 to about 4 million lines at year end. Meanwhile, CACS sales have risen at a similar rate, from $18.7 million in 1997 to a projected $44 million in 1998.

Bullish analysts expect CACS' explosive growth to continue, driven by another doubling of access lines in 1999. CACS' sales are expected to increase at a similar rate, by over 90%, to about $84 million.

However, there are strong indications that access line growth will not meet expectations. Year over year line growth has been slowing, and fell from 137% in Q2 to 81% in Q3, by our estimate. Sequential line growth was weak, at 22%. We think these growth rates will continue to decline, as we explain below. This is the main reason that we project CACs 1999 revenues at about $62 million, versus the "street's" $84 million.

Interestingly, while CACS bulls project access line growth at 100%, CLEC bulls on Wall Street project access line growth at 80%. More importantly, and closer to reality, capital spending projections at the CLECs also indicate that CLECs expect line growth to decline. The CLECs we surveyed plan to raise capital spending by 17% in 1999 versus 1998. In 1998, capital spending rose by 71%. CACS revenues are driven by CLEC capital spending. Even then, the CLECs' own projections may be currently too aggressive.

We project that year over year CLEC line growth will slow to 42% in 1999 and to 22% in 2000. Even at these lower growth rates, the CLECs would have a 30% share of their potential market by Q4 00, by our calculation. Moreover, this could be still be too optimistic, as the RBOCS, GTE, and IXCs (which bought CLECs) such as AT&T (Teleport) and WorldCom/MCI (MFS) also want this business.

The problem is that the market for CLECs is more limited than many investors think. The market is mainly in high density urban areas where there are many large buildings with multiple potential customers. The large number of potential customers justifies the capital expenditure to connect these buildings to CLEC networks. However, CLEC line growth has been very rapid, and significant penetration of this target market has been achieved, and has already reached about 19% in just over two years. Continuing these growth rates will be very difficult.

As a result, demand growth for CACS equipment will also slow, and should fail to meet analyst expectations.

There are other problems as well. While CACS was early to the market with its Wide Bank T3 multiplexor, competition is heating up. CACS Access Bank T1 multiplexors are largely commodity products with many competitors. Telco systems has introduced a low end T3 multiplexor which has similar price performance to CACS, and which is being sold by many of CACS key distributors.

CACS has introduced a new product, the Access Navigator, but, here, too, expectations are far too high. This product is supposed to generate about $17 million in sales in 1999 and $43 million in 2000. In order for this product to meet analyst expectations, it will have to garner over 50% of CLEC market share in the year 2000, by our calculation. However, there are many competitors in the market for this product, as we explain below. Lucent, in particular sells competitive products, both

high end and low end, with good distribution. We project Access Navigator sales will not exceed $26 million in the year 2000.

Of the approximately 19.8 million shares held by insiders and pre-IPO investors, which represent 87% of the total shares outstanding, approximately 5.6 million shares will be freed from lock-up agreements at the end of January, 1999. The shares should trade in more volume at that time. The remaining 14.3 million shares will become available for sale in future quarters under section 144.

At a current price of 14.6 times projected 1998 sales and 81 times 1999 consensus earnings estimates, we think CACS is very overvalued. While we do not project any disappointment until Q2 99, which is the reason for our "3" rating, the share price appears to have discounted all the good news until then. CACS is probably expected to beat consensus estimates, near term. Our target price of $15 would award CACS with a 52 PE on our 1999 estimate (and 40 PE on consensus estimates), which would still be nearly three times greater than comparable companies Premisys Communications and Adtran, Inc.

Background:

Carrier Access (CACS) manufactures multiplexors used by Competitive Local Exchange Carriers (CLECs), Internet Service Providers and others. Its Access Bank product line converts T1 digital circuits to 24 analog or digital circuits for voice and data connections. Its Wide Bank product line of T3 multiplexors converts T3 circuits to up to 28 T1 circuits for carrying voice and high speed data.

T3 multiplexors are generally purchased by CLECs for installation in their Central Offices, or as co-located equipment in RBOC Central Offices. CACS T1 multiplexors are used mostly as customer premise equipment.

On December 2, 1998 the company introduced the Access Navigator DCS Service Manager. In industry terms this is a Digital Access Cross-Connect System, or DACS (Also referred to as Digital Cross-Connect System or DCS). The product is used in Central Offices and allows carriers and ISPs to “groom” (manage bandwidth) and route traffic into their networks.

CACS products are sold through distributors such as Walker & Associates and Philips Communications to a narrow market segment and to a small customer base. We estimate over 80% of sales are to “competitive carriers”, primarily CLECs. An additional 8% of sales are to private label OEM, mainly ADC Telecommunications. About 25 telecom companies accounted for about 70% of revenue in the first nine months of 1998, according to the company.

Discussion:

1. CACS is highly dependent on increased CLEC purchases for its growth, but the growth rate of CLEC access lines has begun to slow, and we expect this trend to accelerate in future quarters.

a. While it is widely reported that the CLECs have a small market share of lines (around 3.5% as of Q198), implying vast growth opportunities, it is important to note that these companies only compete in a very limited segment of the market. The CLEC strategy has been to focus on providing service to business customers in large buildings in high density urban areas.

Evidence suggests that their market share growth has already begun to slow, as the easy market opportunities are tapped out. As CLEC market share growth slows in future quarters, their investment in access lines and related equipment such as multiplexors will also slow.

The "street's" earnings projections for CACS assume an overly aggressive 100% plus annual CLEC line growth rate for the foreseeable future. Interestingly, an examination of actual "street" line growth projections for individual CLECs reveals that a slowdown to 80% is actually being predicted in 1999, so that "street" analysts following CLECs project lower line growth than CACS analysts. More importantly, we project that access line growth will be only 42% in 1999, as we discuss below.

CLECs typically invest in fiber rings in the highest density areas of the large cities to carry their own network traffic to their switches. They then connect the buildings to their fiber ring via telephone poles or underground fiber. (Winstar and a few others use wireless technology to connect the "last mile"). CLECs are therefore limited to the high density areas where they have invested in fiber rings and Central Office facilities to carry traffic over their own network. (Some also resell RBOC lines at a slim margin but they are trying to move away from this unprofitable business).

In addition to the market limitation of the high density areas, the CLECs cannot afford to "wire" every small building in a city where one or two customers may want to sign up, but instead focus on large buildings that have many potential customers. Considering that MCI incurred substantial losses in trying to offer local services to residential customers, and AT&T bought Teleport and Tele-Communications, Inc. largely to avoid the huge investment needed to build infrastructure for wide spread local service, it is obvious that CLECs do not have the financial or operational resources to provide service to even all business customers in large cities.

To better understand the market limiting focus on large buildings, it is interesting to look at a few examples. Electric Lightwave reported 62,657 access lines in service at September 30, 1998 but only 711 buildings connected. The increase in buildings connected over the previous quarter was a mere twenty nine. Nextlink Communications reported 134,107 access lines in service at September 30, 1998, and 736 building physically connected to the company's network. The company also leases the "last mile" from the Incumbent Local Exchange Carrier (ILEC), (paying T1 leased rates which increase with distance from the Central Office), where a building does not have enough customer lines to justify the investment of connecting the building. Nextlink had customers in 9,688 "off-network" buildings at September 30. These off-network buildings are low margin business and do not justify the cost of installing the last mile. The potential for off-network business is also limited by proximity requirements to CLEC central office equipment.

Considering that CLECs had 3.3 million access lines as of Q3 98 and we estimate the total potential to be 18 million access lines, which is equivalent to 90% of all business lines in high density urban areas, the CLECs have already obtained a considerable 19% market share of their addressable market in little more than two years. (also see "Are the CLECs Best Days Behind Them ?", Business Communications Review, November 1998 for further explanation of the CLEC potential market and an even more conservative forecast than ours).

However, a slowdown in CLEC access line growth is already underway. The following Table presents access line growth for CACS' four largest customers and five of the largest other CLECs by market cap (The four largest customers are Nextlink, Winstar, Teleport and E.Spire. The other five CLECs we looked at are Electric Lightwave, McLeodUSA, Intermedia Communications, GST Communications and ICG Communications). Note that this Table excludes lines acquired by acquisition of other CLECs, because purchased line growth does not result in additional purchases of telecom equipment for the CLECs as a group.

Table 1: Historical Line Growth:

	Nine CLECs cumulative lines in service	Quarterly increase	Seq. line growth rate	y/y rate of increase	Annual growth rate of cum. lines
Q4 96	236,662				
Q1 97	305,496	68,834	29%		
Q2 97	434,998	129,502	42%		
Q3 97	612,089	177,091	41%		
Q4 97	856,924	244,835	40%		262%
Q1 98	1,119,301	262,377	31%	281%	
Q2 98	1,426,549	307,248	27%	137%	
Q3 98	1,747,126	320,577	22%	81%	

The sequential growth rate of Access Bank units sold declined from approximately 45% in Q2 98 to 27% in Q3 98, in parallel with the CLEC access line growth slowdown. We expect the Access Bank growth rate to continue to decline as access line growth slows further and as competition intensifies. Access Bank Multiplexors represented about 70% of sales in the June quarter.

We estimate that the sequential growth rate of all CLEC access lines will slow to no more than 18% in Q4 98, 15% in Q1 99, 10% in Q2 99, 7% in Q3 99 and 5% thereafter. Going forward, our access line growth estimate for all CLECs is as follows:

Table 2: Projected Line Growth:

	All CLEC lines in service	Quarterly increase	Seq. line growth rate	Y/Y increase (dec) in seq growth	Annual growth rate of lines in service

Q3 98	3,352,800	558,800			
Q4 98E	3,956,304	603,504	18%	12%	135%
Q1 99E	4,549,750	593,446	15%	14%	
Q2 99E	5,004,725	454,975	10%	-23%	
Q3 99E	5,355,055	350,330	7%	-37%	
Q4 99E	5,622,808	267,753	5%	-56%	42%
Q1 00E	5,903,948	281,140	5%	-53%	
Q2 00E	6,199,146	295,198	5%	-35%	
Q3 00E	6,509,103	309,957	5%	-12%	
Q4 00E	6,834,558	325,455	5%	22%	22%

The result of the above estimate, which factors in a 2.5% quarterly increase in local access lines, means that CLECs would have a 30% market share of their potential market by Q4 00. Even this estimate, which we use in our projection, will not be easy to obtain. The Regional Bell Operating Companies, GTE, WorldCom\MCI, and AT&T, among others, are much larger and better financed, and they will not give up market share easily. In fact, WorldCom\MCI and AT&T (including recently purchased Teleport) are aggressively trying to increase their share of the local market. The obvious implication of the above CLEC line growth estimates for CACS is that as year over year line growth slows and turns negative, demand for its products will decline.

These CLEC line growth assumptions are used in our projection of CACS' revenues in Section 6. In our projection, we add line growth estimates for other local exchange carriers such as Teleport (AT&T), MFS (WorldCom\MCI), and independent ISPs and other carriers (such as Frontier) and assume that CACS will get a significant share of this business as well. These combined CLEC and other carrier revenues to CACS form the basis of our financial projections and earnings estimates.

b. We looked at the capital expenditures of eight of the largest independent CLECs by market cap to see if spending patterns matched our analysis of access line growth rates (These are the same companies as in Table 1 except that E.Spire is excluded as we were unable to obtain a capital expenditure estimate from it). The combined capital expenditures of these companies is as follows (in millions) :

Table 3:

	y/y	seq
Q197: $188		
Q297: $247		32%
Q397: $456		84%
Q497: $447		(2%)
Q198: $350	86%	(22%)
Q298: $585	136% 67%	
Q398: $703	54%	20%
Q498E:$646	45%	(8%)

While year over year spending growth rates have been high, they are slowing. Sequential growth has been uneven but, looking at the last five quarters in combination, a slowdown is apparent. Furthermore, the year over year slowdown will be most dramatic beginning in Q299, when comparisons will be harder. The Q4

98 number represents company provided estimates. The same companies expect capital expenditures of $2,675 next year, which would represent a 17% increase over their 1998 spending, and a substantial slowdown compared to the total year over year 1998 growth rate of 71%.

The moderate year over year growth in 1999 capital expenditures for CLEC telecom equipment purchases clearly has negative implications for CACS. However, it is not as ominous as the negative year over year access line growth we predict beginning in Q2 99 (see Table 2). Why the discrepancy between capital spending plans and projected access line growth rates? The probable reasons are:

1) In looking at access line growth, we looked at the market for voice, fax and internet access lines, which is the primary focus of most of the CLECs. However, many CLECs are also investing in high speed data networks (frame relay, ATM) and this market is growing faster than voice. CACS products do not compete in frame relay\ATM networks. To the extent that a portion of the capital expenditures growth is for high speed data networks, capital expenditure growth would be relatively higher than access line growth.

2) The nine CLECs we looked at in Table 1 above had combined net losses of $397m in Q397, $427m in Q497, $554m in Q198, $560m in Q298 and $628m in Q398. Interestingly, the combined net losses for these five quarters of $2,567m was greater than their revenues of $2,261m during this period.

While the CLECs own projections are for higher capital expenditures, we question for how long investors will continue to finance this magnitude of net losses and capital expenditures (roughly $1.2 billion per quarter at the current pace, for these nine CLECs alone). Most of the CLECs are going after the same markets and are building enormous capacity. All are expecting to increase market share significantly, while turning profitable, but not all will prosper. The projected capital expenditures may be scaled back significantly if CLEC business fundamentals do not improve rapidly, or if the healthier CLECs buy others, acquiring infrastructure already in place rather than building new infrastructure. Either scenario would result in lower than projected capital expenditures, which would be more in line with our access line growth projection.

3) It is also worth noting that purchases of CACS products correlate more closely with access line growth than with capital expenditures. CLEC capital expenditures are driven primarily by investments in underground fiber and high capacity switches (such as the Lucent 5ESS2000), and by investments in wireless licenses and equipment in the case of a company like Winstar. Some of the CLECs sign up the customer first, to earn a slim margin as a RBOC reseller while they build their own networks. They then transition the lines to their own networks as they are built. For this reason, certain network infrastructure can be cost justified because the CLEC can bring "resold" lines to the CLECs own network (earning a higher margin) in addition to normal access line growth. Where this is the case, it would make sense that the capital expenditures growth rate would be higher than the access line growth rate.

c. The combined quarterly revenues for the nine CLECs above are as follows (in millions):

Table 4:

	Rev	Sequential Growth
Q3 97	$287	
Q4 97	$428	49%
Q1 98	$548	28%
Q2 98	$623	14%
Q3 98	$662	6%

Any way you slice it, CLEC growth rates are clearly slowing. Keep in mind we did not selectively choose these companies. These are the CLECs with the highest market caps in the sector.

d. CLECs add capacity before signing up customers to fill the capacity. Many CLECs have been in business only a year or two and have built capacity in anticipation of continued market share growth. Although difficult to quantify with any degree of precision, we estimate that CLEC Central Office capacity utilization is currently running at only 50% to 60%, on average. The CLECs will need to increase their capacity utilization in order to turn profitable. We estimate that their Central Office capacity utilization will increase gradually to 75% by Q300.

This has important implications for CACS. As CLECs use existing capacity to serve new customers, they will not need to buy as much new Central Office equipment. This will cause a further drag to demand for the Wide Bank product. The same will hold true for the company's new Access Navigator product line, which is also used as Central Office equipment.

e. In a sign that competitive carrier line growth and equipment purchases may already be below expectations, Adtran, Inc. announced lower than expected sales and profits for the fourth quarter on December 4, 1998.

Pairgain Technologies, which makes HDSL T1 access products, also announced lower than expected revenues and profits for Q4, including a more than 15% ASP decline in the quarter in HDSL pricing.

2. CACS products are sold almost exclusively into the CLEC market. Competition in this market is intensifying. CACS' ability to expand its sales beyond the CLECs appears limited at best.

a. CLECs are looking for low cost multiplexors that are quick to install, so they can quickly add capacity, and that are small in size to minimize rack space and co-location cost. These solutions have become increasingly available.

CACS primary competitor in the low end T3 multiplexor market is Telco Systems, whose Edgelink 100 multiplexor began shipping in April, 1998. The street price of the Edgelink is similar to CACS Wide Bank, and the product provides

equivalent functionality and occupies the same amount of rack unit space. Telco's product seems to be gaining market share, with more units sold than CACS in Q3 98, according to Telco. Our discussions with independent distributors also indicate that Telco's Edgelink 100 now has a market share similar to CACS, even though it was later to market. The Edgelink product also offers full redundancy, versus 1:7 DSX-1 redundancy for the Wide Bank. This means that if there is a T1 circuit failure in the Wide Bank, it will cause three other T1 circuits to fail, whereas on the Edgelink, only that one T1 circuit will be affected. This "full protection" of the Edgelink product causes some buyers to prefer it over the Wide Bank.

Both the Edgelink and Wide Bank are Network Equipment Building System (NEBS) certified, which is essential to getting products installed in Central Offices. With two identical products selling into the same market, increased price competition is likely.

Telco also announced in June that Cisco would jointly market Telco's Edgelink 100 multiplexor to work with the Cisco AccessPath-TS3 Model 531 for ISPs' ISDN delivery. This endorsement of the Telco product by the dominant supplier of data networking products may be proof of its superiority in internet\data applications. CACS' Wide Bank has received no such endorsement. CACS has focused on the market for voice multiplexing, which is still much larger than data, but growing at a much slower rate. While CACS products seem to have gained market acceptance for low end internet access, this is not the case for high speed data networks.

The NEC RC28D is the "industry standard" T3 multiplexor and is also a factor in the CLEC market segment. NEC's product is noted for excellent reliability, but is about $1,000 more expensive and occupies more rack space than the Wide Bank and Edgelink. It has been on the market for years, and for a time was the only alternative for a low cost T3 multiplexor. Therefore, it has a much larger installed base, which works to NEC's advantage. Though the CLECs buy a significant number of NEC RC28D's, NEC's biggest market is the RBOCs. For the CLECs, the low cost, small size (for low co-location cost) and remote manageability features of the Wide Bank and Edgelink often give them an advantage over the RC28D. The RC28D is particularly strong in wireless and SONET backbone Central Office environments. Large purchasers of this product include Bell Atlantic, Ameritech, US West and Frontier Corporation.

Adtran, Inc. is a $300 million manufacturer digital transmission products for telecom companies and corporate end users. Adtran began shipping the Total Access product line this month. The Total Access line supports T1, T3 and SONET network interfaces and there is an OC3 card in development. The product line is fully redundant and NEBS compliant. This product line is aimed at the Central Office equipment data market (ISDN, HDSL etc.), and its modules perform T3 multiplexing, bandwidth management and other functions. The company has indicated to us that many feature sets such as small rack unit space and remote management were targeted for the CLECs, and that there is strong interest among the CLECs, as well as among RBOCs, for the product line.

Adtran has also indicated that it plans to introduce a low end T3 multiplexor

aimed at the CLEC\competitive carrier market, to be priced competitively with CACS and Telco Systems' devices. Indications are that it will be one rack unit in size and it is expected to be released around May of 1999. This would provide additional competition for Carrier Access from one of the leading manufacturers of integrated access devices. In October, 1998, Adtran signed a distribution agreement with Walker & Associates, which is CACS' largest distributor. Our discussions with Adtran indicate that Adtran is working to expand in the CLEC segment, and has hired sales people to focus on the CLEC segment. While it may take a couple of quarters for the competitive impact of Adtran to be felt, Adtran will increase competition in the CLEC segment.

Also competing in the T3 multiplexor market are Nortel Networks, Alcatel and Newbridge Networks. These companies, however, compete mainly in the higher end of the market and in data networks and do not compete directly with CACS. Newbridge's 3645 product is strong in frame relay networks and in corporate WANs. Bell Atlantic, for example, is using the Newbridge product in its frame relay network.

b. The sales growth rate of the Access Bank T1 Multiplexor product line, which is being commoditized, has begun to decline, and we expect ASPs and margins to also decline as competition intensifies. The company's competitors in this market include Cisco Systems, Lucent Technologies, Paradyne Corporation, Premisys Communications, Pulsecom, Telco Systems, Vina Technologies and others.

Premisys announced its Slimline and Streamline T1 multiplexors in September 1997. These products compete directly with CACS Access Bank T1 multiplexor. Due to production problems, shipments were delayed and are projected by analysts to reach only $1 million in sales in Q4 98. However, these products now appear ready for large scale deployment and could account for as much as 10% of Premisys sales in Q1 99 and 15% of sales in Q2 99, according to analysts. Furthermore, Nortel announced on December 2, 1998 that it would resell the Premisys Slimline T1 multiplexor, primarily to the CLEC market. Nortel committed to purchasing in excess of 10,000 Slimlines during 1999 for resale. The press release on this agreement notes that Nortel provides 65% of all switching equipment to the CLEC market. Shipments to Nortel are expected to begin in Q1 99 and increase through the year.

As a result, Premisys is poised to gain market share in the CLEC market. Lucent already sells Premisys equipment under its own brand name and may also provide a boost to Premisys multiplexor sales.

c. While CACS' Wide Bank and Telco's Edgelink products have made inroads in the low end CLEC market due to their low cost and small size, they have not penetrated the RBOCs or Inter Exchange Carriers (IXC) such as AT&T (excluding Teleport), WorldCom\MCI and Sprint in any meaningful way. Telco told us that it made its first three sales to RBOCs in Q3 98, but it is unlikely that these low end products will ever gain significant market share in RBOC\IXC Central Offices.

Part of the reason is that many high capacity network switches already have multiplexing capability provided directly by the switch vendor. For example, Lucent Technologies makes a line of DDM-2000 Multiplexors for OC1 (52 Mb/s), OC3 (155

Mb/s) and OC12 (622 Mb/s) capacity switches. The DDM-2000 Transmux Circuit Pack is an add on plug-in pack that provides T3 multiplexing functionality, eliminating the need for purchasing separate T3 multiplexors. The RBOC\IXCs often incorporate these multiplexors as part of the switch equipment in their Central Offices. In these cases, no third party T3 multiplexors are needed.

CLECs do not purchase these multiplexors because of the higher cost and because in many cases they are not allowed to co-locate their switches in RBOC Central Offices, and in other cases choose not to do so. When the switch is physically in a different building, the multiplexors still need to be in the Central Office (where the lines originate). So, they need to purchase stand alone multiplexors anyway.

Another difficulty facing CACS is that once RBOC\IXC engineers have settled on a product such as the NEC which has excellent proven reliability and competitive cost, they are very resistant to maintaining different multiplexors from various vendors in their Central Offices. They have tended to standardize on one or two products over the years. Since the CLEC companies are newly formed, there is no such built in resistance to a new product.

The RBOC\IXC companies are also less price sensitive than the CLECs. Remember that the CLECs are losing substantial amounts of money while the RBOC\IXCs are quite profitable and charge higher prices to their customers. The cheapest price is not their first priority. Compact size is not as important for them either because they own their Central Office space and do not pay co-location costs. Remote manageability is not important either as their Central Offices are staffed with on site engineers.

While there may be an opportunity for CACS to sell multiplexors to a RBOC\IXC for installation at customer premises, this is a smaller market and will not provide significant growth for the company. This market may also be difficult to penetrate. One engineer we contacted recommended using the same multiplexor at both ends of the network to avoid any possible compatibility problems. In some cases using the same multiplexor is mandatory. The NEC RC28D, for example, is a “point to point” multiplexor because of its proprietary high speed switching software. So where a RBOC has an RC28D in their Central Office and one is needed at the customer premise, it would need to purchase an RC28D as customer equipment as well.

CACS reported recently that WorldCom and GTE Internetworking (GTE’s ISP subsidiary which includes acquired BBN Corporation) approved its Wide Bank product. WorldCom had previously approved the Access Bank product line. Access Bank generated approximately 70% of CACS sales in recent quarters, and WorldCom was not a significant customer. Therefore, we do not expect significant new WorldCom business based on this product approval. In fact, we think that larger telcos like WorldCom and GTE Internetworking would be more likely to buy the Access Bank, which is used in customer premises, than the Wide Bank for their Central Offices.

Finally, given that 70% to 80% of CACS sales are to CLECs and its marketing,

sales and product development efforts are focused on the CLEC market, the reality is that the large carrier market would not develop for CACS without a significant effort, and such a major effort would be risky. As a result, the RBOC/IXC market should provide very limited sales opportunities for CACS. .

d. The fastest growing segment of the telecommunications market is data, and more specifically, frame relay, ATM and internet. CACS competes in the voice and low end data business market (voice\data T1 and T3 multiplexing). Its T1 multiplexors provide individual channel (64kbs) internet access, and the company's products are designed for voice only or voice\data integration. CACS T1 multiplexors do not have a SONET interface for integration in high capacity data networks and are not designed for frame relay\ATM networks. CACS therefore does not have a position with the telco carrier or corporate market for frame relay, ATM and high capacity (T3 and above) internet networks. This eliminates the fastest growing telecommunications market for CACS.

e. Furthermore, corporate enterprise networks are migrating to advanced products beyond the capabilities of standard T3 multiplexors. For example, Nortel Networks introduced the Passport line of enterprise network switches in June 1998. These switches allow corporate WANs and LANs to carry voice, data and video traffic from fractional T1 to OC-3 speeds over leased lines, over public or private frame relay or over ATM networks. Nortel has already installed over 8,500 of these switches worldwide. These switches eliminate the need for T1/T3 multiplexors and offer advanced features such as prioritized traffic. Prioritized traffic allows time sensitive data such as voice and video to be transported with higher priority, resulting in improved quality and minimal latency. While CACS has successfully sold into the CLEC market, its product line does not allow it to compete successfully in the enterprise data network market.

f. The following table compares prices and features among the main manufacturers of standard T3 multiplexors:

Table 5:

	Carrier Access	Telco Systems	NEC	Newbridge Networks	Nortel Systems
Product Name	Wide Bank 28	Edgelink 100	RC28D	3645	FMT150
Market	CLEC ISP	CLEC ISP	RBOC CLEC ISP CEN IXC	RBOC IXC CDN	RBOC IXC CDN
Street Price	$5,250	$5,250	$6,250	(1)	$15k-$20k (2)
Reliability			X	X	X

Size	1 Rack unit	1 Rack unit	2.5 Rack units (fully conf.)	(1)	1 Rack unit
ATM Networks				X	X
Frame Relay				X	X
Remotely Manageable	X	X		X	X

(1) Price and size depends on configuration. The 3645 also does T1 multiplexing.
(2) Expandable to handle up to three T3 signals.

IXC = Inter Exchange Carrier
CEN = Corporate Enterprise Network

3. On December 2, 1998, CACS announced a new product, the "Access Navigator DCS Service Manager". Limited shipments are to begin in December. Per the press release, this product "allows carriers to save local access cost by combining and managing data and voice services from multiple customers and applications at the network edge."

The advantages of the CACS product, according to the company, are that it is very compact in size, power consumption is low, and installation is simple. The functionality of the product is the same as competing offerings for voice and low end data applications. This CACS product is aimed at the same CLEC market as the Wide Bank and Access Bank, offering the same benefits of low cost, small size and ease of installation. The CACS product has a capacity of up to 32 incoming T1s, or 768 lines (coming from customer premises).

The CACS product will compete with offerings from Lucent (DACS II product line), Tellabs (TITAN 5300 & 5500 product line), Eastern Research (DNX product line), Paragon Networks (Master Series), Premisys (IMACS series) and Adtran (Total Access product line), among others. Lucent and Tellabs appear to be dominate the among the RBOC\IXC carriers. Higher end systems such as the Tellabs TITAN series perform advanced functions such as converting asynchronous traffic to SONET-based traffic.

Eastern Research, which is one of the stronger competitors in the small carrier market, introduced a module to its DNX line of Integrated Access DACS in June, 1998 which adds T3 multiplexing capability. Eastern Research also indicated to us that at the beginning of the year it will ship an eight port DACS that will have up to 88 T1 capacity, doubling the capacity of their current 44 port DNX-11 product, while utilizing the same amount of rack space (10.5").

Lucent's DACS II is the worlds most widely used Digital Cross Connect System, according to Lucent. This product line offers models for small (DACS II ISX for under 128 T1 lines) and for large networks (DACS II ECEF for applications over 256 T1 lines, which is equivalent to 6,144 individual lines). Lucent told us that it just began reselling the Eastern Research product under its own brand name as the DACS

II AX for the 32 to 88 DS1 (T1) port market. With the Lucent brand name and sales force behind it, one would expect that Eastern Research's product will obtain additional market share in the lower end segment where CACS wants to compete.

"Street" estimates for CACS Access Navigator are for revenues of $17 million in 1999 and $43 million in 2000 for this product. These estimates seem too high. Revenue of $43 million in the year 2000 would imply a 54% market share of the CLEC and competitive carrier and ISP markets (CACS potential market), by our calculation. Even if we optimistically assume CACS' market share grows to 33% by Q2 00, this would mean revenues of $26 million in the year 2000 (see financial projections).

4. CACS should be commended for having managed its profit growth successfully, given the erratic quarterly sales of its Wide Bank product line, significant management turnover, and heavy reliance on a single distributor, which we describe below. But while the tremendous CLEC line growth of recent quarters has masked some of these underlying problems, slower future line growth will cause these and other problems to be more apparent.

a. It is interesting to look at Wide Bank product line sales by quarter, as follows (in 000's):

Q4 97: $2,995 (product introduction)
Q1 98: $2,390
Q2 98: $1,683
Q3 98: $3,900 (estimated based on actual units sold and est. ASP)

The company maintains that Q2 98 sales declined sequentially because there was a big backlog at the end of Q4 97, which resulted in higher than normal Q1 98 sales. That would mean the "true" demand in Q497 was more like $4,000. We question whether distributors would have stepped up to the plate and ordered $4,000 worth of a new product in its first quarter, particularly when the normalized (average) sales during the first three quarters was only $2,356 and also considering that telcos are notoriously slow to test and approve new products. We suspect that the actual trend of the first three quarters may be a pretty accurate reflection of true demand (considering increased competition and slower line growth), and that the company may have "stuffed the channel" in Q3 98.

Interestingly, the company apparently warned investors in its Q3 98 conference call not to expect much revenue growth in Q4, presumably due to seasonal fluctuations. Analysts then reported in late November that Access Bank sales are better than anticipated and sequential revenue will not be flat. We suspect that seasonal fluctuation is not the full reason for the revenue warning. CACS was able to grow 17% sequentially in Q497 over Q397. Furthermore, to go from 51% sequential growth in Q3 98 to nearly flat in Q498 would seem to indicate more than just seasonal fluctuations. We suspect that prior quarter channel stuffing, the emerging slowdown in CLEC access line growth and increased competition may be the real explanations for relatively flat sequential growth in Q4 98.

b. Page 12 of the CACS July 30, 1998 424B4 SEC filing discloses that the Vice President of Marketing resigned in December, 1997 and the Vice President of Sales resigned in March, 1998. As of the date of the company's Q3 10Q filed November 16, 1998, the company had not replaced the Vice President of Marketing. It remains to be seen whether these resignations will have an adverse effect on future quarters.

c. CACS has been reliant on one distributor, Walker & Associates, for much of its recent growth. Walker represented 46% of sales and over half of growth in the first half of 1998. While sales to Walker in Q3 98 were lower at 34%, they are still quite dependent on this distributor, which also sells competing product such as that from Telco Systems and NEC. We think this is an added risk.

5. Financial Projection Assumptions and Notes:

a. The CLEC lines installed at Q1 98 of 2.2 million and Q1 98 CLEC growth rate of 31% is from "street" estimates.

b. Q2 98 and Q3 98 access line growth rates are based on our analysis of nine of the largest CLECs by market cap, including CACS four largest end user customers.

c. Our Q4 00 estimate of 6.83 million CLEC lines in service is similar to the Yankee Group estimate of 7 million lines in service at Q4 00.

d. We project overall local access line demand to increase at a 2.5% quarterly rate, or 10% per year. Though local voice lines growth is projected to be lower 10%, growth in internet access lines should be higher.

Many of the CLECs are in the ISP business in some way, and acquisitions have played a big part. Last year, for example, ICG bought Netcom, TCG bought Cerfnet and Intermedia bought DIGEX. ISP Points of Presence (POPS) use T3 multiplexors, as do Telco Central Offices, to convert T3 circuits to 28 T1 circuits.

Many of the internet access accounts sold to small and medium sized businesses (CLEC customers) are dial up accounts. The industry rule of thumb for dial up accounts is a 10:1 ratio of access lines to subscribers. Therefore, the number of T3 multiplexors and DACS products needed to be purchased to handle incoming dial up accounts is only about 10% of the number needed for an equivalent number of local voice lines. Because of this, and because the large majority of access lines are used for voice, we believe our estimate is conservative.

e. Our analysis of ASPs in 1998 indicates that prices held steady during the year. The company reports in its Q3 98 10Q that it expects "ASPs and gross margins will decline as products mature, volume discounts in distributor contracts take effect, and competition intensifies, among other factors". While this comment was made about the company's products in general, the commodity T1 multiplexors are particularly susceptible to intense competition and declining margins. ASPs would also be expected to decline as component costs decrease.

We reduced Access Bank ASPs by 2.5% per quarter beginning Q199 to reflect declining component costs and pricing in an increasingly competitive environment. We left ASPs for the Wide Bank and Access Navigator products unchanged.

Note that our financial model assumes margins will increase to 52% as per "street" estimates. We expect Access Bank and Wide Bank margins to decline due to increasing competition. While the "street" expects high Access Navigator margins, and for those margins to be maintained through Q4 00, this remains to be seen. Any margin percentage shortfall or ASP decline in the Wide Bank or Access Navigator products would cause a larger shortfall in revenues and in profits than our model projects.

f. A Note on Access Line definitions

Note that not all reported CLEC access line growth is equivalent to business lines actually installed at customer premises. First, most CLECs have at least some "resold" lines. These are RBOC lines where they simply act as a reseller. For resold lines, the CLEC does not need to purchase Central Office equipment. For example, USN Communications, which reported 310,000 access lines in service at the of Q3 98, is strictly a reseller.

In addition, many CLECs report "access line equivalents" by counting each customer "trunk" (presumably each circuit of a customer installed T1) as 2.5 access lines (or a similar multiple), under the theory that each T1 circuit would, on average, be equivalent to 2.5 PBX extensions.

Lines obtained through acquisition should also be backed out for the purpose of considering demand for telecom equipment or internal growth.

Some companies also report a line number called "voice grade equivalents", or "VGEs". This is a meaningless number that should be ignored.

6. Financial Projections:

	Q198	Q298	Q398	Q498E
Access Bank Products	$4,850	$6,841	$8,950	$9,690
Wide Bank Products	2,390	1,683	3,900	3,748
Access Navigator	0	0	0	625
Other Products	0	525	825	800
Total Revenue	7,240	9,049	13,675	14,863
Cost of Goods Sold	3,768	4,513	6,742	7,283
Gross profit	3,472	4,536	6,933	7,580
Sales & marketing	975	1,020	1,708	2,229
R&D	843	1,150	1,510	2,229
Gen & Admin	531	789	876	1,040
Amortization of deferred stock Compensation	104	175	205	0
Total Operating expenses	2,453	3,134	4,299	5,499
Income from operations	1,019	1,402	2,634	2,081
Other income (expense), net	168	140	399	400
Income before taxes	1,187	1,542	3,033	2,481
Income taxes	450	607	1,150	918
Net income	737	935	1,883	1,563
P/S dividend requirement	0	0	270	0
N/I as reported	737	935	1,613	1,563
sh outstanding - fully diluted	21,226	21,825	23,620	25,000
Diluted EPS	$0.03	$0.04	$0.07	$0.06
Net Revenue	100.0%	100.0%	100.0%	100.0%
Cost of Goods Sold	52.0%	49.9%	49.3%	49.0%
Gross profit	48.0%	50.1%	50.7%	51.0%
Sales & marketing	13.5%	11.3%	12.5%	15.0%
R&D	11.6%	12.7%	11.0%	15.0%
Gen & Admin	7.3%	8.7%	6.4%	7.0%
Amortization of deferred stock Compensation	1.4%	1.9%	1.5%	0.0%
Total Operating expenses	33.9%	34.6%	31.4%	37.0%
Income from operations	14.1%	15.5%	19.3%	14.0%
Other income (expense), net	2.3%	1.5%	2.9%	2.7%
Income before taxes	16.4%	17.0%	22.2%	16.7%
Income taxes	37.9%	39.4%	37.9%	37.0%
Net income	10.2%	10.3%	13.8%	10.5%
P/S dividend requirement	0.0%	0.0%	2.0%	0.0%
N/I avail to common stkhldrs	10.2%	10.3%	11.8%	10.5%
% Increase over prior quarter, year				
Rev inc over PQ	10%	25%	51%	9%
Rev inc over PY	190%	126%	143%	126%
Operating income over PQ	78%	38%	88%	-21%
Operating Income over PY	451%	90%	210%	263%
Net Income over PQ	47%	27%	73%	-3%
Net Income over PY	450%	86%	171%	211%

	Q199E	Q299E	Q399E	Q499E
Access Bank Products	$9,592	$8,284	$7,346	$6,647
Wide Bank Products	3,598	2,921	2,547	2,364
Access Navigator	2,220	3,890	4,380	4,742
Other Products	800	800	800	800
Total Revenue	16,210	15,895	15,073	14,553
Cost of Goods Sold	7,781	7,630	7,235	6,985
Gross profit	8,429	8,265	7,838	7,567
Sales & marketing	2,431	2,384	2,261	2,081
R&D	2,350	2,146	1,959	1,892
Gen & Admin	1,135	1,113	1,055	917
Amortization of deferred stock Compensation	0	0	0	0
Total Operating expenses	5,917	5,643	5,275	4,890
Income from operations	2,513	2,623	2,562	2,678
Other income (expense), net	400	400	400	400
Income before taxes	2,913	3,023	2,962	3,078
Income taxes	1,078	1,118	1,096	1,139
Net income	1,835	1,904	1,866	1,939
P/S dividend requirement	0	0	0	0
N/I as reported	1,835	1,904	1,866	1,939
sh outstanding - fully diluted	25,250	25,500	25,750	26,000
Diluted EPS	$0.07	$0.07	$0.07	$0.07
Y/Y Change	109%	74%	0%	19%
Net Revenue	100.0%	100.0%	100.0%	100.0%
Cost of Goods Sold	48.0%	48.0%	48.0%	48.0%
Gross profit	52.0%	52.0%	52.0%	52.0%
Sales & marketing	15.0%	14.8%	14.5%	14.3%
R&D	14.5%	13.5%	13.0%	13.0%
Gen & Admin	7.0%	7.0%	7.0%	6.3%
Amortization of deferred stock Compensation	0.0%	0.0%	0.0%	0.0%
Total Operating expenses	36.5%	35.3%	34.5%	33.6%
Income from operations	15.5%	16.5%	17.0%	18.4%
Other income (expense), net	2.5%	2.5%	2.7%	2.7%
Income before taxes	18.0%	19.0%	19.7%	21.1%
Income taxes	37.0%	37.0%	37.0%	37.0%
Net income	11.3%	12.0%	12.4%	13.3%
P/S dividend requirement	0.0%	0.0%	0.0%	0.0%
N/I avail to common stkhldrs	11.3%	12.0%	12.4%	13.3%
% Increase over prior quarter, year				
Rev inc over PQ	9%	-2%	-5%	-3%
Rev inc over PY	124%	76%	10%	-2%
Operating income over PQ	21%	4%	-2%	5%
Operating Income over PY	147%	87%	-3%	29%
Net Income over PQ	17%	4%	-2%	4%
Net Income over PY	149%	104%	16%	24%

	Q100E	Q200E	Q300E	Q400E
Access Bank Products	$6,816	$6,978	$7,133	$7,282
Wide Bank Products	2,394	2,513	2,459	2,575
Access Navigator	5,611	6,480	6,794	7,114
Other Products	900	900	900	900
Total Revenue	15,720	16,871	17,287	17,872
Cost of Goods Sold	7,546	8,098	8,298	8,579
Gross profit	8,175	8,773	8,989	9,293
Sales & marketing	2,138	2,295	2,351	2,431
R&D	1,965	2,109	2,161	2,234
Gen & Admin	865	928	951	983
Amortization of deferred stock Compensation	0	0	0	0
Total Operating expenses	4,968	5,331	5,463	5,648
Income from operations	3,207	3,442	3,527	3,646
Other income (expense), net	600	600	600	600
Income before taxes	3,807	4,042	4,127	4,246
Income taxes	1,409	1,495	1,527	1,571
Net income	2,398	2,546	2,600	2,675
P/S dividend requirement	0	0	0	0
N/I as reported	2,398	2,546	2,600	2,675
sh outstanding - fully diluted	26,500	27,000	27,500	28,000
Diluted EPS	$0.09	$0.09	$0.09	$0.10
	25%	26%	30%	28%
Net Revenue	100.0%	100.0%	100.0%	100.0%
Cost of Goods Sold	48.0%	48.0%	48.0%	48.0%
Gross profit	52.0%	52.0%	52.0%	52.0%
Sales & marketing	13.6%	13.6%	13.6%	13.6%
R&D	12.5%	12.5%	12.5%	12.5%
Gen & Admin	5.5%	5.5%	5.5%	5.5%
Amortization of deferred stock Compensation	0.0%	0.0%	0.0%	0.0%
Total Operating expenses	31.6%	31.6%	31.6%	31.6%
Income from operations	20.4%	20.4%	20.4%	20.4%
Other income (expense), net	3.8%	3.6%	3.5%	3.4%
Income before taxes	24.2%	24.0%	23.9%	23.8%
Income taxes	37.0%	37.0%	37.0%	37.0%
Net income	15.3%	15.1%	15.0%	15.0%
P/S dividend requirement	0.0%	0.0%	0.0%	0.0%
N/I avail to common stkhldrs	15.3%	15.1%	15.0%	15.0%
% Increase over prior quarter, year				
Rev inc over PQ	8%	7%	2%	3%
Rev inc over PY	-3%	6%	15%	23%
Operating income over PQ	20%	7%	2%	3%
Operating Income over PY	28%	31%	38%	36%
Net Income over PQ	24%	6%	2%	3%
Net Income over PY	31%	34%	39%	38%

	1998E	1999E	2000E
Access Bank Products	$30,331	$31,870	$28,209
Wide Bank Products	11,721	11,429	9,942
Access Navigator	625	15,231	26,000
Other Products	2,150	3,200	3,600
Total Revenue	44,827	61,730	67,751
Cost of Goods Sold	22,306	29,631	32,520
Gross profit	22,521	32,100	35,230
Sales & marketing	5,932	9,158	9,214
R&D	5,732	8,348	8,469
Gen & Admin	3,236	4,219	3,726
Amortization of deferred	0		
stock Compensation	484	0	0
Total Operating expenses	15,385	21,725	21,409
Income from operations	7,136	10,375	13,821
Other income (expense), net	1,107	1,600	2,400
Income before taxes	8,243	11,975	16,221
Income taxes	3,125	4,431	6,002
Net income	5,118	7,544	10,219
P/S dividend requirement	270	0	0
N/I as reported	4,848	7,544	10,219
sh outstanding - fully diluted	22,918	25,625	27,250
Diluted EPS	$0.21	$0.29	$0.37
Y/Y Change	110%	38%	28%
Net Revenue	100.0%	100.0%	100.0%
Cost of Goods Sold	49.8%	48.0%	48.0%
Gross profit	50.2%	52.0%	52.0%
Sales & marketing	13.2%	14.8%	13.6%
R&D	12.8%	13.4%	12.5%
Gen & Admin	7.2%	6.8%	5.5%
Amortization of deferred			
stock Compensation	1.1%	0.0%	0.0%
Total Operating expenses	34.3%	35.2%	31.6%
Income from operations	15.9%	16.8%	20.4%
Other income (expense), net	2.5%	2.6%	3.5%
Income before taxes	18.4%	19.4%	23.9%
Income taxes	7.0%	7.2%	8.9%
Net income	11.4%	12.2%	15.1%
P/S dividend requirement	0.6%	0.0%	0.0%
N/I avail to common stkhldrs	10.8%	12.2%	15.1%
% Increase over prior quarter, year			
Rev inc over PY	139%	38%	10%
Operating Income over PY	204%	45%	33%
Net Income over PY	179%	56%	35%