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STRONG SELL RECOMMENDATION

October 15, 1996
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THE DIANA CORPORATION (NYSE Symbol: DNA)

Closing Price:	$32 and 1/2	1995 EPS:	($0.17)
52-Week Trading Range:	$114 - $9	1996 EPS:	($0.76)
Total Term Debt:	$13.1	Trailing 12-Month EPS:	($0.93)
Fully Diluted Shares:	5.3 million	Estimated 1997 EPS:	($1.25)

RECOMMENDATION

Diana's shares traded at a low of $3.50 shortly after it acquired Sattel Communications ("Sattel"). Since then all of Diana's other businesses have materially deteriorated. Most market participants readily acknowledge that Sattel accounts for the entire $157.2 million increase in the Company's market value. In the most recent quarter Sattel had sales of $841,000. Sattel's closest "comparable" (with sales of $50 million) is valued at approximately 0.7 times sales. Sattel's value is attributed to certain alleged technical and competitive advantages. We have performed an exhaustive technical software and hardware evaluation of Sattel's products and have concluded that Sattel's performance claims, which form the basis for any anticipated growth, are wholly false and incorrect. In fact, Sattel's products are neither scalable nor programmable in the same sense as today's modern switches. (The study is described in detail below.) We believe Sattel's products to be completely uncompetitive and that it is technically and economically impossible to attempt their resurrection. We strongly believe that the shares are worth much less than $5 and believe that the Company's performance will continue to deteriorate for the foreseeable future. We see no reason for any investor, particularly investors with a fiduciary duty, to purchase or hold this security.

SUMMARY

According to Sattel Communications' press releases and product promotional materials the Company's telecommunication products possess important characteristics that make them highly attractive to a wide variety of customers. Sattel claims that its Digital Switching System ("DSS") telephone switch is "technologically advanced" and offers features and performance capabilities that are either not available or superior to those of their competitors. The Company claims that the DSS can handle up to 375,000 Busy Hour Call Attempts ("BHCA"), which is equal to approximately 104 calls switched per second. It also claims that the DSS has an extraordinary expansion capability ("scalability") from 96 line side ports to a maximum line side port capacity of 10,240 ports. Each single "line side port" services one subscriber's telephone line. In addition, Sattel claims Signal System Seven ("SS7") and ISDN connectivity. These claims form the basis for Sattel's large sales projections, which the Company has made but never attained.

Even if Sattel's products actually performed according to the Company's claimed specifications the DSS would not in any way be unique or special. However, we believe the truth is that none of these claims are correct. In fact, we believe that because of inherent limitations in the DSS software and hardware technology it is not economically and technologically feasible for the DSS to ever achieve or even come close to achieving these performance claims, which are already being offered by many of its competitors. To the contrary, based on a complete hardware and software engineering evaluation, we believe that these products are inferior to those offered by the majority of Sattel's competitors.

In fact, Sattel's product is more than seven years old and impossible to modernize. Our report details many significant DSS shortcomings that make it slower, less scalable, more difficult to program and maintain than the competition, and incompatible with modern peripherals. Sattel uses a centralized matrix, which is an old 1980's design technique that concentrates all switching logic on a single card. Modern products distribute the switching function. Sattel's line cards have no imbedded computing capability. In most current designs line cards have on-board processors that allow for more efficient operations and expansion. The Sattel switch runs on a software language called "Assembly" that today is rarely if ever used in system level designs. This makes it hard to interface and incompatible with the latest products. Modern telecommunication products use high level software languages such as C, C++ and Java. (In fact, Assembly software is today relegated for use in household devices such as blenders and microwave ovens.) The DSS has no mass storage device or graphic user interface. Both of these features are standard today. These and many other serious unrepairable deficiencies are discussed in detail in our report. We believe that these fundamental problems are unfeasible for Sattel to overcome even if Sattel had and it does not have a large sophisticated internal R&D capability. It would be easier to build a new product completely from scratch. We believe that there is no market for the DSS or the DataNet, which may be the reason why Sattel was able to acquire its "technological advantage" for $200,000.

SATTEL PRODUCT BACKGROUND

The DSS was developed by Sattel Technology Corporation, prior to 1989, an unrelated private company from which Diana acquired the DSS, in November 1994. The switch was put together by a group of contractors in Redondo Beach, California to be part of a large telephone system sold by Hughes to the Indonesian Public Telephone Network. NASA had recaptured and brought back to earth a broken Hughes Satellite. Hughes refurbished and sold the satellite to the Indonesians for use in their telephone network. Sattel Technology's DSS switch was used to link the satellite with the land-line telephone facilities. Many of Sattel's features indicate that even when the switch was developed, it was designed to be used in a very low demand environment. Sattel Technologies only significant sales were in Indonesia. (However, even here only 37 switches were sold despite its affiliation with a Hughes satellite system in a country with over 100 million inhabitants and consisting of 3,000 islands.) The product had not been marketed or evolved since then until Sattel Communications came along and attempted its res-urrection. The following is a DSS sales summary prior to the purchase of the technology by Sattel Communications:

- Indonesia — 37 switches
    - Philippines — 6 switches
    - USA — 4 switches (None sold to PTNs)
    - China — 3 switches
    - New Zealand — 2 switches
    - Taiwan — 2 switches
    - Australia — 1 switch
    - Mariana Islands (Pacific) — 1 switch
    - Syria — 1 switch

Six of the nine sales to foreign countries were for three switches or less. This clearly indicates a failure to penetrate any national or foreign market except for the Indonesian sale. Of particular importance is China, a large country where only 3 switches were sold. The Indonesians committed to the purchase as part of a larger deal with Hughes, which included a satellite and earth stations. As a result they most likely paid for its development and took the DSS in a package deal. Since purchasing the technology rights two years ago, Sattel has only realized two or three sales, all of which are insignificant and one of which involved a $5 million "investment" in a start-up by Sattel prior to the sale.

The original developers have since left the company and this leaves Sattel Communications with little or no in-house product design expertise. This may be the reason for Sattel Technologies' refusal to assist in Diana's development programs, which we believe to be unrealistic and completely ill-fated. Sattel has at most six engineers of its staff, including the Director of Research. The Company is relying on a loosely supervised group of off-site independent contractors to at least give the switch certain features that it lacks, which are now standard for the competition.

Our review of the Sattel switching product has uncovered a recurring theme of published claims and specifications not agreeing with the actual capabilities of the product. We believe that the scalablilty and call handling capacity of the DSS architecture is far less than Sattel claims. Furthermore, we see published claims of features that we simply can not identi-fy on the product.

DESCRIPTION AND ANALYSIS OF SATTEL'S PRODUCTS

This report is composed of three parts: hardware architecture analysis, software evaluation, and a description of the market and competition. The first section discusses the DSS' hardware and architecture. The hardware section describes each component of the DSS switch and compares it and its performance to current

industry standards. A software evaluation section follows describing software issues that will effect the system's performance, maintainability, available features and its sales. The last section gives an over-view of how Sattel's products might fair in each segment of the
telecommunications market based on their technical capabilities and competitive products.

HARDWARE

The following is a detailed analysis of Sattel's DSS matrix, line card, call capacity, scalability, line card ring generator, CPU processor, storage and memory, adjunct server and administrative control.

Matrix Architecture

The DSS is composed of a centralized switch matrix. This is a very old design that can't be modernized and can't provide many services required by today's telecommunications markets. Today a switching system must be able to scale up to large line side port capabilities. Despite Sattel's claims the DSS matrix, and the DSS switch design as a whole, does not lend itself to large port capacity.

Modern designs have the matrix distributed across each of the line cards. The DSS matrix is central and not distributed. Furthermore, the DSS switch can not be converted or retro-fitted to use a distributed matrix. There is no TDM (Time Domain Multiplexing) bus between each line card. Rather, a ribbon cable is used to connect each line-card to the central switch matrix. On this ribbon cable rides a slow 2MHZ data stream carrying all PCM (Pulse Code Modulation) between the central switch matrix and each of the line cards. This is a very dated design that makes Sattel far less scalable to its competition. This is directly opposite to Sattel's claim of being far more scalable than Excel or Summa Four.

Because of the central matrix the wiring needed to build up the DSS back-plane is complex to manufacture and susceptible to constant failure. More importantly, however, is that this core architectural design will limit the DSS in port size and features. It will keep the DSS from evolving into any-thing that can compete with other switch maker's current designs. This architecture is something that may have been current in the mid 80's but is simply not "state of the art" or even "middle of the road" by today's standards. We believe that the core switch fabric architecture is sub-standard and can not be improved.

Lack of Line Card Intelligence

The line cards supporting digital (T1/E1) trunk line and analog telephone line interfaces of the DSS have no on-board processing capabilities. The main system processor (VME computer card) controls every facet and detail of the operation of each line card in the system. Further, this is done via a primitive dedicated control bus as opposed to an internal signaling packet network such as an HDLC (High Level Data Link Control) bus. An HDLC connection between the line cards and the CPU is necessary to make the switch expandable.

Such designs are rare, if not unheard of today, as virtually all modern switching designs employ distributed processing elements on line cards with dedicated internal packet bus to service them. These distributed processing elements take care of low level localized functions. For instance, when a
subscriber lifts the handset off its hook the DSS line card relies on the central CPU to instruct it to deliver a dial tone. In a modern switch the line card processor is capable

of recognizing this event by itself. Smart line cards have the advantage of off-loading the requirements of the central processor. At the same time smart line cards allow the architecture to be easily extended and to support advanced protocol fea-tures such as ISDN, SS7, and variations of R1/R2.

The DSS switch as a whole will be limited in expanding in size, services and features to be offered because of this dated architecture approach. As line cards are added significant loads are placed on the limited cen-tralized CPU, greatly limiting the DSS' expansion potential. Further, as line cards are added the wiring complexities from the line-card to centralized switch matrix will limit the practical size of the switch.

The DSS line card architecture is a simple testament to the fact the DSS is a design resurrected from yesterday. It has neither been updated or evolved to the point of being technically equivalent or competitive with designs cur-rently in production and marketed by Sattel's competitors.

Switch Call Capacity

Sattel's documentation claims up to 375,000 Busy Hour Call Attempts or 104 calls per second. For com-parison, modern switches of comparable port size are able to achieve 35 calls per second using SS7 signaling in-bound and out-bound, the fastest signaling protocol and call model available. The DSS does not have SS7 capability yet Sattel claims almost three times the rate achieved by SS7 products. Further, both Summa Four and Sattel use the same base CPU card, but Sattel is claiming to be three times faster than the Summa Four switch whose design is inherently faster. Furthermore Sattel is making this claim based on in-band signaling protocols (MF audio tones) since they do not have SS7 signaling. SS7 is digital, the DSS issues slower MF audio tones. We believe Sattel's call capacity claim is false. Based on the capabilities of other more advanced platforms, and on the limitation inherent in the Sattel's DSS architecture, it is highly unlikely for the DSS to achieve this call handling performance. Further, Sattel does not have a load test bed setup in their lab that would even allow them to come up with any call handling figures, never mind the lack of specifications on the capacity published.

Scalablilty Claims

Sattel's documentation claims that the DSS can support up to 10,240 line side ports. Further Sattel's own documentation states that DSS line cards support up to 16 ports per card. Based on this claimed capacity, it would take 640 DSS line cards to reach the stated 10,240 line side port capacity. The DSS chassis only has room for 42 DSS line cards. This would give us a maximum total capacity of 672 ports in the DSS chassis leaving us short by 9,568 ports from Sattel's claim of 10,240. It is physically impossible to support the line-side port capacity as specified by Sattel on the DSS platform in a single DSS enclosure utilizing their 16 port analog line card. It is possible Sattel may be planning to utilize more than one cabinet by somehow wiring them together. In such a scenario it would take 7 or 8 physical DSS enclosures to reach the stated port capacity, all of them using the one single CPU card. Because of the DSS' centralized switch matrix and "dumb" line card design it would be impractical if not impossible to "wire" 7 or 8 DSS chassis into one working unit. Further, due to the primitive internal bus structure, it would be at best a cabling and electrical connection mess, if it is ever actually attempted. It has never even been tried. Its more likely that "the 10,240 port capacity number" is an unfortunate misprint.

The absolute best case for line side capacity would be to populate all card slots with E1 cards that are then connected to external channel banks, which in turn pro-vide the analog interface to telephone station sets. In this case the physical capacity of the switch for line side support would be 5,040 ports. This is half the capacity claimed in Sattel's documentation. As such, we believe the figure printed is another unfortunate error. Fur-ther, the use of channel banks for each T1/E1 would substantially increase the cost of the system (approximately $3000-$4000 per T1/E1 trunk) making the technique uncompetitive as well as difficult to support.

Switches today that make claim to 10K port capacities and higher are in the domain of the Northern Telecom MSC and DMS platforms. These sell anywhere from $8 million to $10 million. The Excel LNX switch, one of the most advanced small programmable switches, has only recently achieved port capacity numbers beyond 10K and has done so by linking LNX switches together via a proprietary fiber optic connection. One reason for linkage of LNX units together to achieve higher port count was to minimize the TDM (Time Domain Multiplexing) bus bandwidth to a level that was easy to deal with and economical to manufacture. We estimate that the Summa Four system 80/20 is still 1 year away from achieving this bench-mark. Sattel's DSS will never be able to implement the Excel or Summa Four approach as there is no PCM high-way on the switch to extend.

The Sattel Communications engineering group has tried a multi cabinet approach. We believe that a system made up of two cabinets has been assembled and appar-ently tested achieving a working density of approximately 2000 ports. Sattel Communications has never built any switching platform larger than this and has never tested any configuration under the load of real live traffic with any of the claimed maximum port densities.

Defective Line Card Ring Generator

A Class 5 telephone switch must make phones ring. Sattel designed the loop-start ring generator (the piece of equipment that pro-duces voltage to actually ring telephones) for each line card right on the line card itself. Our consulting engineers have determined that the ring generators can not ring all 16 loop-start ports simultaneously on a single card. (A necessary engineered feature.) Thus, the operating company that deploys a DSS must ensure (or hope) that three or four ports on any single card are never in a ringing state at the same time. If so, failure will occur and phones will not ring.

Computer Architecture

The DSS switch uses standard Motor-ola VME computer boards. This is an "off the shelf" computer on a single board equipped with an industry standard bus that is sold to systems integrators. No technology development has been made to the computer architecture inside the switch. The CPU board is purchased from outside vendors and has not been modified in any way whatsoever.

Lack of Mass Storage Device

The DSS does not have a system hard drive. All software is loaded on EPROMS (Electrically Programmable Read Only Memory). Modern switches use hard drives or are designed to interface with external mass storage devices.The DSS approach for system level products is dated. EPROM program storage is used typically for small embedded products (household appliances) that rarely need software updates or enhancements and work in static environments.

The DSS is targeted toward dynamic applications, requiring constant software updates and enchantments to make it compatible with a wide variety of telecommunications environments. It is inconceivable how a claimed telecommunications class four/five switch could rely on so simple a technology for stored program control. This is a hint of further deficiencies in the software operating system and dated software architecture as a whole, which is discussed in detail below.

Adding hard disk storage to the DSS system will likely be impossible for Sattel unless they throw out the complete software generic (the core or master control program) and start by writing a new generic from the beginning. Hard drives require advanced operating systems to control them.
The DSS has no operating system nor could an off the shelf software product be added or adapted due to the incompatibility of the system's software generic. (See software section for a discussion on the DSS software generic.) Furthermore, because the DSS lacks a hard drive it can not provide user recorded voice prompting, downloadable software upgrades, billing information storage and switch configuration downloads.

SS7 And Switch Adjunct Server (SAS)

Sattel claims they have SS7 capabilities. The DSS does not have SS7 capability. Sattel may be working on "patching" an independent vendor's SS7 adjunct system onto the DSS in hopes it will achieve SS7 interworking and compliance. We know of no DSS SS7 deployment that is carrying live traffic. We believe that Sattel has been working on a "station to network call model" with SS7 and has not yet attempted an "SS7 to SS7 call model", which would be necessary for long distance tandem operations such as those found in a Class Four switch. Sattel is aggressively marketing SS7 capability.

Sattel has purchased a binary tool-kit platform from New-Net called AccessMANAGER. NewNet's AccessMANAGER is a solid prod-uct that contains some of the best small scale SS7 technology on the market. It sells binary software SS7 tool-kits that allow developers and switch manufac-tures to integrate building blocks of SS7 technology into their products. It's important to note here that Sattel has simply purchased an off-the-shelf product from NewNet and as such has nothing more than a right to use license for the product. It has not developed, acquired, or purchased any technology. Most of Sattel's product claims actually belong to NewNet. In fact, Sattel's attempt to integrate NewNet's adjunct SS7 box with their own switch is a difficult and risk prone venture. For a perspec-tive on this effort note that a group of five engineers spent over 18 months engi-neering, testing and deploying NewNet's SS7 software into a Summa Four switch. Summa Four invested significant efforts to realize a unified SS7 product for their switch and took more time in doing so than Sattel Communication has even been in existence. Sattel has a large challenge ahead in their quest for SS7 interoperablility. The architectural nature of the DSS is closed. Unlike the Summa Four or Excel that support a programmable API (Application Programmable Interface) that allow one to program the switch from an external point, the DSS has no pro-grammable interface. Sattel is trying to build a custom API to interface with the NewNet adjunct box and via RS-232 interface that

runs at 19.2K baud. The NewNet is designed to interface via a faster port such as an ethernet port. This approach is likely going to be very unreliable and will limit severely call hand-ing capacity. Furthermore, DSS is a closed architecture with a fixed application. Based on the fact that the DSS has been fully coded in assembly language and supports no ethernet high speed interface, it is unclear how Sattel will see completion of this effort in any timely matter, if at all. We believe that even if ultimately successful with SS7 project, due to the limitations brought on by the switch matrix,
interface, and line-card, the DSS will still in no way improve its competitive position.

All work done to this point has been on the ANSI SS7 product. No work has been done on the ITU (International Telephone Union) outside the USA version. A ITU undertaking is in essence a completely new project. Yet Sattel claims to be in position to make international sales. We believe that the only explanation possible is that little is understood by Sattel's management as to the scope and risk involved in this SS7 undertaking.

In summary, Sattel has no SS7 solution at this time nor is their likely to be one anytime soon. Furthermore, an SS7 solution patched onto the DSS would not add value to the switch, but rather would only serve to amplify and further expose fundamental architectural flaws inherent in the DSS architecture.

Administrative Maintenance Control

The point of control for "operations, maintenance, and provisioning" of the DSS is done via a "dumb" ascii terminal off the DSS, interfacing over a serial RS-232 connection. The human interface presentation is strictly character based with no graphics or mouse. It is an approach that was used in
switches up until the late 80's. This has since been replaced on current products with GUI (graphical user interface) running on PCs with Windows or workstations using X Windows, and connections are generally done via ethernet and TCP/IP. The DSS does not have an ethernet or TCP/IP connection and it is difficult or impossible to incorporate one on the DSS.

The RS-232 maintenance interface point supported by the DSS is very limited. Switches today employ open ethernet/TCP-IP connections that allow net-work builders the ability to interface via any terminal devices on a LAN or WAN, as well as monitor the node via a network management package sup-plied by third parties (HP Open View or Sun Solstice). Further, being a Class 4 and 5
switch means lots of data entry associated with switch setup such as telephone exchange number, routing tables, line card setup information, and many other switch configuration parameters. Modern switches would let you load and store this information on a hard drive or download via an ethernet
port. The DSS has no such hardware facility or software to make this possible. The DSS architecture does not use a modern open administrative maintenance and control and is inherently limited from using any open-system approach because of its terminal I/O (input/out-put) limitations.

SOFTWARE

Assembly Language

The DSS software was written in 1989. We have found no significant improvements to the DSS software since its orig-inal release and believe the software has no potential to be modernized. DSS's flawed software design is most apparent in its use in an out of date software language. The switch is completely coded in native Motorola 68K assembly language. This technique died out long ago and has been replaced with software designs being coded in high level languages such as C, C++, and Java.

The Assembly language code written by the original DSS developers is diffi-cult if not impossible to understand and as a result, it takes a software engineer much longer to code applications or fix problems. Furthermore, the DSS does not have a real operating system, which makes it technically unfeasible to support ethernet ports, hard drives and peripherals.

Sattel will find the maintenance and evolution of its software near impossible. We believe that the original software was written entirely by an engineer named Dan Held. Mr. Held is now employed by Sattel. He is apparently one of the few individuals that understands the DSS soft-ware. It is questionable if even he could effectively modify and maintain that software. By its nature, Assembly language becomes incomprehens-ible even to its original designers as time passes and the software code expands as others add their own code to the original package. This is a major impediment to
the DSS development. We see no reason whatsoever to invest in the obsolete DSS software technology. Furthermore, we believe, even if the Assembly language is updated or thrown out and complete re-written in a high level language, that the switch still has no value. We believe that the DSS is an un-maintainable system from a software standpoint utilizing obsolete software practices.

R1/R2 Signaling

Sattel advertises in their promotional material that they support the generic ITU (International Telephone Union) standards for R1 and R2 in-band signaling. This is of little use to foreign mar-kets because R1 and R2 vary in almost every country around the world. As such, over thirty variants of R1 and R2 can be found globally. This makes world wide deployment of switching facilities a difficult prospect for even more advanced and modern switch manufactures. Excel has solved this problem by investing tremendous resource in a technology called PPL. This lets an end user work with a graphical based tool to modified the R1/R2 protocol through the downloading of data tables
into the switch. As a result, Excel's software generic does not have to change. Excel archives PPL data tables for most variants and makes them available to all switch customers free of charge. Summa Four deals with this problem by maintaining custom software loads that are installable via a
floppy disk onto the hard drive. This is a considerable challenge for Summa Four but since their software architecture is written in C/C++ and localized intelligence resides on their E1/T1 cards, Summa Four has been successful. DSS has no provision for either downloading data tables or custom software via diskette. The R1/R2 protocols are hard coded into EPROM and embedded into the core of the software generic. Sattel will need to make a custom generic for each new country it goes into in order to realize deploy-ment and acceptance by the local PTN. This is highly unlikely to happen due to the un-maintainability of their current software product as well as the immense
load and burden it would place on Sattel's small engineering staff if it where attempted. This issue will likely be a serious road block for Sattel if it really tries to move into foreign markets. Sattel's technology is insufficient to adapt to these diverse environments. Again, even if Sattel were able to get the R1/R2 protocol variants in the switch, we believe that the DSS' obsolete hardware and software still render it of no value to the market.

DESCRIPTION OF THE DATANET

DataNet is a separate product having nothing to do with the Sattel DSS switch product, though in theory it could interwork with it in some fashion. Sattel is promoting the DataNet product as being some-thing that will give internet service providers (ISPs) some sort of advantage for some purpose. It is unclear why they are making these claims. DataNet is made of off-the-shelf modems purchased from US Robotics and packaged with a T1 interface. An incoming dial-up modem call is routed into the DataNet, which terminates on one of these modems. The modems turn the analog data stream into digital format that then gets multi-plexed into a T1 bit stream and exits out the back of the box. In doing this Sattel claims a 4:1 compression advantage over hauling the call via normal telephony transport. It is assumed an ISP would purchase private dedicated T1 spans to back-haul this data to the ISP point of presence. Once at the ISP POP this T1 is de-multiplexed by a channel bank, apparently sourced from yet some other vendor, and brought out as RS-232. From that point the ISP has to take the RS-232 data and convert into ethernet /TCP-IP using still more equipment from a third party vendor.

The concept of developing a cost efficient means of transporting internet data from one point to another is valid. ISPs that want to establish a local dial-up facility in a particular area need a way to bring data from these remote location back to the central computer center. Not surprisingly, many
local calling solutions already exist, which are far more advanced than what Sattel is offering. Cisco, 3Com, Bay Networks, and Cabletron, all sell products into this market. These products do far more then Sattel's DataNet, allow-ing conversion of the analog modem traffic into TCP-IP before even
trans-porting over leased facilities. These products are full intelligent routers with modem pools that support full network management and routing capa-bilities. Sattel's DataNet does none of this and is sim-ply acting as a analog to digital converter at one end of an ISP's remote extension. Further,
nothing technically significant is introduced at the ISP POP side that provides any advantage over other products now available from some of the above mentioned suppliers. DataNet is a very low level data multiplexing solution that any network manger could put together himself with a few days
and a Black Box catalog. In short, DataNet realizes no new tech-nical achievements or product abilities that the market has not long ago solved and has developed beyond.

DESCRIPTION OF MARKET AND COMPETITOR ANALYSIS

The following is a discussion of each of the possible telecommunication market segments that Sattel could possibly pursue to generate sales. Each market segment description includes a summary of Sattel's competitive position.

Regional Bell Operating Companies ("RBOC")

We believe that the DSS has no potential for sales to any of the national RBOCs. Its technical obsolescence and questionable NEBS certification (particularly with a multiple cabinet installation) disqualifies it from any sales in this market. Since the switch was created seven years ago, only
four switches have been sold in this country and all to private networks. The DSS does not have SS7 capabilities. SS7 capabilities are required for all Class 4 central office operations. Furthermore, the DSS needs SS7 capabilities even if deployed in a Class 5 central office. In fact, in a Class 5 environment an incoming non-SS7 subscriber call on the station side must be converted to SS7 by the switch

("interworking") before it is routed out-bound ("transported down stream"). The DSS is incapable of performing any of these functions. The RBOCs have no reason to look at the DSS as a possible solution for switching in their networks.

Competitive Local Exchange Carriers ("CLECs")

Most CLECs that might be in a position to buy end office switching equipment serve a very sophisticated client base. These clients demand state of the art equipment. CLECs generally sell their services to large sophisticated business users who use direct T-1 access, ISDN and frame relay services. This market segment is made up of a small group of large companies including MFS/Worldcom, Teleport and MCI Metronet. MFS, by far and away the largest CLEC, has made a significant commitment to Erickson and is not expected to be adding other manufacturer's switches to its network. We see no reason for any CLEC to purchase any of Sattel's products.

Wireless Local Loop

This market has tremendous potential for switch makers. Cellular and the coming of PCS services are projected to greatly increase their subscriber base. This segment, unlike the CLEC segment, is not inhibited by the need to use the local RBOC's embedded wiring. Wireless providers have the advantage of giving instant service without install-ing land-line facilities to the end user. Again here, the DSS has no play because it is deficient in all AIN (Advanced Intelligent Network) and SS7 protocols (ISUP, TCAP, IS41, A Interface, or GSM) needed for entry into this market. Further, Sattel's DSS has no radio or base station technology that would allow it to tie directly to the end user's handset. PCS and cellular network operators need services and features that are not available on the DSS. Their demand is being served by companies with excellent state of art products. We see absolutely no basis for Sattel's claim that it can become a supplier to this segment.

Shared Tenant Services

This market segment is served by large PBX (Private Branch Exchange) manufacturers (AT&T, Northern Telecom, Erickson, Siemens, Fujitsu). PBX's are used to outfit buildings with local loop service. Through exemptions from FCC telecommunication rules, Shared Tenant Service providers have been able to bypass the RBOCs for some time and offer direct local loop service. As such they have had a fair amount of time to deploy equipment from many well known manufac-tures of switching equipment. The new telecommunication act has done nothing to increase this market and as such the installed base is not projected to grow rapidly.

Switch feature requirements for this environment are sophisticated and critical. A wide variety of end station services need to be supported by these systems including segregated console control, voice messaging, standard tele-phone station service (transfer, caller ID, hold/park.). The DSS architecture has none of these functions and as such will not be able to penetrate this market. In fact, it is difficult to make progress in this area even with advanced technology because the market place is highly competitive. The technically obsolete DSS is of no use in either the replacement or new equipment Shared Tenant Services market.

Long Distance Courier ("LDC")

Long distance is an area that has seen large growth in the last five years as hundreds of independent long distance switched releasers and aggregators have entered the business. Many have deployed their own switching infrastructures and operate small networks dedicated to their client base.

These users can sometimes utilize low end switches in their networks. In fact, even the DSS might be of some service to long distance re-sellers. However, DSS' only play in this area is to be extremely price competitive. Again, how-ever, heavy competition is found from the likes of Summa Four, Excel, Harris, Redcom, and ITT/CoreTelco. The DSS would be the bottom end product offer-ing at best. If a sale were made in this market segment it would be due to rock bottom pricing and failure of the purchaser to truly research the architecture and compare the DSS with it's competitors. Even at the lowest possible price, the DSS's hardware and software deficiencies make it uncompetitive even in this special market niche.

Foreign Markets

All the conditions and circumstances stated above for vari-ous market segments apply to overseas sales, with the addition of one more impediment. The DSS will have a difficult time finding acceptance in the for-eign countries due to it's inability to adjust easily to variants of the local PTN. It's protocol parameters for R1/R2 (the telephone interfaces used in foreign networks) are hard coded into the DSS software generic. As such, Sattel will need to build a custom software release for each country. This, under normal circumstances, would be a very difficult problem but for Sattel, it is a bigger challenge because the generic is coded in low level Assembly language. It will be difficult for Sattel to find pro-grammers that are skilled with the ancient practice of understanding and cod-ing in assembly language. We see no reason for Sattel to even attempt this modification. Its likely this will be another barrier for Sattel to overcome for overseas deployments.

The Internet

Many emerging telecommunications equipment manufacturers are guilty of promoting the internet and claiming that their products have some advantage when applied to this market. Sattel's claims repre-sent an extreme case of over promotion. The DataNet product, as discussed earlier, offers nothing new to the market and is simply a construction of standard products bought from other vendors. It is unlikely that any DataNet products will see a win when compared against the offering from some of the competitors mentioned above (Cisco, 3Com, Bay Networks, and Cabletron).

The DSS product has no significance or advantage to ISPs. ISPs are not in the telephone business and, in general, and do not supply local loops to customers. ISPs terminate dial-up modem calls and act as an entry point to the Internet network. The DSS has no potential for sales to ISP providers unless that pro-vider also wishes to become involved in the CLEC business. If so they have no reason to buy any Sattel products. In short, DSS or DataNet working together, or as separate products, have no reason to see any significant sales in the ISP market as better products already exist.

Video Server

Sattel announced that it is partnering with Stream Logic for the purpose of creating video servers to service the pay per view movie markets offered by many hotel/motel organizations. It is unclear why Stream Logic would partner with Sattel as the DSS architecture offers nothing to further Stream Logic's entry into this market. Stream Logic trades under the symbol STLC at under $2 and is a "penny stock". Its "affiliation" with Diana was used to promote STLC stock. Sattel would need to have back office hubing tech-nology capable of supporting DS3 or similar high speed bandwidth connections into a video server. Further, an out of band signaling approach via ISDN, SS7, or TCP-IP would be needed for control. Neither of these technologies are available on the DSS. The DSS architecture offers no significant architectural advantage for the video server market. It is questionable if it can be used in this area at all by anyone.

CONCLUSION

In our review of Sattel's products we have found constant discrepancies between claims and actual capabilities of the product. Some of the most obvious divergencies relate to expansion capacity (port size) and call handling capacity claims. Further, we find publication and discussion of features in the switching product that simply don't exist (ISDN and SS7 signal-ing).

The most significant area of concern is the idea that the DSS possesses some technology that could be valuable. Our assessment of Sattel's products is that they lack features that are today standard and are instead built with technologies that are no longer in use. We do not see either the DSS switching platform or the DataNet internet product as offering anything that will give a customer any advantage, nor will it allow that customer to integrate services that they may require in the future from products that exist today, or will be developed, because of its incompatibility and dated interface.

Questions for Diana and Sattel's Management

DSS Matrix architecture
Does DSS support a modern distributed switching matrix or a conventional centralized matrix?

No Hard Drive
Does the DSS support hard disk stored program control or is everything hard coded in EPROMS?

Stream Logic and Video Server
What hi-bandwidth interface and signaling mechanism does DSS offer for connection to video servers?

No Line-Card Intelligence
What is the largest switch built by Sattel Communications?
How many DSS cabinets did it require?
How was it load tested?

The Line Card Ring Generator
How many ports can ring simultaneously on the DSS line-card?

NEBS Compliance
Is the DSS NEBS complaint?
If so, please produce documents from BellCore showing compliance?
Does this compliance include a multi-cabinet installation?

Switch Call Capacity
How did Sattel Communications arrive at its claimed call handling capacities?
What kind of laboratory test system has Sattel Communications constructed to validate and observe these high call handling capacity numbers?
How can it be three times as fast as a Summa four System 80 or Excel LNX using the same basic CPU board product?
How can a DSS utilizing in-band telephone protocols be three times faster than a Summa four System 80 utilizing SS7?

Administrative Maintenance Control
Is all maintenance and control limited to access via a dumb terminal and RS-232 interfaces?
Is it possible to download switch configuration information as opposed to typing in on a dumb ascii terminal?
Does the DSS have ethernet I/O port that would allow access to the switch via a LAN for maintenance and operations issues?

SS7 & Switch Adjunct Server (SAS)
Where can you show a working ANSI SS7 deployment with the DSS switch architecture?
For the ANSI version of the product, is Bellcore TR-TSV-000905 compliance specification supported?
Where can you show a working ITU SS7 deployment with the DSS switch architecture?
How is the SS7 adjutant being interacted with the DSS switch?
Are you using an ethernet port or RS-232 for I/O between the two devices?
What protocol are you using to insure data integrity?
How will the DSS achieve the stated call handling capacities if all control of the switch from the SS7 adjunct is done via slow RS-232 interfaces?

Assembly Language
Is the DSS coded in native 68k assembly language?
What real-time operating system does the DSS utilize?

R1/R2 Signaling
How do you support variant of R1/R2 through out the world and how does it compare with other techniques such as those engineered by Excel and Summa Four?