Ascend

COMPETITIVE ANALYSIS

Ascend TAOS vs. Key Competitors' Products

Ascend Competitive Marketing Group

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ASCEND

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1. Product Positioning

Ascend's True Access™ Operating System (TAOS) provides the industry's premier WAN access feature set and a platform for next-generation Internet and enterprise applications . The TAOS kernel provides a rich foundation of features for mainstream WAN access environments and it comes standard on all MAX™ and MAX TNT™ products. No other operating system provides these extensive features as standard-issue software. The TAOS extensions provide targeted software solutions that allow users to customize the MAX and MAX TNT into a wide variety of WAN access environments – from small ISPs and enterprises to carrier-class networks. Finally, Ascend, unlike many of its competitors, is committed to providing ***industry-standard*** solutions, so that TAOS can fit into the broadest range of network configurations.

2. Competitive Environment

Key Competitor	Embedded Software	WAN Access Product(s)
Cisco	CiscoIOS	AS5X00
Lucent/Livingston	ComOS	Portmaster
3Com	HiPer Access	Total Control SuperStack
Bay Networks	Adapteon	5399, 8000
Shiva	ShivOS	LAN/Rover

3. Product Description – TAOS Competitors

CiscoIOS

Cisco IOS software is the platform that delivers network services and enables networked applications for the AS5X00. IOS offers different LAN/WAN features, primarily in the backbone LAN routing area. IOS feature sets for remote access hardware are divided into three categories: IP-Only, desktop, and enterprise. The IP-Only feature set includes protocols and feature support for environments where only TCP/IP is supported. The desktop feature set includes support for IPX and AppleTalk protocols. The enterprise feature set is targeted at remote access applications where multiprotocol routing, bridging and VPN capabilities are required.

Lucent/Livingston ComOS

Lucent/Livingston's ComOS operating system software is factory-installed in all Lucent/Livingston hardware. All PortMaster products can be managed through the same command-line interface or via PMConsole – a GUI that mirrors the command-line interface. While Lucent/Livingston markets itself as the creator of RADIUS, ComOS employs limited RADIUS 2.0 without extensions, and offers limited security, and no VPN support.

3Com HiPer Access

The HiPer Access Router Card in conjunction with HiPer DSP Cards is part of the Total Control HiPer Access System. The Access Router card provides LAN/WAN protocol support, distributed security services and per-user firewalls. SNMP sessions are available through the Network Management Console Card via Total Control Manager/SNMP software or any SNMP-based management host.

Bay Networks Adapteon

In early November 1997, Bay introduced a new remote access server software suite for the 8000 that provides embedded RADIUS support, Multilink Multichassis Point-to-Point Protocol (MPP) support, and V.110 support. In addition, the new software enables hardware-based compression that employs either Microsoft Point-to-Point Compression (MPPC) or STAC support. Bay also introduced a new security server, BaySecure Access Control, for authentication, authorization, accounting support and tunnel management at an additional charge of $4,500, or $8,500 for server with backup. Adapteon can be managed and configured remotely over a dial-up connection or from anywhere on the network. Network management is supplied through Bay Networks Optivity, Bay Networks Annex Manager graphical user interface, or a Telnet-based local administration utility. Dial VPN Services are supplied through BayStream .

Bay Networks Adapteon products can support either x2 or K56Flex (they can not support both on the same box or module due to licensing agreements).

Shiva ShivOS

ShivOS 5.5 is a fifth generation OS for the LanRover Access System and the new VantagePath Access Concentrator (VPAC) developed jointly by Shiva and Nortel. ShivOS delivers dial-in, dial-out and LAN to LAN support, non-blocking call control, security, management, and modem card management.

In January 1997, Shiva announced PowerBurst remote-node acceleration technology. Shiva claims PowerBurst can double file-system based application response time regardless of bandwidth. The PowerBurst architecture has two software components: PowerBurst Intelligent Client installed on the remote client workstation, and PowerBurst LANRover Server Agent on the Access Switch. The server agent is integrated into Shiva's server operating system. The only protocols that this PowerBurst release supports are IPX and NetWare Core Protocol (part of the IPX protocol suite); therefore, this "feature" is irrelevant to Internet traffic and to the ISP/carrier segment.

Shiva allows users to purchase software features as components/upgrades via the "LanRover Power-Up Series": the "Power Base" configuration includes basic routing and configuration software; the "Connectivity Kit" adds dial-out/fax functionality and LAN-to-LAN routing (US list $499); the "Security Kit" provides authentication and monitoring functionality (US list $499); and the "Performance Kit" adds Shiva's PowerBurst acceleration software (US list $1,999). The "Power Suite" option bundles all of the kits with RADIUS accounting/call report functionality via LanRover AccessManager (US list $2,499).

In late 1997, Shiva introduced the VantagePath Network Gateway, a remote access device used in conjunction with the Shiva operating system to provide VPN extensions. This new product lists for $12,500. It offers tunneling via Layer 2 Forwarding (L2F) and multi-protocol IP and IPX dial-in for 100 concurrent sessions. In addition, the VantagePath Network Gateway performs security and management functions such as data encryption via IPsec, packet filtering, user authentication via RADIUS and third-party authentication.

4. Ascend TAOS Key Competitive Advantages

The TAOS kernel and extensions: The TAOS kernel comes **standard** on all MAX and MAX TNT products. TAOS extensions create customized software solutions for service providers to offer value-added services and for enterprise sites to build complete access integration.

Rich feature set is standard: Ascend customers do not have to spend extra dollars on an AAA server, modem management, DSP management or bandwidth management.

Based on open standards: Ascend's TAOS employs revolutionary multi-vendor equipment network management.

Diverse VPN support: Ascend has provided VPN support for over one year with ATMP and PPTP and delivers L2TP support today.

Integrated dynamic firewall: TAOS includes the SecureConnect™ integrated dynamic firewall - the winner of the PC Magazine Editor's Choice Award for Firewalls - October, 1997.

Extended RADIUS server functionality: TAOS provides the basic Authentication, Accounting and Authorization (AAA) server functionality as well as over 120 extensions to provide enhanced AAA services.

Easy to use: TAOS employs a Java-based configurator: For easy installation and configuration, Ascend offers the Java-Based Ascend Configurator. This simplifies the installation process, and provides a QuickStart application to get the MAX or MAX TNT up and running in minutes, even for unique configurations.

Optimized for the WAN environment: The True Access Operating System leverages Ascend's heritage in WAN access solutions. Ascend has poured more research and development into WAN access technologies than any other vendor in the industry, and TAOS is the end result of this commitment. TAOS not only represents Ascend's current industry-leading functionality, but it also underlines Ascend's commitment to future WAN access development. TAOS provides the industry's premier WAN access feature set and a platform for next-generation Internet and enterprise applications.

Solid track record: Ascend's installed base is over five million access ports, and Ascend shipped over four million digital modems by year-end 1997. Ascend continues to be the clear remote access leader shipping 51.2% share of worldwide analog ports, and 62.2% of worldwide ISDN PRI ports in Q3'97 (Dell'Oro Group, November 1997).

Internationally proven: Guaranteed interoperability with a wide number of modem manufacturers and carrier networks including carriers in over 36 countries.

Investment protection: TAOS is well positioned to deliver the next-generation of WAN access solutions, such as Voice over IP / Voice over Frame Relay, real-time IP Fax and store-and-forward IP Fax.

5. Selling Against the Competition

CiscoIOS Weaknesses

- High price: over $12,000 in extra costs
  - IP-only feature set: $2,000
  - Desktop feature set (includes connectivity for IPX and AppleTalk): $3,500
  - Enterprise feature set:$4,000
  - Installation fee: $2,850
- Not designed for WAN traffic
  - IOS features are optimized for LAN environment
  - Key features for optimized remote access are missing
  - Requires more servers to accommodate same amount of users as Ascend's MAX product line
- Difficult to purchase and configure
  - Requires knowing exact environment for installation
  - Requires a configuration agent to determine software combination
  - New environment requires software upgrade
- Memory intensive
  - Base memory requirements are high
  - 8 flash, 16 shared, 32 DRAM minimum for AS5300
  - Cannot run all software capabilities without adding memory
  - Cost for main memory upgrade (32 MB to 64 MB) : $1,900
- High administration cost
  - Extra cost for modem manager: $6,000
  - No multi-vendor management application
  - No bandwidth manager with core software
  - No AAA server
- Incomplete VPN support
  - L2F and IPSec only
- Low value proposition
  - No ISDN BRI support
  - No free modem manager
  - No free Authorization, Authentication, Accounting (AAA) Server (RADIUS)
  - No MP+/BACP support
- Proprietary
  - No multi-vendor remote access management

Lucent/Livingston ComOS Weaknesses

- Not a customized solution
- No VPN support
- Low value proposition
  - No ISDN BRI support
  - No xDSL support
  - Limited Enterprise Protocol support
- No extended RADIUS
- Designed for small ISP networks; not designed for large access networks
- No multi-vendor network management support

3Com HiPer Weaknesses

- Not a customized solution
- Partial support of SNMP MIB
  - SNMP proxy via the Network Management Card
- No OSPF support
  - HiPer can not support variable-length subnetting or authenticate protocol exchanges
- No extended RADIUS
- No multi-vendor network management support
- Limited VPN support – PPTP only
  - No L2F, L2TP or IPSec
- Limited bandwidth management and control
  - No dynamic B-channel aggregation within the chassis or between multiple chassis

Bay Adapteon Weaknesses

- Not a customized solution
- No OSPF support
  - Adapteon can not support variable-length subnetting or authenticate protocol exchanges
- Uncertain migration path to xDSL
  - Currently, Adapteon does not support IDSL, SDSL, HSDL or RADSL modules
  - Bay Networks will resell Paradyne DSLAMs
  - Bay promises to integrate Paradyne's DSL technology into the Adapteon line, but in fact this may be extremely difficult given the backplane architecture of the 5000 and may require backplane upgrade
- No Multicast V1 & V2 Support
- No multi-vendor management support
  - Bay Networks only provides (via Optivity) management for their own products, or basic MIB access to third-party hardware. The starting price of Optivity 8.0 is approximately $12,000.

- No integrated dynamic firewall - a basic stand-alone firewall only
- Limited VPN support
  - VPN available through non-integrated third-party security - VPNet.
  - Requires additional hardware and additional management tools - higher cost and additional management overhead
- No extended RADIUS
- Not extensively tested in the field or in large networks
  - Bay is new to the remote access business with limited experience in the market
  - Low market share (less than a 1% share per Dell'Oro Group, November 1997)
  - Questionable investment protection Lack of success in market should lead customers to question the company's long term commitment to the market.

Shiva ShivOS Weaknesses

- OSPF support promised for sometime in 1998
  - Not ready for large networks that require variable-length subnetting and authentication of protocol exchanges
- xDSL support promised for sometime in 1998
- Not tested in large networks – no track record
- Limited VPN support
  - No IPSec
- No multivendor management support
- No integrated dynamic firewall – a basic stand-alone firewall only

6. Competitive Comparison Matrix

Feature		Ascend TAOS	Cisco IOS	Lucent ComOS	3Com HiPer Access	Bay Networks Adapteon	Shiva ShivOS
Modem Support	V.34	Yes	Yes	Yes	Yes	Yes	Yes
	K56Flex	Yes	Yes	Yes	NO	Yes	Yes
	x2	NO	NO	NO	Yes	Yes	NO
	V.90	Future	Future	Future	Future	Future	Yes
	PHS	Yes	NO	NO	NO	NO	NO
	V.110	Yes	NO	Yes	NO	Yes	NO
WAN Access	T1/E1	Yes	Yes	Yes	Yes	Yes	Yes
	V.34	Yes	Yes	Yes	Yes	Yes	Yes
	ISDN BRI	Yes	NO	NO	NO	NO	NO
	ISDN PRI	Yes	Yes	Yes	Yes	Yes	Yes
	PPP	Yes	Yes	Yes	Yes	Yes	Yes
	Frame Relay	Yes	Yes	Future	Yes	NO	Yes
	ISDL	Yes	Yes	NO	NO	NO	NO
	HDSL	Yes	NO	NO	NO	Future*	NO
	SDSL	Yes	NO	NO	NO	Future*	NO
	RADSL	Yes	Future	NO	Yes	Future*	NO
Enterprise Protocol Support	IP	Yes	Yes	Yes	Yes	Yes	Yes
	IPX	Yes	Yes	Yes	Yes	Yes	Yes
	AppleTalk	Yes	Yes	NO	NO	NO	Yes
	Client Software	Yes	NO	NO	Yes	Yes	Yes
	Dial Out	Yes	NO	Yes	Yes	NO	Yes
AAA Server	PAP/CHAP	Yes	Yes	Yes	Yes	Yes	Yes
	RADIUS extensions	Yes	NO	NO	NO	NO	NO***
	TACACS+	Yes	Yes	NO	NO**	NO	Yes
Security	Integrated Firewall	Yes	NO	NO	NO	NO	NO
Bandwidth Management	Multilink PPP (MP)	Yes	Yes	Yes	Yes	Yes	Yes
	Multilink Protocol Plus™ (MP+)	Yes	NO	NO	NO	NO	NO
	Multi-chassis MP	Yes	Yes	Yes	NO	Yes	NO
	Multi-chassis MP+	Yes	NO	NO	NO	NO	NO
	Hardware compression	Yes	NO	Yes	NO	NO	NO
Management	SNMP MIB Support	Yes	Yes	Yes	Partial	Yes	Yes
	Modem Round-Robin Allocation	Yes	NO	NO	NO	NO	NO
	Integrated modem manager	Yes	NO				
	DSP manager	Yes					
Terminal Services	SLIP	Yes	Yes	Yes	Yes	Yes	Yes
	C-SLIP	Yes	Yes	Yes	Yes	Yes	Yes
	PPP	Yes	Yes	Yes	Yes	Yes	Yes
IP Routing	RIP v1	Yes	Yes	Yes	Yes	Yes	Yes
	RIP v2	Yes	Yes	Yes	Yes	Yes	Yes
	OSPF	Yes	Yes	Yes	NO	NO	Future
Tunneling	ATMP	Yes	NO	NO	NO	NO	NO
	PPTP	Yes	NO	NO	Yes	NO	Yes
	L2TP	Yes	NO	NO	NO	Yes	Yes
	L2F	Future	Yes	NO	NO	NO	Yes
	IPSec	Future	Yes	NO	NO	Yes	Yes
Virtual Routing	Separate RIP, OSPF route engines	Future	NO	NO	NO	NO	NO

*Bay Networks has announced plans to integrate xDSL technology via its partnership with Paradyne

** 3Com has announced plans to integrate TrancendWare into the USR RAC products

*** Shiva's VantagePath claims new, expanded multi-level RADIUS functionality

7. Other Competitive Reference Documents

For further information, please refer to the following documents:

1. Ascend TAOS VS Cisco IOS Competitive Evaluation and Selling Strategies

Any feedback or suggestions are welcome. Please send any pertinent competitive information to the attention of the Competitive Marketing Group in Alameda.

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