

Product Announcement



I.D. Number: 051PA

Cisco AS5100

Introduction

This document introduces the latest product in Cisco's access server family, the AS5100. It includes a brief overview and positioning statement, application examples, a more detailed product description, configuration, and orderability information.

Overview and Positioning

The AS5100 series is Cisco's newest integrated access server. It provides dial-up access to enterprise networks from single users (remote node services) or from remote sites (asynchronous dial routing.) It integrates the functions typically provided by standalone data service units/ channel service units (DSUs/CSUs), channel banks, modems, communication servers, and routers.

The AS5100 offers the same access server functionality as the Cisco 2509/2511 products, but in a high-density package. It fits into Cisco's broad access product line as a central or regional device for enterprise and service provider markets. Remote node users will access enterprise network services by dialing in to the AS5100 using Remote Access Client software (see related announcement in this package) and a modem.

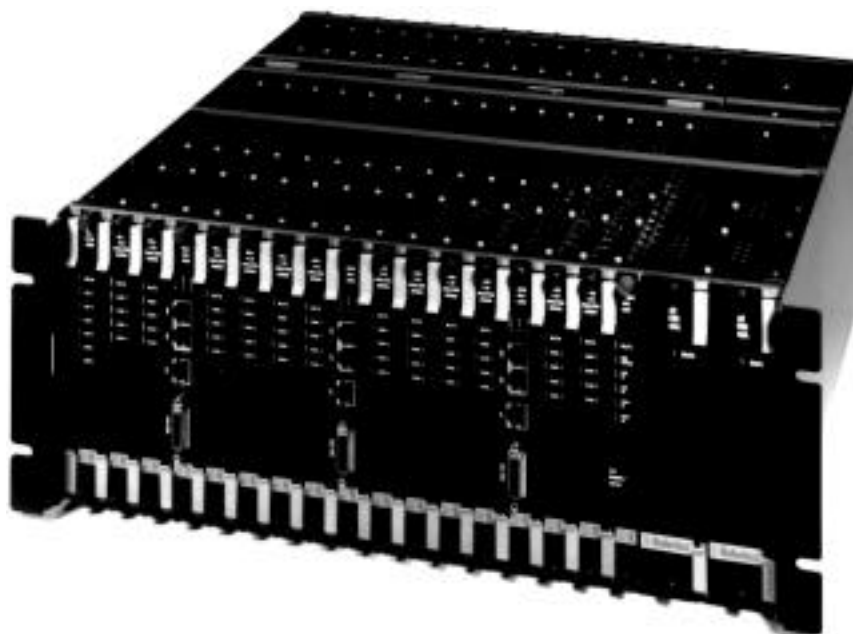
Asynchronous dial routing from remote sites can be accomplished through other Cisco routers including the Cisco 1020 or the popular Cisco 2500 series. The AS5100 will be used in enterprise network extensions for telecommuting and for mobile user transaction-based services. It will also be applied by service providers' new information and access services.

The AS5100 is the first product resulting from the U.S. Robotics (USR)/Cisco relationship announced late last year.

Key Advantages

From a functional perspective, the AS5100 provides several key advantages.

- Cisco Internetwork Operating System™ (Cisco IOS)—Since the Cisco IOS™ is the dominant software running on most of the world's internetworks (both on Cisco routers and on many partners' platforms), the AS5100 offers guaranteed compatibility with those networks. The highest level of feature support can be obtained when running the Cisco IOS on the AS5100.



- **Protocol Support**—The breadth and depth of protocols supported by the Cisco IOS is another key advantage for the AS5100. Not only does the AS5100 support remote node and remote LAN dial-in protocols, but it supports the full suite of routed and routing protocols. In the future, key features such as asynchronous mobility will be offered exclusively by Cisco.
- **Performance**—All AS5100 components are designed for high-speed operation. The V.34 modem card sets and the access server cards allow single-channel operation at up to 115 kbps. Performance tests using the Cisco 2511, the base technology for the AS5100 access server cards, prove it to be the highest-performing access server on the market today and demonstrate that performance does not decrease with additional users.
- **Compatibility**—By supplying modem components and access server components in one package, we have anticipated and avoided the incompatibility concerns that plague multivendor installations. Known successful configuration parameters can be documented and distributed, reducing the number of compatibility problems. This is particularly true in the modem market, where literally hundreds of models and versions are available.
- **Future**—The AS5100 series is based on a platform that scales to provide support for upcoming dial-up technologies as well as support increased demand from existing services. The chassis buses are capable of carrying both increased density and higher-speed traffic.

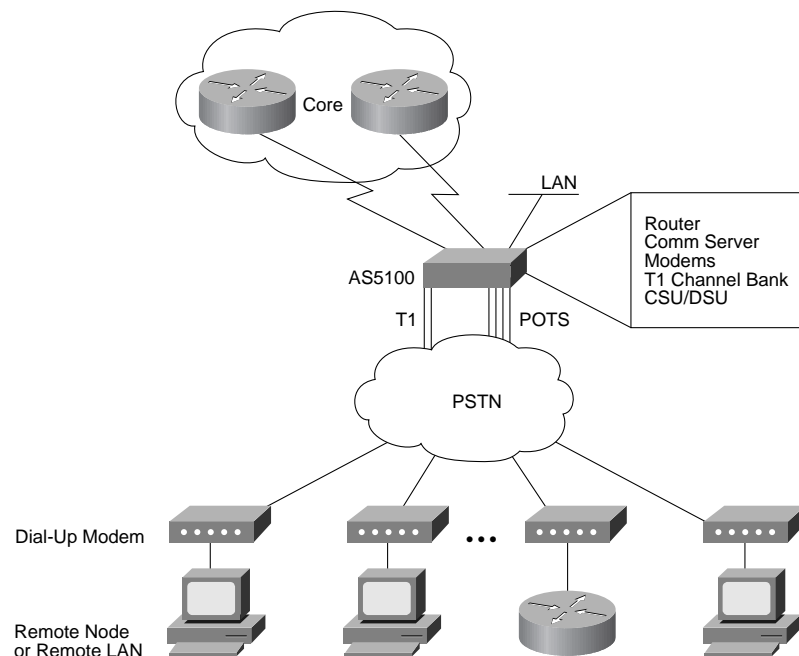
From an operational perspective, there are advantages that center primarily on the integration of technologies.

- **Single-vendor support from Cisco**—A big challenge for dial-up users in the past has been an excess of “finger pointing” (the terminal server vendor pointing fingers at the modem vendor, etc.). Now, with the integrated AS5100 and Cisco’s proven support capabilities, users can reap two major benefits: reduced time to isolate problems and reduced time to solve them.

With this product, customers can obtain total functionality in a single package, along with service and support from a single vendor — Cisco.

The functions of the AS5100 are illustrated in Figure 1. Individual remote users running remote client software applications on their computers dial through a modem to the AS5100 sites. Similarly, small remote LANs with asynchronous dial-up routers like the Cisco 1020 dial through a modem to the same AS5100.

Figure 1. AS5100 Functions



Depending on the number of simultaneous sessions required and the tariffing of services, the AS5100 will be set up for digital (channelized T1) or analog (plain old telephone service, or POTS) service. In the digital case, the public switched telephone network (PSTN) infrastructure delivers the calls digitized on channelized T1 carriers, and the AS5100 supplies the DSUs/CSUs, channel bank, and modems. In the analog case, the POTS lines are connected directly to the modems.

From the modems, the calls are directed to the access server cards. There, the asynchronous serial protocols are handled, and the router engine forwards the resulting data packets to the appropriate network interface. The AS5100 supports both Ethernet and serial network interfaces.

Applications

Applications for this technology include remote node and remote LAN dial-up. The following examples illustrate several uses of the technology. (See Figure 2.)

Enterprise—Telecommuters

In this application, customers are looking for access to a corporate network for work-at-home telecommuters. In many parts of the country ISDN is not yet ubiquitous so the AS5100's high-speed V.34 modems will be a popular telecommuter solution.

Telecommuting applications are increasing rapidly both by choice and by mandate. Quality-of-life issues such as long commutes, flexible work time, and clean air regulations are driving the trend. New applications and technologies, including faster modems, are the enablers. Tasks that are now commonly accomplished at home include documentation, software development, and the use of personal productivity tools.

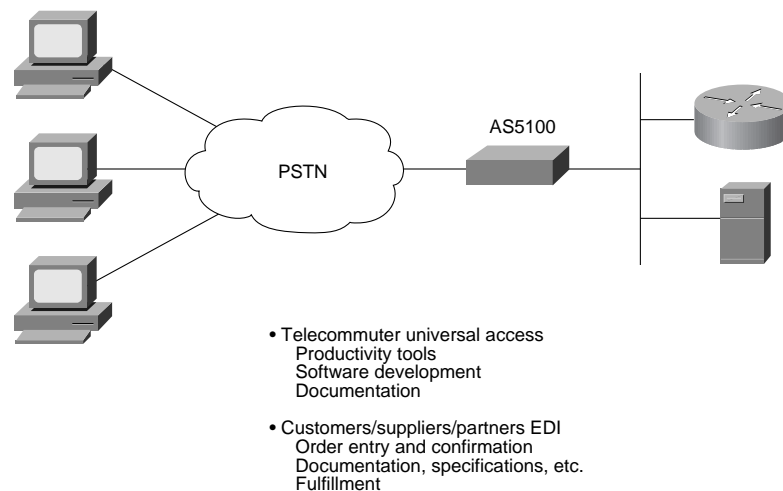
The AS5100 is the central site server; telecommuters can call into it from their home systems to gain network access.

Enterprise—Partners

Enterprise clients are also using their networks to improve communications with their partners, suppliers, and customers. These scenarios include such applications as order entry and confirmation, documentation and specifications, and fulfillment. Key competitive advantages can be gained if communications are expedited and improved in these areas.

Again, for dial-up communications from partner organizations, the AS5100 can form the central site server.

Figure 2. Enterprise Remote Node



Enterprise—Mobile Users

Perhaps the greatest demand for dial-in access to enterprise networks today comes from mobile users. Mobile users include traveling employees such as service, sales, marketing, and executive professionals. These users have portable PCs and connect from hotel rooms where phone lines are available. Demand for increased travel and improved communications from these groups is driving the application. The requirements for these mobile users include e-mail, personal productivity tools, and general file access. (See Figure 3.)

Additionally, the AS5100 provides mobile users who require access to SNA mainframe applications the ability to use SNA remote client software that supports Cisco's NCIA.

Enterprise/Education—Remote LAN

Remote LAN applications can be accommodated with many different solutions thanks to Cisco's broad line of access routers and LAN extenders and the various WAN technologies available. Cisco's 1000 series, 2500 series, and 4000 series offer various capabilities, media and protocol choices, and price points for remote LAN access. One possible technology for remote LAN access is asynchronous dial-up routing. (See Figure 4.)

A typical scenario for use of the AS5100 would involve internetworking many small remote sites. Possible users of this technology might be rural point of sale (POS), K-12 schools, and branch offices with occasional use applications and relatively low bandwidth requirements.

Figure 3. Enterprise Mobile Users

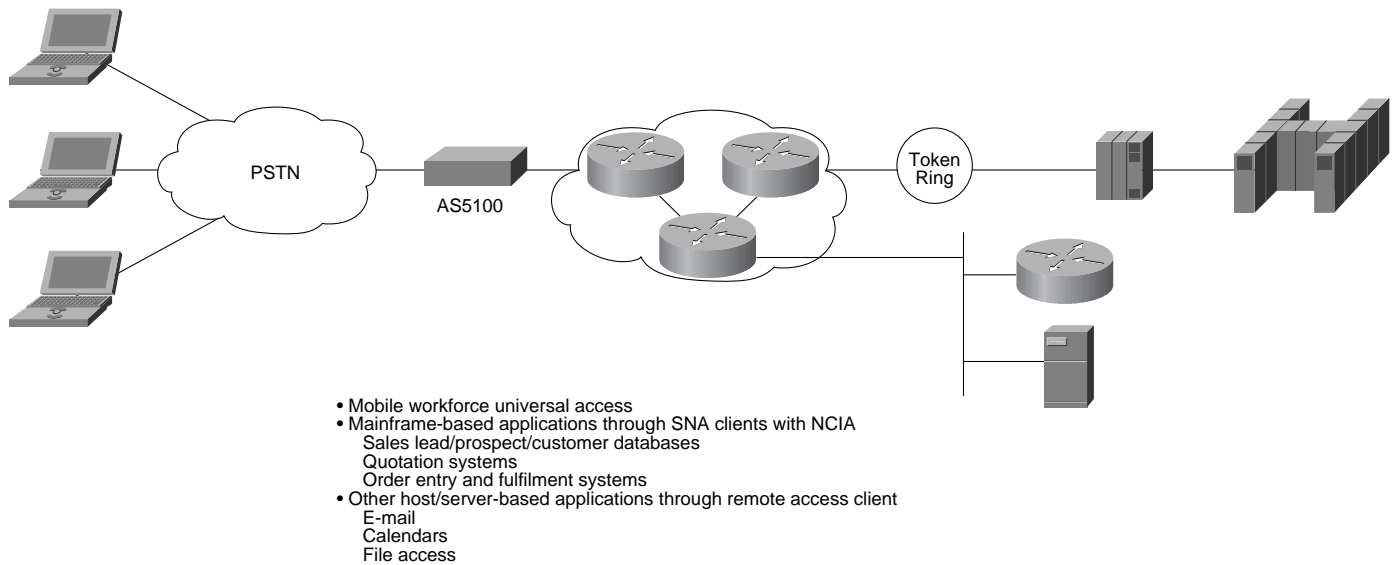
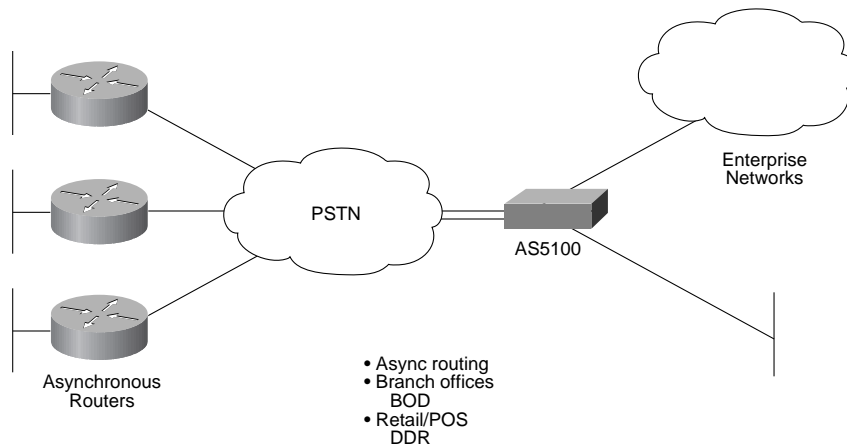


Figure 4. Enterprise Remote LAN



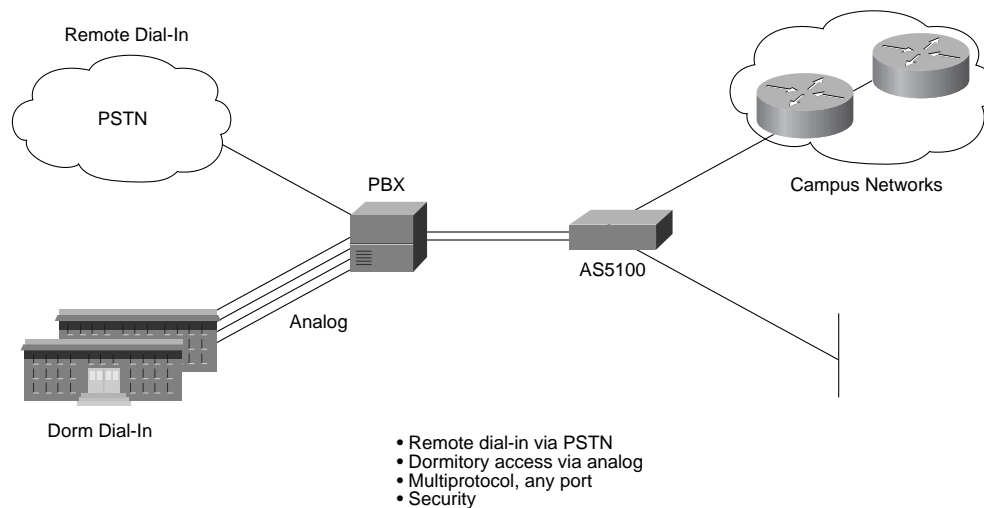
University—Remote Users and Student Dorms

Universities have long been using dial-up access as a way of supporting large numbers of occasional users. Traveling faculty and staff have the same requirements as business mobile users do. Similarly, there are university telecommuters. A major difference in this segment, however, is the large student

population. Many universities use dial-up service to support this population of users, both from remote sites and even in large quantities from dormitories.

The AS5100 with its higher densities is ideally suited for these applications. (See Figure 5.)

Figure 5. University Remote Node



Service Providers

The huge growth in demand for access to the Internet and to the many services being offered are growing and pushing dial-up service into big business for service providers.

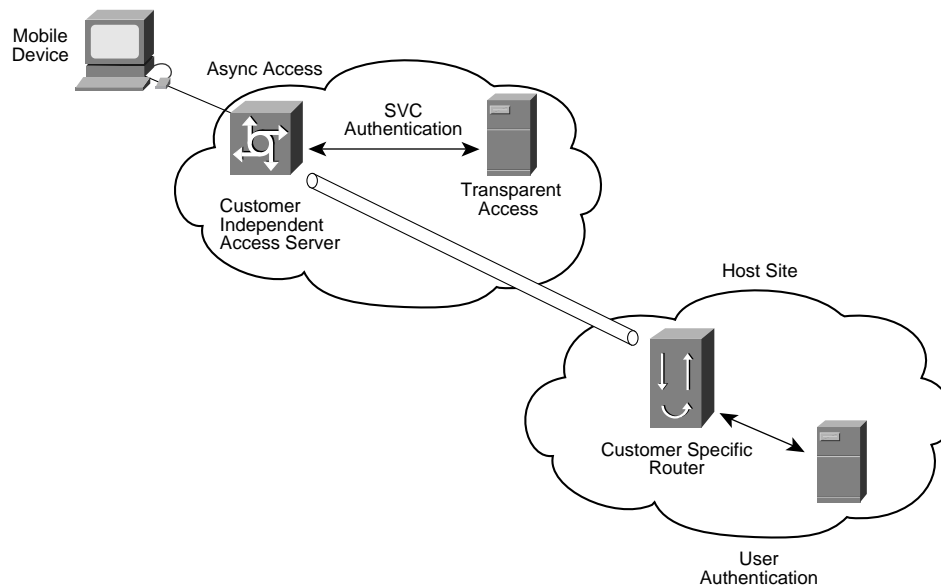
Depending on the service type, remote node users of these services could include mobile enterprise users, telecommuters, and home users wanting access to the Internet.

In short, any of the applications discussed for Enterprise users can also apply in the Service Provider area. The service providers have many of the same requirements as our enterprise customers including security, accounting, and multiprotocol

access. In addition, the service providers have specialized requirements. For example they must be able to deploy Virtual Private Networks over the public network.

Cisco's Access Servers and IOS provides this specialized service for async dial-up users. The figure below illustrates asynchronous access to a private network through a public access server. The user dials the public access server and is Authenticated via a centralized security server. After authentication a "tunnel" is created to the user's home site where local authentication/ authorization can take place.

Figure 6. Service Providers-Backhaul



AS5100 Product Description

The AS5100 is a modular platform that can be custom configured to meet varied requirements. It consists of a rack-mountable chassis, power supplies, and circuit cards.

Chassis Specifications

The AS5100 chassis is a single 7-inch-high rack-mountable shelf. It has 17 card slots and two power supply slots.

The chassis supports two power supplies for full redundancy. These load-sharing supplies are fan cooled and can be inserted or removed while the chassis is powered up. Both AC and DC supplies are available.

One of the 17 card slots is dedicated to a network management card that performs the Simple Network Management Protocol (SNMP) agent functions for communication between a management console and the modem and T1 cards in the chassis. The rest of the card slots are available for a T1 card, up to 12 quad modem cards, and up to three access server cards.

All cards are hot-swappable; that is, they can be inserted and removed with the power on. There is no need to interrupt operation. Hot-swapping will not damage the unit or cause data errors on other cards in the chassis.

Chassis Capacity

- 16 card slots for application/interface cards
- 1 card slot for a network management card
- 2 slots for power supplies

Regulatory/Agency Approvals

- FCC Part 15, Class A EMI/RFI
- FCC Part 68
- UL listed
- CSA approved
- IC (formerly DOC) certified

Power Supply

- AC and DC fuse protection
- Input line fuse protection with all DC power supply units (PSUs)
- Auto shutoff in overvoltage and short-circuit conditions
- Automatic redundant switchover with two units installed

Operating Environment

- Temperature: 0–40 C, 32–104 F
- Relative humidity: 0–95% noncondensing

Power Requirements

AC PSU

- Nominal 120V (90–132 VAC) @ 47–63 Hz or strap-selectable nominal 240V (180–264 VAC) @ 47–63 Hz)

DC PSU

- Nominal –48VDC (–42VDC to –60VDC) with respect to common

Maximum Output Power

- 325 watts
- +5V 45A
- -5V 2A
- +12V 3.5A
- -12V 3.5 A

Power Supply Input

- Maximum Input Power
 - 475 watts
 - 1621 BTUs
 - 4A (AC), 9.9A (DC)
- Typical Input Power (configured with a T1 card, NMC, and 12 V.34 Quad Modem Cards)
 - 325 watts
 - 1105 BTUs
 - 2.7A (AC), 6.8A (DC)

Mechanical Specifications

Weight of fully loaded chassis: 54.5 lbs/24.4 kg

Chassis dimensions (LxWxH): 18.59 x 19 x 7
(47.219 cm x 48.260 cm x 17.780 cm)

Modem Specifications

Each of the modem card sets contains four U.S. Robotics modems with all of the compatibility, error correction, and data compression features of the USR Courier family. The modem cards support the complete set of U.S. Robotics AT commands. Front panel LEDs indicate the status of each channel.

Digital, analog, and selectable digital/analog modem cards are all available. Cisco offers both the high-performance V.34 and cost-effective V.32 modem card versions.

DTE Interface

- Supports standard DTE rates up to 115,200 bps
- Asynchronous operation
- Synchronous operation (DCE supplies Tx/D clock)
- Physical interface I, SCSI-II 50-pin connector (converted via supplied cable to 4 EIA/TIA-232, 25-pin female)

Error Correction

- ITU-T V.42 error control
- MNP 2–4 error control

Data Compression

- ITU-T V.42bis data compression
- MNP 5 data compression

Modulation

- ITU-T V.34 and V.FC at 28,800 bps
- V.32 terbo at 19,200 bps
- ITU-T V.32 bis at 14,400; 12,000; 9600; 7200 and 4800 bps (symmetrical and asymmetrical full duplex)
- ITU-T V.32 at 9600 and 4800 bps
- ITU-T V.22 bis at 2400 bps
- ITU-T V.22 at 1200 bps
- ITU-T V.32 at 1200/75 bps

- ITU-T V.21 at 300 bps
- Bell 208B at 4800 bps (synchronous)
- Bell 212A at 1200 bps
- Bell 103 at 300 bps
- QuickConnect technology
- Adaptive Speed Leveling (ASL)

Dimensions

- Application Card: 12.45 x 6.4
- Interface Card: 4.85 x 6.4

Channelized T1 Interface

For customers who want to take advantage of the cost structures of channelized T1 service versus POTS, they will need digital modems and the Dual T1 card set.

The Dual T1 card set performs both the line termination functions of a T1 CSU and the DS0 demultiplexing functions of a T1 channel bank. The Dual T1 card set can handle two T1s and distribute 48 DS0s to the quad modem cards via the chassis time division multiplexing (TDM) bus.

The card set supports feature groups B and D for fast transaction processing and call routing. It also supports Fractional T1, so customers pay only for the number of channels required.

T1 Interface

- Dual T1 interface supports up to 48 DS0s
- D4 or ESF frame formats
- AMI or B8ZS line coding
- Integral CSU
 - Auto equalization for data and clock recovery
 - Range = -36 dB at 772 kHz (6000 feet on 24 AWG TP wire)
- Internal and loop timing source from either span line
- Automatic fallback to alternate timing source
- Configurable E&M type II signaling support, including:
 - Wink start or immediate start
 - Answer supervision
 - Feature Group B, Feature Group D, and others

- DNIS and ANI address signaling
- Supports ground start and loop start supervision
- Supports MF and DTMF addressing

Physical/Electrical

- LEDs for Run/Fail, Carrier, LoopBack, and Alarm status
- Bantam monitor jacks for span lines on T1 NIC
- Dimensions
 - T1 Application Cards: 12.45 x 6.4
 - T1 Interface Card: 4.85 x 6.4
- Power
 - 5 watts per card set
- Heat
 - 17 BTUs per card set
- Operating Environment
 - Temperature 0–40 C, 32–104 F
 - Relative humidity 0–95% noncondensing

Access Server Cards

The AS51-16A-E cards are based on the popular Cisco 2511 access server. Each card supports up to 16 asynchronous connections at speeds up to 115.2 kbps. On the network side, each card supports an Ethernet connection and a synchronous serial WAN port. Each card also includes the standard Cisco console and auxiliary ports.

The AS51-16A-E runs the standard Cisco IOS and therefore offers Cisco's complete feature-rich set and proven reliable operation. For Cisco's access server products, the Cisco IOS delivers the routing features available across the Cisco family as well as the features specific to asynchronous dial-up access. The Cisco access server functional areas include the following:

- Remote node service—Supports Serial Line Internet Protocol (SLIP), Point-to-Point (PPP), XRemote, AppleTalk Remote Access (ARA), and the emerging IPX remote node standards (IPXCP and IPXWAN); allowing PCs, Macintoshes, and X-terminals to dial in and access network services as if they were directly connected to the network.
- Routing—Uses asynchronous lines for inexpensive dial-up routing of IP and IPX protocols using voice phone lines, and uses synchronous lines for heavier traffic. Routing includes innovative features such as bandwidth-on-demand (BOD) routing and dial-on-demand routing (DDR).
- Terminal service—Connects terminals, PCs, printers, hosts, and modems; supports Telnet, LAT, TN3270, rlogin, and X.25 PAD, as well as translation between these protocols.

The protocols supported for each application in each of the available Cisco IOS feature sets are listed in the table below. Note that a new feature set is now available — the Remote Access Software (RAS) feature set. The purpose of the RAS set is to provide total remote node functionality in an image that can operate in a smaller memory space than a full router-featured image.

		IOS Feature Sets			
Category	Protocol/Feature	IOS IP	IOS Desktop	IOS RAS	IOS Enterprise
Terminal services	Telnet, rlogin	•	•	•	•
	TN3270			•	•
Remote node	SLIP, PPP, SLIP, PPP	•	•	•	•
	ARA V1 and V2, IPX over PPP, IPXWAN, XRemote, MacIP		•	•	•
Protocol translation	Telnet, TN3270, LAT, X.25, PAD			•	•

Management

One of the key advantages of the AS5100 is its modem management capability. Network operators will appreciate the ability to set all modem parameters through the modem's "third port," the management interface. (The telco line interface and the DTE interface are the two ports on standard modems.) Every parameter that can be set via AT commands can also be set through the management port. One important example is the ability to busy out a modem in case of problems. This simple capability can stop blocking of calls to a rotary when a single modem fails.

Each AS5100 is equipped with a network management card that provides the SNMP proxy agent service for the modem and T1 cards in the chassis. The network management card communicates with the cards over the dedicated management bus. All of the access server cards in the chassis are also SNMP manageable. A single SNMP console can manage the modem chassis and cards through the network management card and the access server cards via a network interface. The access server cards also support individual console and auxiliary ports for local management.

Cisco is also offering a management tool called the Total Control Manager (TCM) developed by U.S. Robotics. TCM provides a graphical user interface (GUI) to communicate with the network management card in the AS5100.

Future initiatives for management integration may include combining the PC platform products (TCM and Cisco's Configuration Builder) as well as adding AS5100 support to CiscoWorks™.

Configuration Guidelines

The AS5100 is a modular platform that can be customized for particular users' applications. Various models and configurations of power supplies, modem cards, and access server cards are available. These configurations are described in the section that follows. First the chassis-level configuration is explained, then, because of the additional options on the access server card, it is covered in more detail.

Chassis Level

The basic components of the system are the chassis, power supplies, modems, T1 cards (for digital applications), and the access server cards. The chassis has space for two power supplies and 17 cards.

All AS5100 series chassis will be configured at the factory according to the following general template and rules. The template and rules are used to simplify configuration, ordering, and manufacturing.

Template

Slot	Slot Options	Description
1	AS51-2T or Empty	Dual T1 card set if digital modem, Empty if analog modem
2	AS51-4XXXX or Empty	Any of the quad modem card sets
3	AS51-4XXXX or Empty	
4	AS51-16A-E or Empty	
5	AS51-4XXXX or Empty	Any of the quad modem card sets
6	AS51-4XXXX or Empty	Any of the quad modem card sets
7	AS51-4XXXX or Empty	Any of the quad modem card sets
8	AS51-4XXXX or Empty	Any of the quad modem card sets
9	AS51-16A-E or Empty	Access server card set
10	AS51-4XXXX or Empty	Any of the quad modem card sets
11	AS51-4XXXX or Empty	Any of the quad modem card sets
12	AS51-4XXXX or Empty	Any of the quad modem card sets
13	AS51-4XXXX or Empty	Any of the quad modem card sets
14	AS51-16A-E or Empty	Access server card set
15	AS51-4XXXX or Empty	Any of the quad modem card sets
16	AS51-4XXXX or Empty	Any of the quad modem card sets
17	AS51-NMCS-E or Empty	Network management card set

Additional Rules

- There can be a maximum of one AS51-2T card per chassis. Customers who want to use Channelized T1 to bring calls in to the AS5100, must choose one AS51-2T card. One AS51-2T will support up to two T1 lines. If one is ordered, it must be in slot 1.
- There can be a maximum of 12 AS51-4XXXX quad modem card sets per chassis. Any mixture of analog, digital, or analog/digital card sets are allowed.
- There can be a maximum of three AS51-16A-E access server card sets per chassis. They must be installed in the slots numbered 4, 9, and 14. Note that this is not a limitation of the chassis, but it greatly simplifies the cabling.
- Each chassis must have one AS51-NMCS-E network management card set installed in slot 17.

Access Server Card Level

The AS51-16A-E card has several options associated with it including DRAM, Flash memory, and the Cisco IOS image. We have made every effort to make the AS51-16A-E card configurable in the same fashion and with the same model numbers as the standalone Cisco 2511 to simplify the ordering and configuration process.

Note that all AS51-16A-E cards (up to three per chassis) must have the same software and memory configuration.

Sample Chassis Configurations

The bundled systems are excellent examples for users trying to configure new systems. In addition, the following samples can be used:

No. of Cards	Model Number	Description
48-Port Analog V.32 Modem System, IP Only Cisco IOS		
1	AS5101-A	Complete chassis, AC, Ethernet including: 1 x 16-slot AC chassis 2 x AC-45A power supply 1 x network management card set
12	AS51-4V32A	Quad V.32bis analog modem set
3	AS51-16A-E	Access server card set—16A, 1E, 1T
3	SF25C-10.2.2	Cisco 2500 IOS IP feature set
48-Port Digital V.34 Modem System, Cisco Enterprise IOS		
1	AS5101-A	Complete chassis, AC, Ethernet including: 1 x 16-slot AC chassis 2 x AC-45A power supply 1 x network management card set
1	AS51-2T	AS5100 dual-T1 card set
12	AS51-4V34D	Quad V.34 digital modem set

No. of Cards	Model Number	Description
3	AS51-16A-E	Access server card set—16A, 1E, 1T
3	SF25A-10.2.2	Cisco 2500 IOS Enterprise feature set
32-Port Analog V.34 Modem System, Cisco Desktop IOS		
1	AS5101-A	Complete chassis, AC, Ethernet including: 1 x 16-slot AC chassis 2 x AC-45A power supply 1 x network management card set
8	AS51-4V34A	Quad V.34 analog modem set
2	AS51-16A-E	Access server card set—16A, 1E, 1T
2	SF25B-10.2.2	Cisco 2500 IOS Desktop feature set
24-Port Digital V.34 Modem System, Cisco Enterprise IOS		
1	AS5101-A	Complete chassis, AC, Ethernet including: 1 x 16-slot AC chassis 2 x AC-45A power supply 1 x network management card set
1	AS51-2T	AS5100 dual-T1 card set

No. of Cards	Model Number	Description
6	AS51-4V34D	Quad V.34 digital modem set
2	AS51-16A-E	Access server card set—16A, 1E, 1T
2	SF25A-10.2.2	Cisco 2500 IOS Enterprise feature set

As shown in the lists and sample configurations above, even though the AS5100 series is a modular platform with many options, it is relatively easy to configure and quote. However, there may be differences from other products in Cisco's line that are itemized in the guidelines below. As always, details should be confirmed with your Customer Service representative.

The standard target delivery time for the AS5100 will be four weeks instead of the three week standard lead time that we target for many of our products.

- Change orders and cancellations may not be as easily accomplished with the AS5100, and requests for changes may end up causing further delays in delivery.
- Each system on a given order may have to be listed separately, although you may order multiples of identical systems. Thus, if your customer wants two systems each

Availability and Orderability

The AS5100 products have been orderable since February 27, 1995, and became available in North America on March 14, 1995. Availability in selected European countries begins in the second calendar quarter with the UK, France, Germany, and Norway.

with 48 modems and a third with 24, you would order quantity two systems with 12 quad modem cards each and quantity one system with 6 quad modem cards, not three systems and 30 quad modem cards.

- You must also put AS5100 equipment and other Cisco equipment on separate sales orders even if they are on the same customer purchase order. This is required to streamline the delivery process and reduce requirements for partial shipments.

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