



Product Catalogue

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Introduction

This document introduces the various components and modules that are used to build up AS4000 systems and networks. It provides an overview of the functionality of each part and outlines the various ancillary systems and services that are available from Airspan.

The AS4000 Wireless Fixed Access system is a digital point to multipoint radio access system providing wireless access for fixed subscribers to the telecommunication network. AS4000 delivers telephony, voice band facsimile/data, ISDN, packet and leased line data services. The AS4000 radio links provide equivalent Performance to copper pairs and are therefore a direct alternative to the use of copper cabling for the delivery of these services to customers.

The system uses point-to-multipoint radio links between the individual customer's premises and the carrier's central office or local exchange as a replacement for the traditional copper air local loops. If greater flexibility or range is required, the network radio equipment can be located in a suitable building or wayside cabinet.

In addition to faster deployment when compared with the time required to install new copper plant, line plant maintenance costs are eliminated, and digital services can be rapidly deployed to new residential and business customers.

Each individual customer location is served by one or more radio links, which can be configured to support a range of services. These can be single or multiple units delivering a mixture of dedicated link and on-demand services. Services supported include:

Plain Old Telephone System (POTS) equivalent service

Fixed line 2x 64 kbit/s leased line data services

ISDN basic rate access at 144kbit/s

Packet data services

AS4000 systems have been designed from the outset to be modular and scalable. This enables systems to be built according to operators' requirements, the frequency availability and the number of customers to be served. It also enables any equipment failures to be rectified simply and quickly.

The AS4000 system consists of a number of major physical blocks (See Figure 1):

Subscriber Terminals (STs), which are located at the customer's premises,

Central Terminals (CTs), sited at a suitable location to maximise radio coverage,

Access Concentrators (ACs), usually sited at the Central Office or Switch site, and

AS8100 Sitespan or the AS8300 Element manager - the Network Management system.

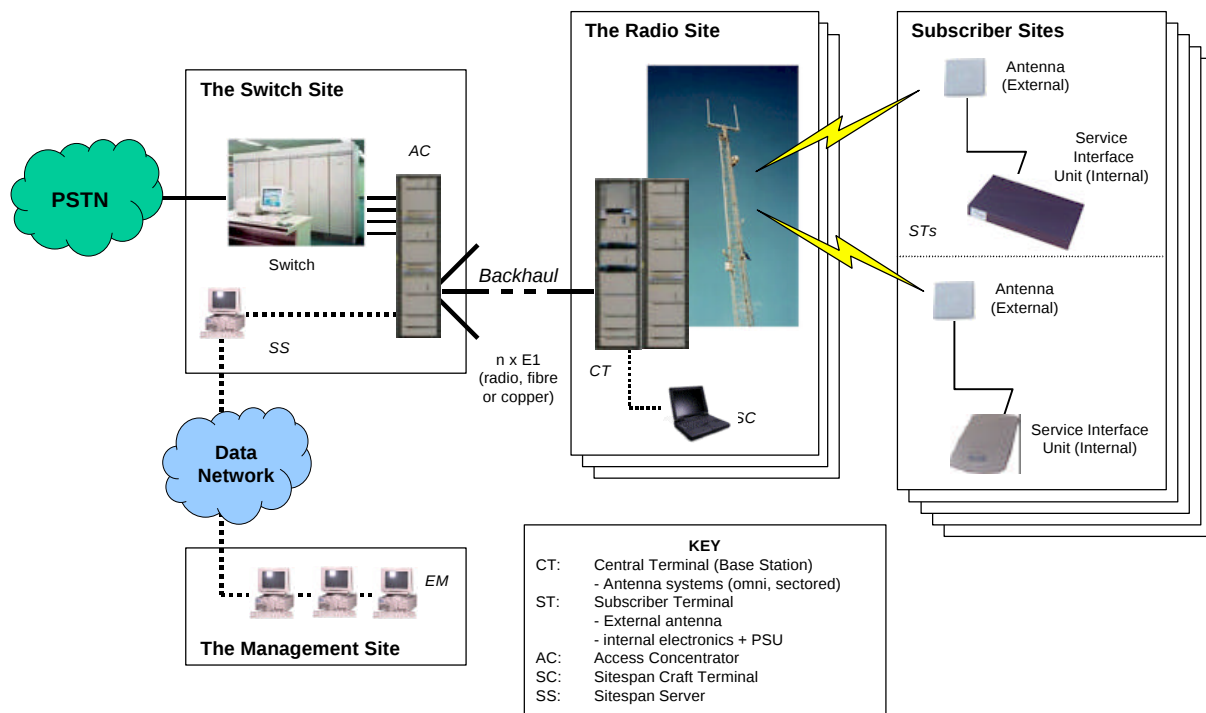


Figure 1. AS4000 Architecture

AS4000 Infrastructure

The AS4000 Central Terminal (CT)

The Central Terminal is the AS4000 radio base station and is normally located at a site chosen for best radio coverage for the target ST population.

The CT comprises at least one rack with an **RF combiner shelf** and associated **modem shelves**. Additional CT racks or expansion racks may be co-located to provide increased capacity.

Each modem shelf is connected to the radio the combiner shelf and operates a single RF channel within the selected channel plan.

Two types of modem shelves are available:

Fixed assigned (FA)
Demand assigned (DA)

The FA shelves operate only in FA mode, whereas the DA shelves can be configured at the CDMA code level to operate either in FA mode or DA mode.

Fixed Assigned (FA) operation

Fixed assigned services (such as leased line data, ISDN and leased line voice) are supported via fixed assigned modem shelves. These permanently allocate CDMA channels to end-user terminals.

AS4000 systems operating in FA mode have been commercially available since 1995 and the CDMA air interface has remained largely unchanged since then.

Demand Assigned (DA) operation

An enhancement of the air interface protocol allows on-demand assignment of radio resources to active users.

This enables provision of a graded service, and improves the efficiency with which the radio channels are used. In addition, the protocol enhancement also enables POTS terminals to use ADPCM coded voice (32kbit/s), further enhancing system capacity.

The radio interface differs from FA operation, in that radio links are allocated as either traffic, or as control channels. Traffic channels can be allocated as *normal access* or as *priority channels*. Priority channels can be configured to provide access to (for example) key users (such as the emergency services) even when all the other system channels are being fully used.

For DA operation, an additional module is required - the Access Concentrator. See section 0 for further details.

Mixed mode (FA/DA) systems

Due to the modular design of the AS4000 CT systems, and the use of common RF architecture, it is possible to mix a DA and FA deployment. This can be achieved by allocating certain RF channels to FA mode operation and others to DA mode.

Shown in Figure 2 are example configurations of AS4000 CT racks.

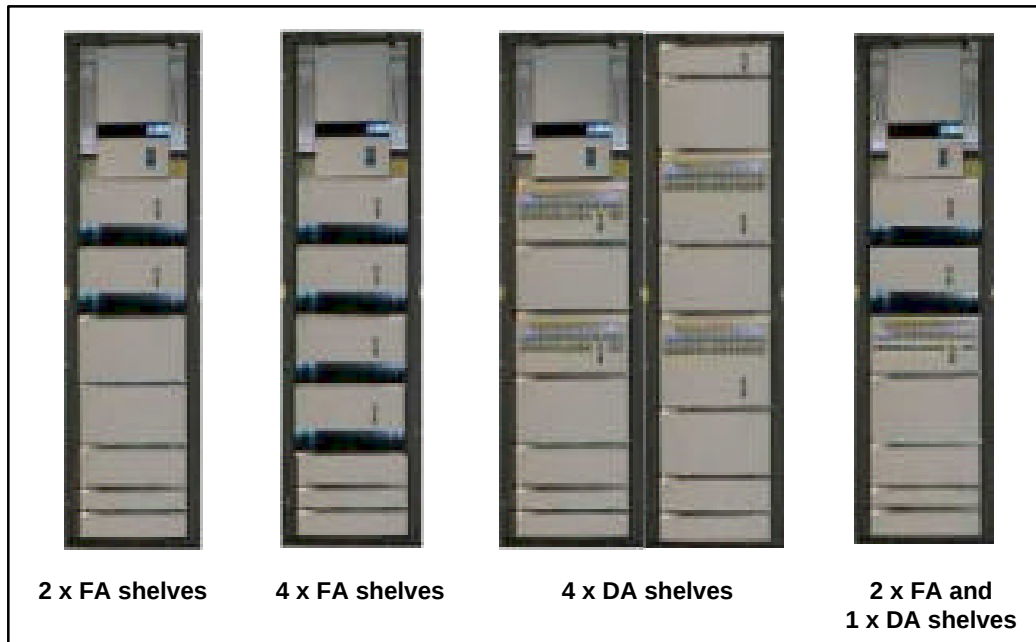


Figure 2. Example CT rack configurations

The RF combiner shelf

The RF combiner shelf (see Figure 3) can accommodate up to 4 RF channels, and link to one or two independent antenna systems. The RF combiner shelf provides the radio subsystem for both FA and DA modes of operation, and allows mixed-mode systems to be implemented.

Each combiner shelf is equipped with **RF cards**, (up to four) **Power Amplifier (PA)** modules (up to two), **Diplexer / Low Noise Amplifier (DIP/LNA)** modules and **Shelf Monitor Cards**.

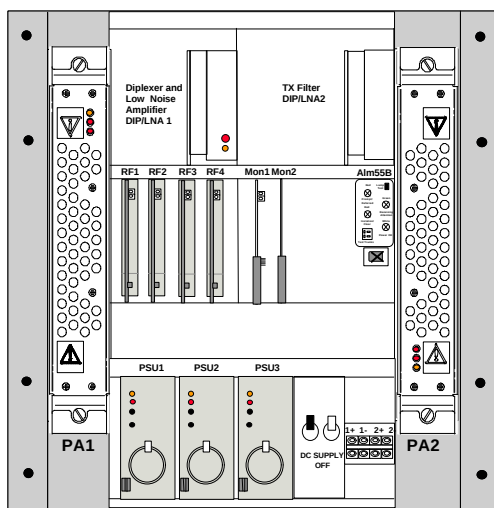


Figure 3.. RF combiner shelf

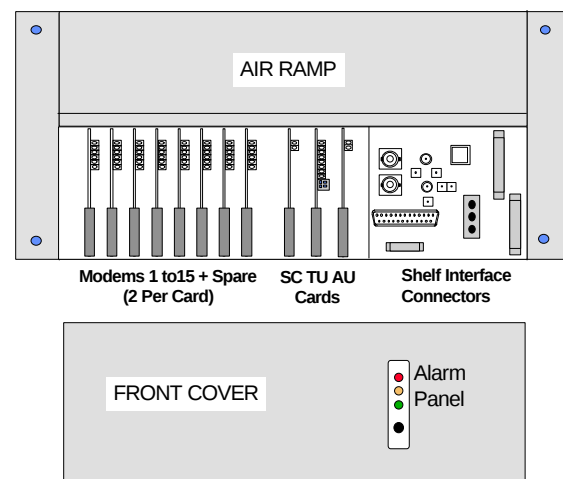


Figure 4. FA Modem shelf and front cover

FA modem shelves

Each FA modem shelf (see Figure 4.) terminates one RF channel, supports up to 15 radio links, provides a network interface with the local exchange, and a network management interface to Sitespan.

Up to four FA modem shelves can be built into a single CT rack. Thus, a total of 60 FA radio links and four network management interfaces can be supported from a single rack.

An FA modem shelf can be equipped with up to eight modem cards, each card supporting two CDMA links, (i.e. 16 links per shelf of 15 customers). This arrangement results in one spare modem per shelf. The spare modem is held in reserve and, if necessary, can be reconfigured to automatically replace a modem that has a fault.

DA modem shelves

Each DA modem shelf (see Figure 5.) terminates one RF channel, provides an E1 network interface with the AC and (if required) a network management interface to the NMS. Redundant E1 links can also be provided to maintain the backhaul link to the Access Concentrator if the main link fails. Up to two DA modem shelves can be equipped within a rack, and a further two modem shelves placed in an expansion rack.

The number of traffic channels supported will depend on the bit rates for configured each circuit. A fully configured DA modem shelf can provide up to 52 x 32kbit/s trunks (equivalent to 39.7Erl at 1%GoS).

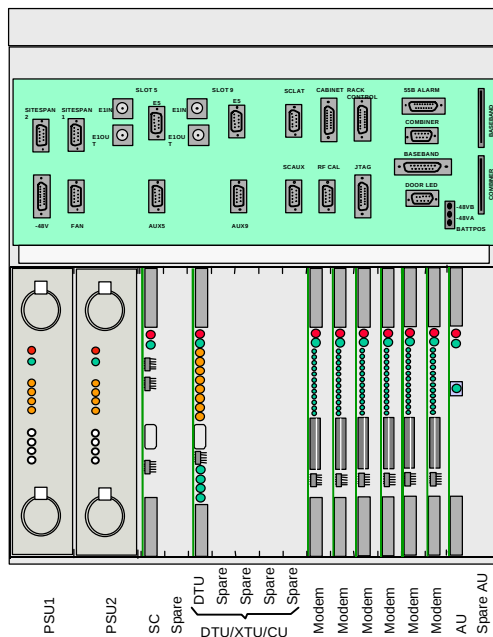


Figure 5. DA Modem shelf

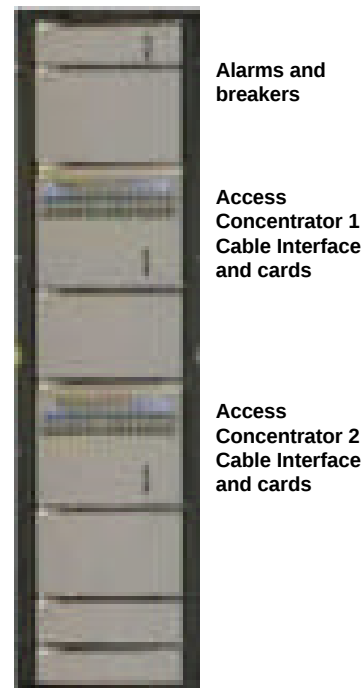


Figure 6. Access Concentrator Rack with two AC Shelves

The Access Concentrator (AC)

This is normally located at the operator's central office or local exchange. Its purpose is to consolidate traffic from multiple CT modem shelves. It is only required for modem shelves operating in DA mode, or when traffic grooming is required.

The AC presents traffic and signalling interfaces to the network switching equipment via multiple E1 2Mbit/s ports - these can be either in unconcentrated or concentrated forms, and include CAS, V5.1 and V5.2 signalling schemes.

One or two AC shelves may be provisioned in an AC rack, with a fully equipped AC shelf supporting up to 64 E1 connections to the switch. The AC may also consolidate management communications between CTs and the management system.

Access Concentrator Card Shelf

The Access Concentrator shelf is identical to the DA modem shelf (see Figure 6.). The AC connection panel is larger, and can cater for up to 64 x E1 connections to the switch.

Central Terminal Antennas

Omni Directional

The Omni antenna sub-system consists of two omni-directional, stacked dipole antennas, mounted on a beam of approximately 2 metres in length. This mechanical assembly is equipped with a bracket for attachment to a suitable pole. The bracket is made of galvanised steel, and is suitable for deployment in harsh environments. Details of the antenna sub-system and pole mount are illustrated at figure 7, on the right.

Directional

The directional antenna sub-system consists of a flat plate antenna with mounting brackets suitable for mounting on a pole up to 100mm diameter. Various HPBW options are available, including 60° 120° and 180°. These are shown in figure 8. and figure 9. below:

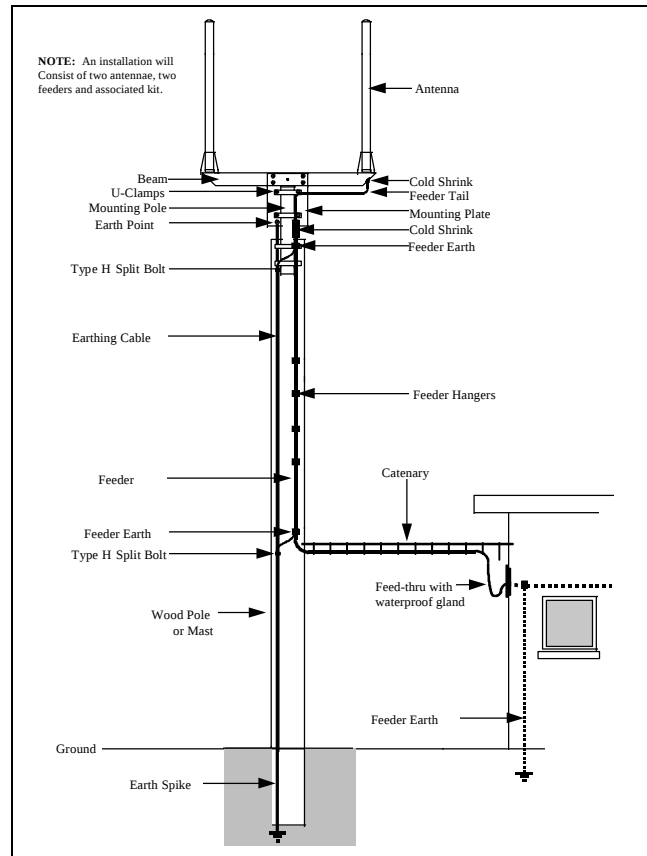


Figure 7. Omni Directional CT Antenna

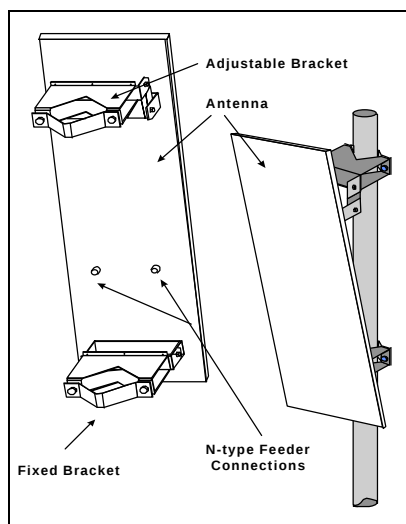


Figure 8. 65° CT Directional Antenna

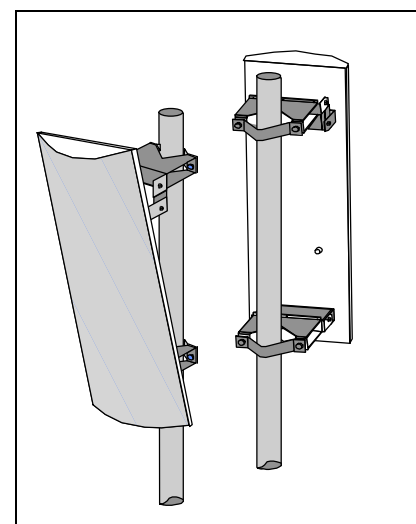


Figure 9. 120° / 180° CT Directional Antenna

The AS4000 Subscriber Terminals (STs)

The ST architecture is shown in the figure below.

The majority of the ST electronics is housed in a single Service Interface Unit (SIU), which is located inside a building or weatherproof cabinet. This is connected to an external antenna and a 12V DC power source. The ST-R2 (shown in Figure 10.) is an example of this architecture.

All Airspan's STs employ this architecture – this gives a configurable and flexible mix of service types (SIU dependent) and operating frequencies (antenna dependent)

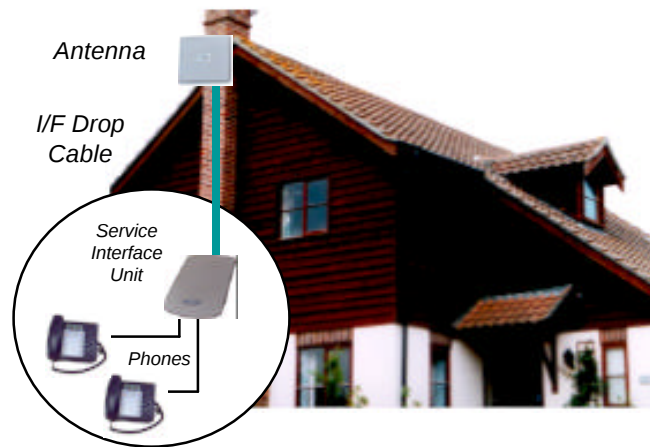


Figure 10. Subscriber Terminal architecture

Summary of ST types

A range of STs are available, each supporting different services and numbers of lines:

Series Letter	Subscriber Terminal	Modes *	Construction	Function	Product Number
P	P1	D	Residential Subscriber Unit	Ethernet 10bT	
	P1V2	D	Residential Subscriber Unit	Two line voice 64 or 32kbit/s & Ethernet 10bT‡	810-6122 (incl batt) 810-6121 (excl batt)
R	R1	D	Residential Subscriber Unit	One line voice 64kbit/s PCM or 32 kbit/s ADPCM	801-6112
	R2	F,D	Residential Subscriber Unit	Two line voice 64kbit/s PCM or 32 kbit/s ADPCM‡	801-6122
S	S1	D	Sub-Unit	One line voice 64kbit/s PCM or 32 kbit/s ADPCM	802-6112
	S2 ♣	D	Sub-Unit	Two line voice 64kbit/s PCM or 32 kbit/s ADPCM	802-6122
N	N2	D	Modular Unit	Two line voice 64kbit/s PCM or 32 kbit/s ADPCM	803-6122 (incl batt) 803-6121 (excl batt)
	N4	D	Modular Unit	Four line voice 32kbit/s ADPCM	803-6142 (incl batt) 803-6141 (excl batt)
B	B1	F	Modular Unit	2B+D ISDN (FA Mode on DA CT)	804-6112 (incl batt) 804-6111 (excl batt)
L	L128	F	Modular Unit	One line 128kbit/s data (either on FA CT, or FA Mode on DA CT)	805-6113 (incl batt) 805-6111 (excl batt)
	L64	F	Modular Unit	One line 64kbit/s data (FA Mode on DA CT)	
	L2x64	F	Modular Unit	Two line 64k bit/s data (FA Mode on DA CT)	805-6122 (incl batt) 805-6121 (excl batt)
M	M2 ♣	D	Modular Unit in Modular Enclosure	Two line voice 64kbit/s PCM or 32kbit/s ADPCM	
	M4 ♣	D	Modular Unit in Modular Enclosure	Four lines voice 32 kbit/s ADPCM; or One line voice 64kbit/s PCM + two lines voice 32 kbit/s ADPCM	
	M4/64 ♣	D	Modular Unit in Modular Enclosure	Four line voice 64kbit/s PCM or 32 kbit/s ADPCM	
	M8 ♣	D	Modular Unit in Modular Enclosure	Eight line voice 32kbit/s ADPCM	806-6122
	M8/64 ♣	D	Modular Unit in Modular Enclosure	Eight line voice 64kbit/s PCM or 32 kbit/s ADPCM	807-6142
	M16 ♣	D	Modular Unit in Modular Enclosure	Sixteen line voice 32kbit/s ADPCM	806-6142

Table 1. AS4000 Subscriber Terminals

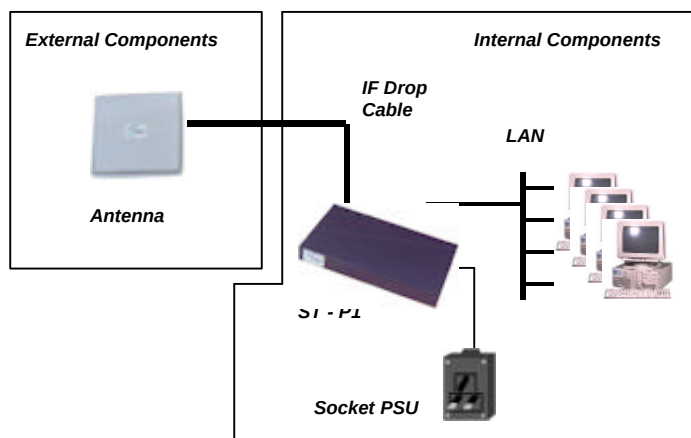
* Mode: F = Fixed Assigned; D = Demand Assigned.

‡ The R2 terminal can only operate in 32kbit/s ADPCM mode on the DA platform.

♣ Denotes Future Product Release.

Note: 32kbit/s ADPCM voice services are only available to STs hosted on Demand Assigned modem shelves.

P-Series Subscriber Terminal (ST – P1)



Principal Features:

Up to 512kbit/s download speeds using Airspan's PacketDrive technology

Supports 10baseT Ethernet

64 self learning MAC addresses

CUG security supported

Corporate VPN provisioning

Applications

Corporate network connectivity

Always on internet connections for small and medium businesses

The ST-P1 terminal, incorporating Airspan's PacketDrive technology, provides 'always-on' high speed internet access for both home and corporate users, with ability to offer Corporate VPN provisioning to create virtual LANs.

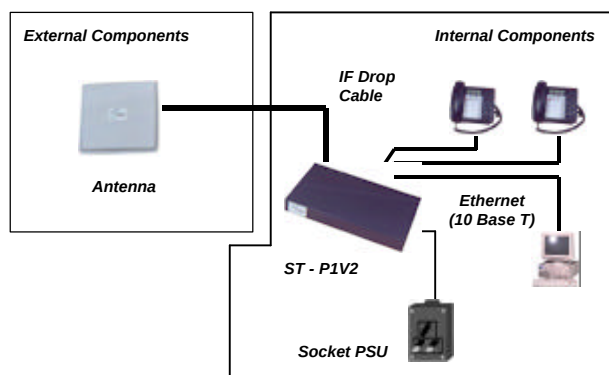
A vast range of end user applications are supported, since the ST-P1 terminals support IP and all higher layer protocols seamlessly. In addition, ST-P1 terminals support Closed User Groups (CUGs) for security or partitioning of multiple corporate networks. An operator deploying these terminals has the facility to provide various degrees of QoS by configuring the uplink and downlink data rates - even at its lowest throughput, the ST-P1 offers superior quality and performance than a V.90 voice band data modem.

Specifications

Radio Parameters:	RF Power: RF Modulation: Link BER: Sensitivity: Antenna Gain: Antenna Directivity: Transmission Delay: Freq. Bands supported:	+18 dBm per link QPSK At least 10^{-7} -98 dBm +13 dBi (3.5 GHz band), +10 dBi (1.9 GHz band), +12 dBi (other bands) $\pm 30^\circ$ (Elevation) $\pm 20^\circ$ (Azimuth) Less than 5 ms 1.9-2.0, 2.0-2.3, 2.3-2.5, 3.4-3.6 GHz
Subscriber Interfaces:	Electrical: Mechanical: Channel Rates:	10baseT IEEE 802.3 RJ45 128 / 256 / 384 / 512 kbit/s configurable downlink 32 / 64 / 128 kbit/s configurable uplink.
Environmental:	Temperature: Humidity: Wind Speed: Ice Accumulation:	Case: -40°C to +45°C, Antenna: -45°C to +60°C 95% @ 40°C 200 km/h ≤ 10 mm
Electrical:	Voltage: Power Consumption: Drop Cable:	100-240V AC / 12V DC (47-63 Hz) 6W (standby), 16W (Packet channel active) Single coax (25m standard, 70m optional)
Dimensions:	Antenna: Case: Socket PSU*:	210mm x 210mm x 80mm, 1.10 kg 323mm x 183mm x 40mm, 1.53 kg 103mm x 66mm x 37mm, 0.29 kg

* a battery-backed PSU is also available

P-Series Subscriber Terminal (ST – P1V2)



Principal Features:

Up to 512kbit/s download speeds using Airspan's PacketDrive technology

Supports 10baseT Ethernet and 2 voice ports

64 self learning MAC addresses

Home PNA applications

External antenna. Wall- and pole-mount brackets available

Applications

Corporate network connectivity

Always on internet connections and voice services for small and medium businesses

Home PNA

The ST-P1V2 terminal, incorporating Airspan's PacketDrive technology, provides 'always-on' high speed internet access for both home and corporate users with the ability to offer Corporate VPN provisioning to create virtual LANs. The two voice channels support toll quality voice, G3 fax and CLASS services.

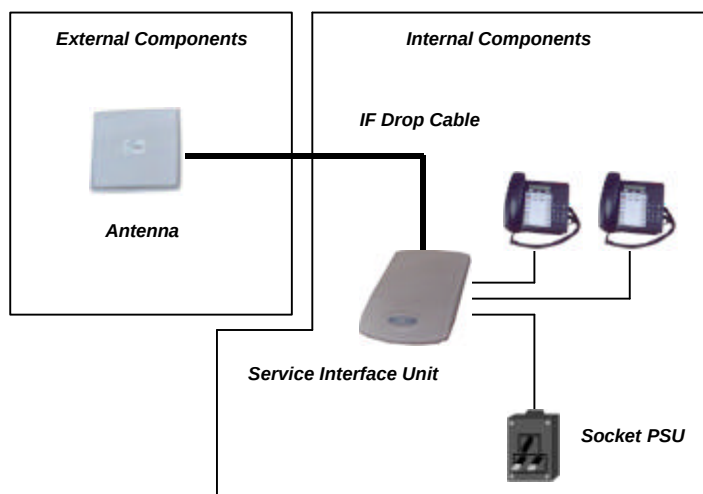
A vast range of end user applications are supported, since the ST-P1 terminals support IP and all higher layer protocols seamlessly. In addition ST-P1V2 terminals support Closed User Groups (CUG) for security or partitioning of multiple corporate networks. An operator deploying these terminals has the facility to provide various degrees of QoS by configuring the uplink and downlink data rates - even at its lowest throughput, the ST-P1V2 offers superior quality and performance than a V.90 voice band data modem. Also incorporated into the ST-P1V2 terminal is the facility to offer HomePNA, the integrated voice and data system for residential applications using the home telephone wiring.

Specifications

Radio Parameters:	RF Power: RF Modulation: Link BER: Sensitivity: Antenna Gain: Antenna Directivity: Transmission Delay: Freq. Bands supported:	+18 dBm per link QPSK At least 10^{-7} -98 dBm +13 dBi (3.5 GHz band), +10 dBi (1.9 GHz band), +12 dBi (other bands) $\pm 30^\circ$ (Elevation) $\pm 20^\circ$ (Azimuth) Less than 5 ms 1.9-2.0, 2.0-2.3, 2.3-2.5, 3.4-3.6 GHz
Subscriber Interfaces:	Electrical: Channel Rates: Drive Capability: Line tests:	Analogue 2-wire telephony, 10baseT IEEE 802.3 512 kbit/s downlink, 32 / 64 / 128 kbit/s configurable uplink, 32 kbit/s (ADPCM) / 64 kbit/s (PCM), 9.6 - 28.8 kbit/s G3 fax REN=3, max. Rloop 250 Ohms. Customer premises equipment detection, ringing voltage verification, dialtone test, digital and analogue loopback.
Environmental:	Temperature: Humidity: Wind Speed: Ice Accumulation:	Case: -40°C to +45°C, Antenna: -45°C to +60°C 95% @ 40°C 200 km/h ≤ 10 mm
Electrical:	Voltage: Power Consumption: Drop Cable:	100-240V AC / 12V DC (47-63 Hz) 6W (standby), 18W (2 voice and 1 Packet) Single coax (25m standard, 70m optional)
Dimensions:	Antenna: Case: Socket PSU*:	210mm x 210mm x 80mm, 1.10 kg 323mm x 183mm x 40mm, 1.53 kg 103mm x 66mm x 37mm, 0.29 kg

*a battery-backed PSU is also available

R – Series Subscriber Terminal (ST – R2)



Principal Features:

2 lines of high quality analogue telephony

Internal Service Interface Unit (SIU)

External antenna. Wall- and pole-mount brackets available

64 or 32 kbit/s operation

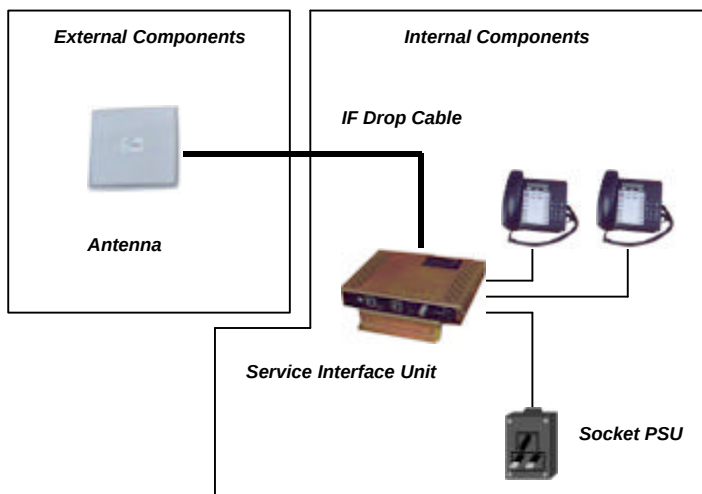
Applications

Voice telephony with equivalent quality to copper lines, analogue modems with speeds up to 56 kbit/s, G3 fax without any loss of speed or quality. The SIU contains a battery compartment, providing battery backup. Powered from the AC mains supply via 12V DC Power Supply Unit (Socket PSU).

Specifications

Radio Parameters:	RF Power: RF Modulation: Link BER: Sensitivity: Antenna Gain: Antenna Directivity: Transmission Delay: Freq. Bands supported:	+18 dBm per link QPSK At least 10^{-7} -98 dBm +13 dBi (3.5 GHz band), +10 dBi (1.9 GHz band), +12 dBi (other bands) $\pm 30^\circ$ (Elevation) $\pm 20^\circ$ (Azimuth) Less than 5 ms 1.9-2.0, 2.0-2.3, 2.3-2.5, 3.4-3.6 GHz
Subscriber Interfaces:	Electrical: Channel Rates: Drive Capability: Line tests:	analogue 2-wire telephony 64 kbit/s (PCM), 32 kbit/s (ADPCM) REN=3, max. RLoop = 250 Ohms Customer premises equipment detection, Ringing voltage verification, Dialtone test, Digital and analogue Loopback.
Environmental:	Temperature: Humidity: Wind Speed: Ice Accumulation:	Antenna: -45°C to +60°C SIU: -5°C to +45°C 95% @ 40°C 200 km/h $\leq 10\text{mm}$
Electrical:	Voltage: Power Consumption: Standby Battery: Drop Cable:	100-240V AC/ 12V DC (47-63 Hz) 6W (standby), 10W (1 or 2 channels active) 3.5h (standby), 1.3h (1 or 2 channels active) Single COAX (25m standard, 70m optional)
Dimensions:	Antenna: SIU: Socket PSU:	210mm x 210mm x 80mm, 1.10 kg 280mm x 192mm x 38mm, 1.37 kg (with battery) 103mm x 66mm x 37mm, 0.29 kg

S – Series Subscriber Terminal (ST – S2)



Principal Features:

2 lines of high quality Analogue telephony

Metal sub-unit Service Interface Unit (SIU)

External antenna. Wall- and pole-mount brackets available

64 or 32 kbit/s operation

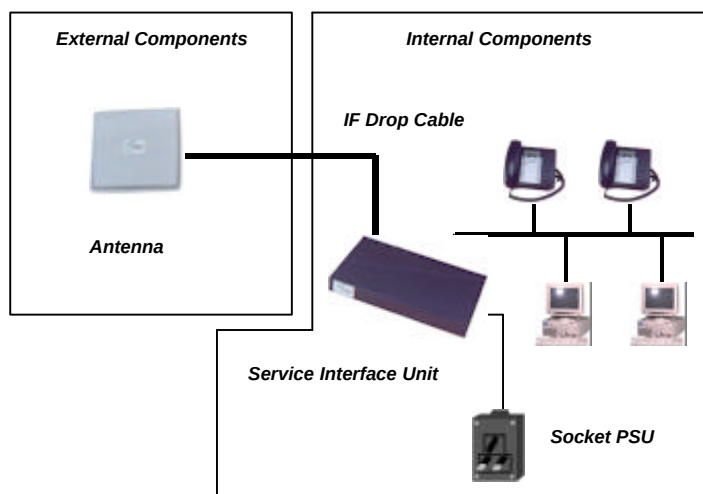
Applications

Voice telephony with equivalent quality to copper lines, analogue modems with speeds up to 56 kbit/s, G3 fax without any loss of speed or quality. Designed for use in places where a more robust unit is needed (e.g. inside payphones). Powered via a 12V PSU from the AC mains supply. Battery backup included.

Specifications

Radio Parameters:	RF Power: RF Modulation: Link BER: Sensitivity: Antenna Gain: Antenna Directivity: Transmission Delay: Freq. Bands supported:	+18 dBm per link QPSK At least 10^{-7} -98 dBm (fully loaded) +13 dBi (3.5 GHz band), +10 dBi (1.9 GHz band), +12 dBi (other bands) $\pm 30^\circ$ (Elevation) $\pm 20^\circ$ (Azimuth) Less than 5 ms 1.9-2.0, 2.0-2.3, 2.3-2.5, 3.4-3.6 GHz
Subscriber Interfaces:	Electrical: Channel Rates: Drive Capability: Line tests:	analogue 2-wire telephony 64 kbit/s (PCM), 32 kbit/s (ADPCM) REN=3, max. RLoop = 250 Ohms Customer premises equipment detection, Ringing voltage verification, Dialtone test, Digital and analogue Loopback.
Environmental:	Temperature: Humidity: Wind Speed: Ice Accumulation:	Antenna: -45°C to +60°C SIU: -40°C to +45°C 95% @ 40°C 200 km/h ≤ 10 mm
Electrical:	Voltage: Power Consumption: Standby Battery: Drop Cable:	100-240V AC/ 12V DC (47-63 Hz) 6W (standby), 10W (1 or 2 channels active) 3.5h (standby), 1.3h (1 or 2 channels active) Single COAX (25m standard, 70m optional)
Dimensions:	Antenna: SIU: Socket PSU:	210mm x 210mm x 80mm, 1.10 kg 200mm x 180mm x 60mm, 2.25 kg (with battery) 103mm x 66mm x 37mm, 0.29 kg

B – Series Subscriber Terminal (ST – B1)



Principal Features:

So Basic Rate ISDN interface (2B+D)

Modular Service Interface Unit (SIU)

External antenna. Wall- and pole-mount brackets available

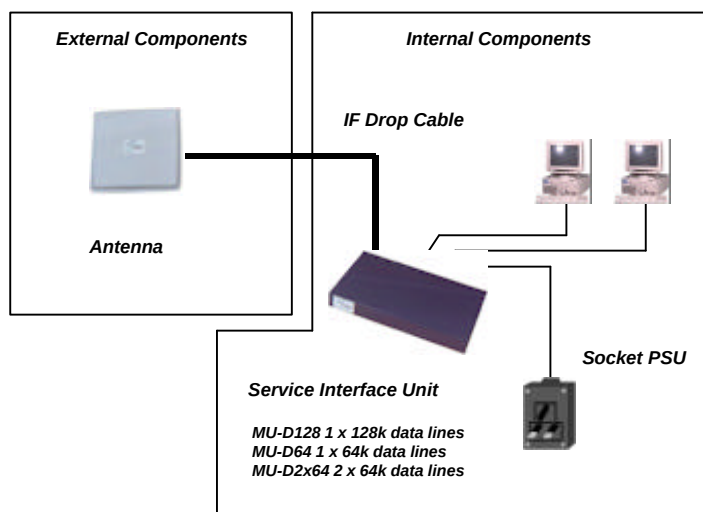
Applications

Designed for ISDN applications, mixed voice and data applications, internet access and G4 fax. Provides an So Basic Rate Interface (2B+D) at the customer premises, i.e. NT1 functionality, with equivalent quality to wireline.

Specifications

Radio Parameters:	RF Power: RF Modulation: Link BER: Sensitivity: Antenna Gain: Antenna Directivity: Transmission Delay: Freq. Bands supported:	+18 dBm per link QPSK At least 10^{-7} -98 dBm +13 dBi (3.5 GHz band), +10 dBi (1.9 GHz band), +12 dBi (other bands) ±30° (Elevation) ±20° (Azimuth) Less than 1 ms 1.9-2.0, 2.0-2.3, 2.3-2.5, 3.4-3.6 GHz
Subscriber Interfaces:	Electrical: Line tests:	Basic rate "S" interface. 40V-dc power feed. Customer premises equipment detection, Line leakage, Ringing voltage verification, Dialtone test, Digital and analogue Loopback.
Environmental:	Temperature: Humidity: Wind Speed: Ice Accumulation:	Antenna: -45°C to +60°C SIU: -40°C to +45°C 95% @ 40°C 200 km/h ≤10mm
Electrical:	Voltage: Power Consumption: Drop Cable:	100-240V AC/ 12V DC (47-63 Hz) 6W (standby), 10W (1 or 2 channels active) Single COAX (25m standard, 70m optional)
Dimensions:	Antenna: SIU: Socket PSU:	210mm x 210mm x 80mm, 1.10 kg 323mm x 183mm x 40mm, 1.53 kg 103mm x 66mm x 37mm, 0.29 kg

L – Series Subscriber Terminal (ST – L128)



Principal Features:

- 1 or 2 lines of high quality data
- Modular Service Interface Unit (SIU)
- External antenna. Wall- and pole-mount brackets available
- 64 or 128 kbit/s operation

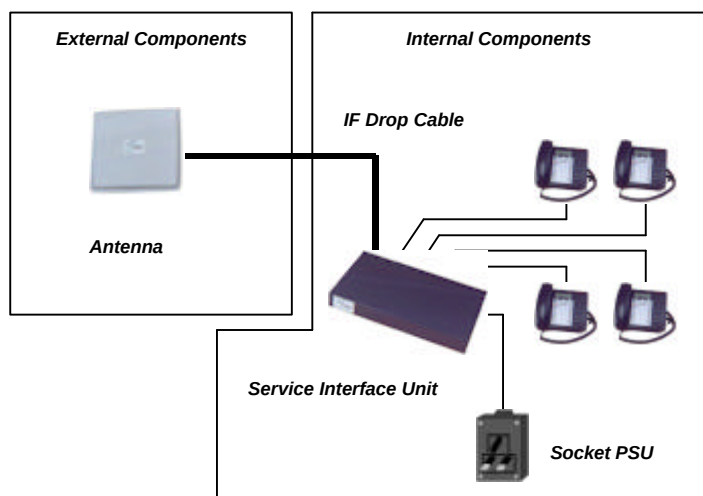
Applications

Designed for leased line data applications. Provides 64 or 128 kbit/s synchronous interfaces, e.g. for connections to routers or other LAN equipment.

Specifications

Radio Parameters:	RF Power: RF Modulation: Link BER: Sensitivity: Antenna Gain: Antenna Directivity: Transmission Delay: Freq. Bands supported:	+18 dBm per link QPSK At least 10^{-7} -98 dBm +13 dBi (3.5 GHz band), +10 dBi (1.9 GHz band), +12 dBi (other bands) $\pm 30^\circ$ (Elevation) $\pm 20^\circ$ (Azimuth) Less than 1 ms 1.9-2.0, 2.0-2.3, 2.3-2.5, 3.4-3.6 GHz
Subscriber Interfaces:	Electrical: Line tests:	EIA530A electrical interface. 25 D sub connector. Passive cable connection to V.35 or X.21 interfaces. Customer premises equipment detection, Line leakage, Ringing voltage verification, Dialtone test, Digital and analogue Loopback.
Environmental:	Temperature: Humidity: Wind Speed: Ice Accumulation:	Antenna: -45°C to +60°C SIU: -40°C to +45°C 95% @ 40°C 200 km/h ≤ 10 mm
Electrical:	Voltage: Power Consumption: Drop Cable:	100-240V AC/ 12V DC (47-63 Hz) 6W (standby), 10W (1 or 2 channels active) Single COAX (25m standard, 70m optional)
Dimensions:	Antenna: SIU: Socket PSU:	210mm x 210mm x 80mm, 1.10 kg 323mm x 183mm x 40mm, 1.53 kg 103mm x 66mm x 37mm, 0.29 kg

N – Series Subscriber Terminal (ST – N4)



Principal Features:

Up to 4 lines of high quality voice telephony

Modular Service Interface Unit (SIU)

External antenna. Wall- and pole-mount brackets available

64 or 32 kbit/s operation

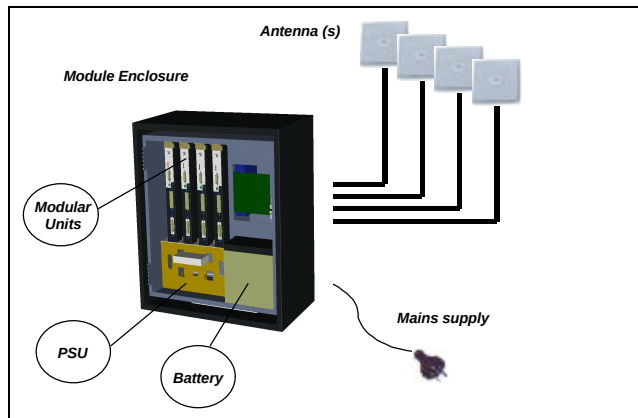
Applications

Provides up to 4 lines at 32 kbit/s, voice telephony with equivalent quality to copper lines. Can also be configured to provide 1 x 64 kbit/s + 2 x 32 kbit/s lines to support analogue modems with speeds up to 56 kbit/s or G3 fax without any loss of speed or quality.

Specifications

Radio Parameters:	RF Power: RF Modulation: Link BER: Sensitivity: Antenna Gain: Antenna Directivity: Transmission Delay: Freq. Bands supported:	+18 dBm per link QPSK At least 10^{-7} -98 dBm +13 dBi (3.5 GHz band), +10 dBi (1.9 GHz band), +12 dBi (other bands) ±30° (Elevation) ±20° (Azimuth) Less than 5 ms 1.9-2.0, 2.0-2.3, 2.3-2.5, 3.4-3.6 GHz
Subscriber Interfaces:	Electrical: Channel Rates: Drive Capability: Line tests:	analogue 2-wire telephony 32 kbit/s (ADPCM) / 64 kbit/s (PCM) REN=3, max. Rloop 250 Ohms Customer premises equipment detection, Ringing voltage verification, Dialtone test, Digital and analogue Loopback.
Environmental:	Temperature: Humidity: Wind Speed: Ice Accumulation:	Antenna: -45°C to +60°C SIU: -40°C to +45°C 95% @ 40°C 200 km/h ≤10mm
Electrical:	Voltage: Power Consumption: Drop Cable:	100-240V AC/ 12V DC (47-63 Hz) 6W (standby), 10W (1 or 2 channels active) Single COAX (25m standard, 70m optional)
Dimensions:	Antenna: SIU: Socket PSU:	210mm x 210mm x 80mm, 1.10 kg 323mm x 183mm x 40mm, 1.53 kg 103mm x 66mm x 37mm, 0.29 kg

Modular Subscriber Terminal (ST – M16)



Principal Features

Up to 16 lines voice at 32 kbit/s (ADPCM), or 8 lines at 64 kbit/s (PCM)
 External antenna(s); wall- and pole-mount brackets available

Applications

Modular units can be used as building blocks to create multi-mode or multi-line STs. Up to four units are contained in a Module Enclosure and are connected to multiple antennas. The M16 is an example of this using 4 x ST-N4 building blocks. Other configurations that combine voice, data and ISDN are also possible. The enclosure contains integrated PSU and battery backup facilities.

Specifications

Radio Parameters:	RF Power: RF Modulation: Link BER: Sensitivity: Antenna Gain: Antenna Directivity: Transmission Delay: Freq. Bands supported:	+18 dBm per link QPSK At least 10^{-7} -98 dBm +12 dBi (C-,S-,P-Band +10 dBi, X-Band +13 dBi) $\pm 30^\circ$ (Elevation) $\pm 20^\circ$ (Azimuth) Less than 5 ms 1.9-2.0, 2.0-2.3, 2.3-2.5, 3.4-3.6 GHz
Subscriber Interfaces:	Electrical: Channel Rates: Drive Capability: Line tests:	analogue 2-wire telephony 32 kbit/s (ADPCM) REN=3, max. Rloop 250 Ohms Customer premises equipment detection, Ringing voltage verification, Dialtone test, Digital and analogue Loopback.
Environmental:	Temperature: Humidity: Wind Speed: Ice Accumulation:	Antenna: -45°C to +60°C, SIU: -5°C to +45°C 95% @ 40°C 200 km/h ≤ 10 mm
Electrical:	Voltage: Power Consumption: Standby Battery: Drop Cable:	100-240V AC/DC (47-63 Hz) Module dependant 6h (standby), 4h (talk, with 2 lines active) Single COAX (25m standard, 70m optional)
Dimensions:	Antenna: Module Enclosure:	210mm x 210mm x 80mm, 1.10 kg 600mm x 600mm x 350mm, ~50.0 kg

Ancillary equipment and services

Network Management: AS8100 Sitespan

AS8100 Overview

AS8100 is a management system designed as a configuration, alarm, test and performance manager for the AS4000 range of Wireless Access Systems. Being flexible in its deployment, AS8100 is scalable to suit a range of different network sizes.

It provides assistance to the network operator to ensure the ongoing service deliveries by simplifying the handling of such tasks as alarm management, performance monitoring and fault localisation. Available in server, client and craft versions, AS8100 uses a Microsoft Windows NT-based, client-server architecture to support multi-user management of a geographically dispersed set of network elements.

AS8100's object oriented architecture has been developed to support rapid response to and from the user interfaces. The user interface is entirely graphical and windows-based, utilising drop-down menus, icon-based representations, maps and equipment views. It is capable of scaling from a single, standalone PC to multiple client server PC configurations.

By permitting configurations that place some or all of the clients remotely from the servers, it is possible to support simultaneous management by several users across a widely deployed network.

One or more clients may simultaneously connect to one or more servers to span a large number of managed elements. Connection of remote clients can be via modem, LAN or WAN. Windows NT Remote Access Service (RAS) is utilised to support dial-up connections at speeds as low as 9.6 kbit/s. All of these capabilities are policed by the Windows NT security management functions.



Figure 23. Sitespan PC (client-server)

The craft version retains all functionality of the client but restricts connection to a single piece of equipment ensuring a consistent look and feel to the systems. This provides facilities to field service engineers for installation, commissioning and fault management of the equipment.

Sitespan can be supplied in the following variants:

Sitespan client-server PC pre-loaded with Windows NT and Sitespan software

Sitespan craft terminal PC preloaded with Windows NT and Sitespan software

Sitespan client-server software only (CD-ROM and manual)

Sitespan craft terminal software only (CD-ROM and manual)

AS8100 Dimensioning

Software	The AS8100 Client Software	Can connect to up to: 10 x AS8100 servers And can manage up to: 10,000 subscriber lines maximum
	The AS8100 Server Software	Can serve to up to: 32 x AS4000 Modem shelves And can manage up to: 10,000 subscriber lines
Hardware	The standard Windows NT PC shipped by Airspan comes complete with a 'Digiboard' (a COM Port replicator). This allows direct connection to up to 16 shelves. These can be CT Modem shelves, or AC Shelves, and either FA or DA.	

Radio Survey Tool

The Airspan Radio Survey Tool allows accurate measurements to be made of the signal coverage from an Airspan AS4000 CT.

The information obtained can be used to augment that derived from the AS9000 radio planning software (Airplan), and provides an operator an additional level of confidence in the predicted subscriber coverage area. The tool can also be used to optimise individual subscriber installations before the ST is permanently installed - especially where pole-mounted installations are required.

A further use for the tool is to track longer-term variations in coverage (such as seasonal variability or variations due to rainfall) by periodically repeating the measurements at the same location.

The **survey tool** (see Figure 26 below) consists of specially configured test head, a drop cable, and a test box with battery charger.

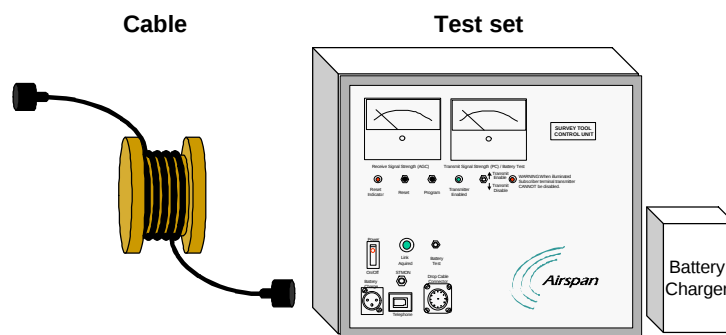


Figure 24. RF Survey Tool kit

This tool should be used in conjunction with a suitable pump-up mast (See Figure 27 right). The customer can purchase this from Airspan, or locally. Airspan will be pleased to provide specifications on request.

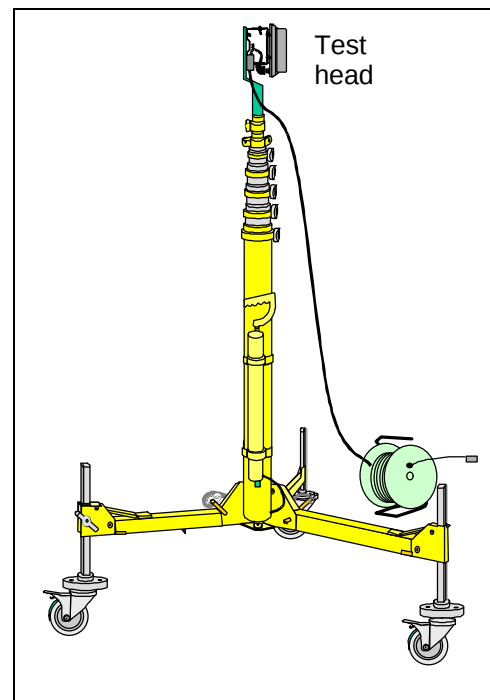
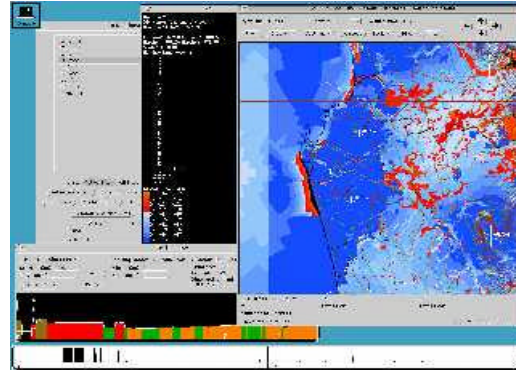


Figure 25. Pump-up mast, for use with survey tool

Radio Planning: AS9000 Airplan

Derived from the industry benchmark product Planet developed by Mobile Systems International, AS9000 Airplan is a software tool, which can be used to predict radio coverage, C/I and A/I performance, and radio link budgets. As such, it is indispensable for medium to large radio networks where optimised antenna siting, orientation and design can yield huge benefits in terms of equipment and radio spectrum.



Airplan AS9000 is available in two versions: Airplan Lite and Airplan, the former capable of networks up to 50 CTs, and the latter capable of planning larger networks. Note that Airplan and Airplan Lite are supplied as software and software licences. Both products are supportable either using Solaris on a Sun SPARCstation, or Windows NT on a Personal Computer.

Installation and Commissioning services

The Airspan Customer Services team offers a wide range of professional engineering expertise and support for the customer.

The Customer Service engineers currently located within our Service Centre in the UK are fully conversant with all aspects of Airspan's product range and have many years' experience in both remote and on-site technical support. Airspan's service offerings include:

Site survey and installation planning
Customer Engineering
Installation
Project Management

Technical Support
Repair and Return
Service Management

Airspan Customer Service is therefore able to support customer projects through planning, installation, implementation and both pre and post warranty support.

Training

The Airspan Technical Education Centre offers customers the optimum level of technical product training. Included in this training are classroom instruction, hands-on applications and troubleshooting techniques in a laboratory and field environment. We believe that Airspan provides unrivalled training to our customers, to enable them to perform their jobs in a competent and knowledgeable manner.

The Airspan Technical Education Centre offers an extensive complement of technical training programmes in the following categories:

Standard Course Offerings (such as Installation and commissioning training)
On-Site Training Programs (at a customer's preferred location)
Special Offerings (tailor-made courses or groups of courses)