



Wireless Networks in rural areas of the Guantánamo Province

Lídice Romero Amondaray (CUBA)

lidice@fie.uo.edu.cu

lidice_ra@yahoo.com

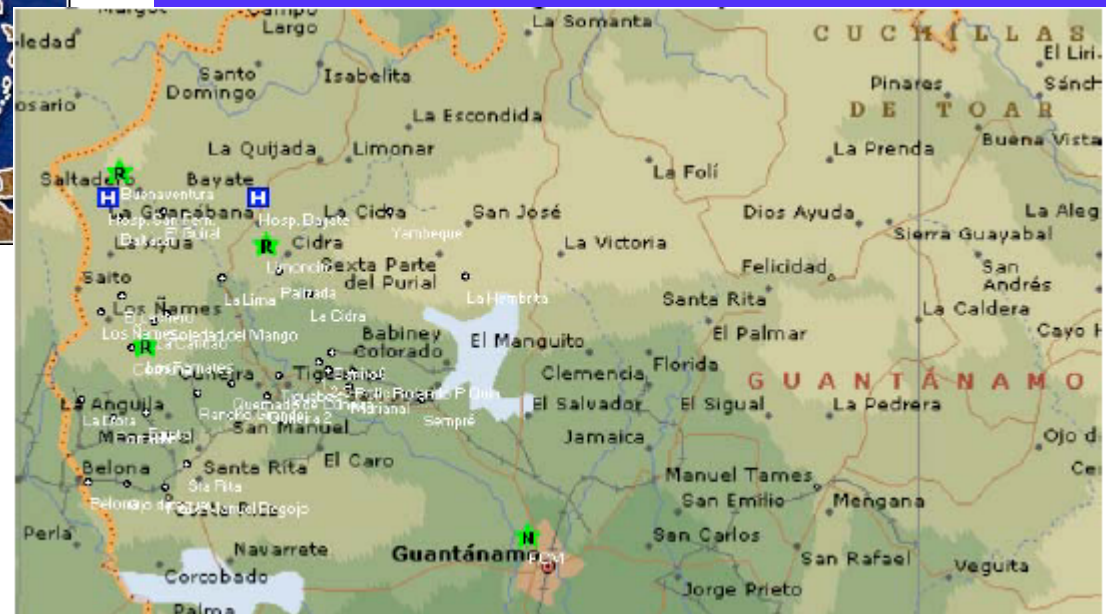


Pilot Project EHAS-CUBA

- This project is financed by the EHAS Programs
- Involves the design of a reliable wireless communication network between the computers in 32 health institutes (2 rural hospitals, 2 polyclinics and 28 medical consultants) encountered in rural mountainous regions without any communications infrastructure
- The area involved is situated in the municipality “El Salvador” in the Guantánamo province, the most southern and undeveloped province in Cuba
- The majority of its health institutes have no communication with the provincial head, where the node of the informatics network sector exist (INFOMED)



Geographic location





Rural health system in Cuba

1. Hospitals, Maternity Homes and Rural Polyclinics:
 - Establishments of higher hierarchy, which are situated in areas of certain population density where telephone lines exist in some cases.
 - Reference centers for various medical consultations.
 - Possess the infrastructure and equipment to make some diagnostics tests.
 - A few of them permit hospitalization and are the places from where the activities of associated medical consultations are coordinated (Distribution of medical supplies, sending and receipt of administrative and epidemiological reports, etc.).





Rural health system in Cuba

2. Family Medical Consultations:

- Dependent on the hospitals and polyclinics
- Located in towns that generally have no telephone lines and bad road or street infrastructure
- Communication and exchange of information between them can take hours and even days
- The need for communication is specially important in these rural areas in case of an outbreak of disease, some natural disaster, information reports on sanitary system and including the system of receipt of medical supplies.
- These centers are governed by doctors who need proper communication



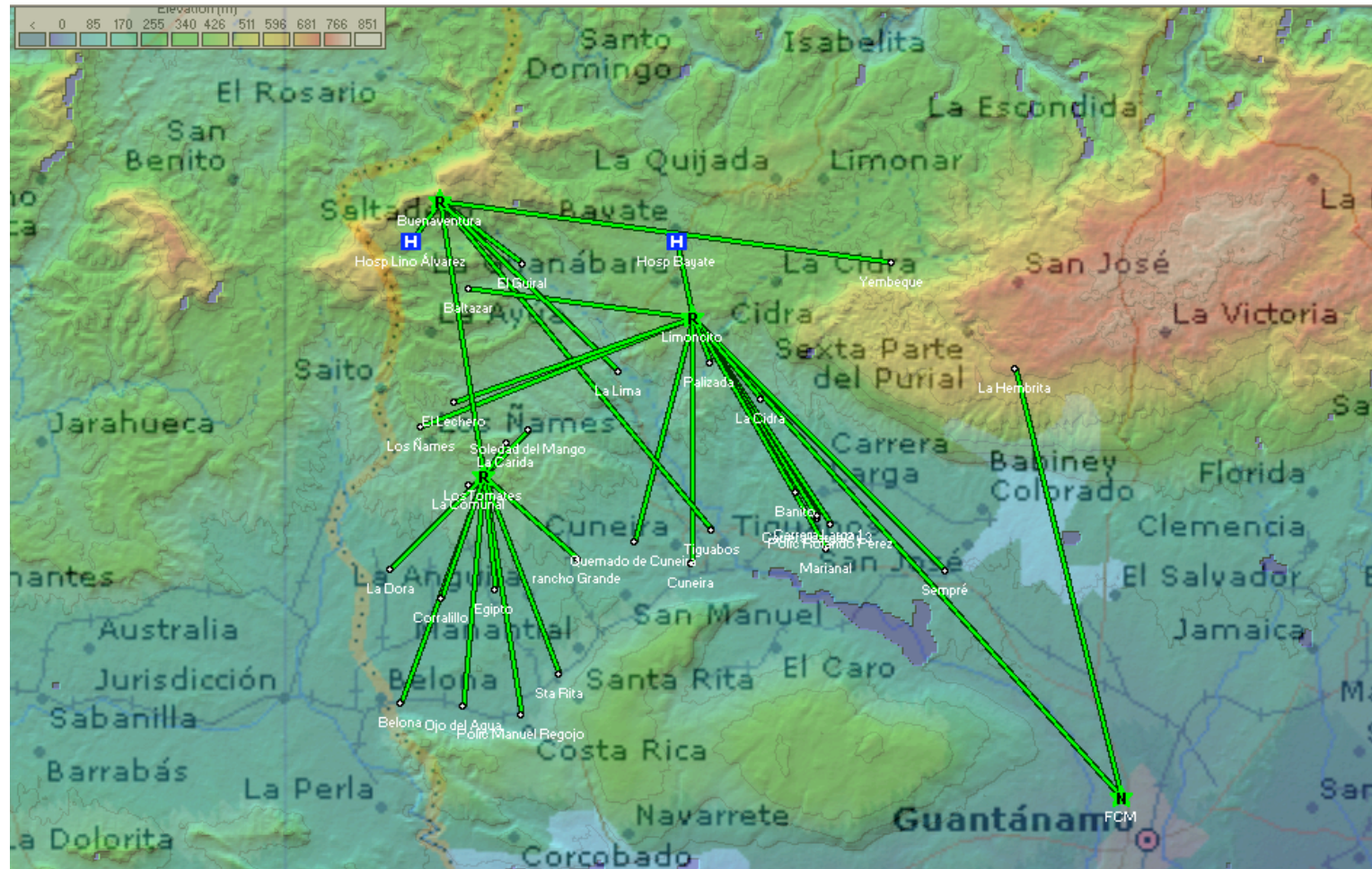


Services provided over the network

- Voice communications
- Distance education/learning
- Video conferences or lists of interesting topics for discussion in the rural health sector
- Access to medical documentation in database, international journals and sites of the national health network (INFOMED)
- Consultation with medical specialists

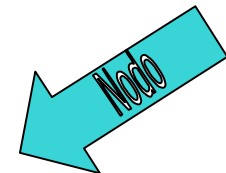
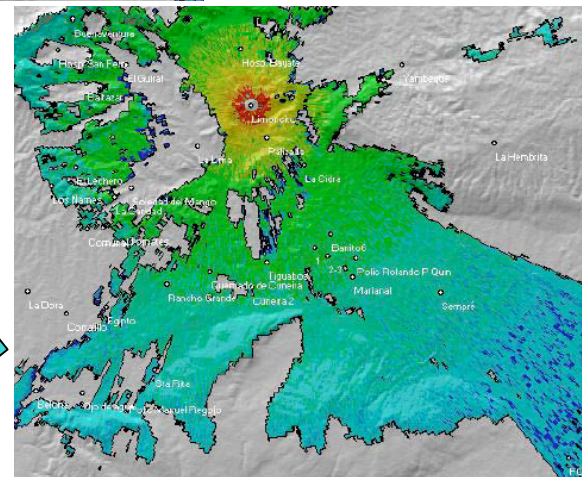
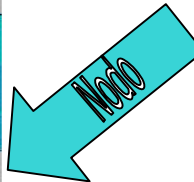
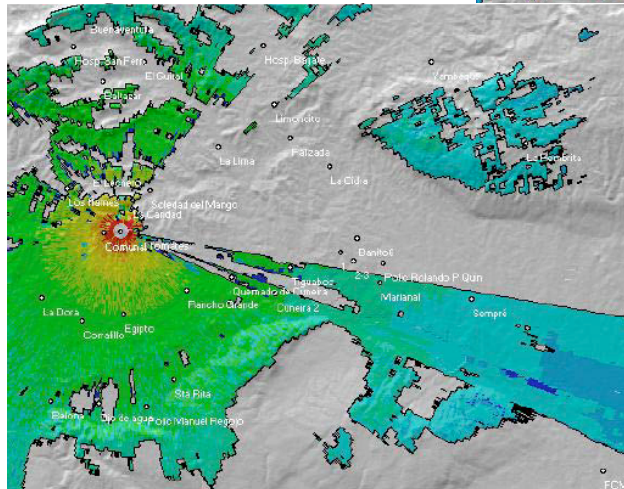
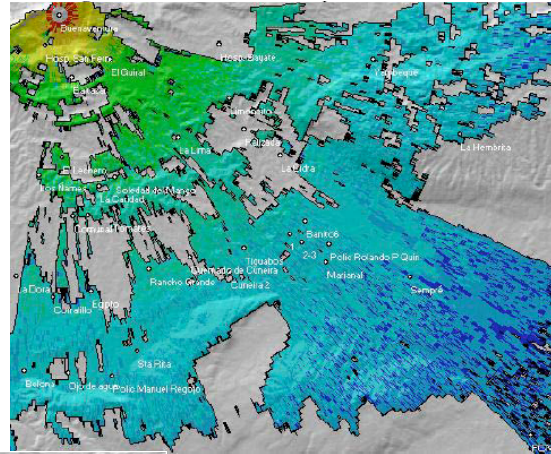


Planning the Wireless Network



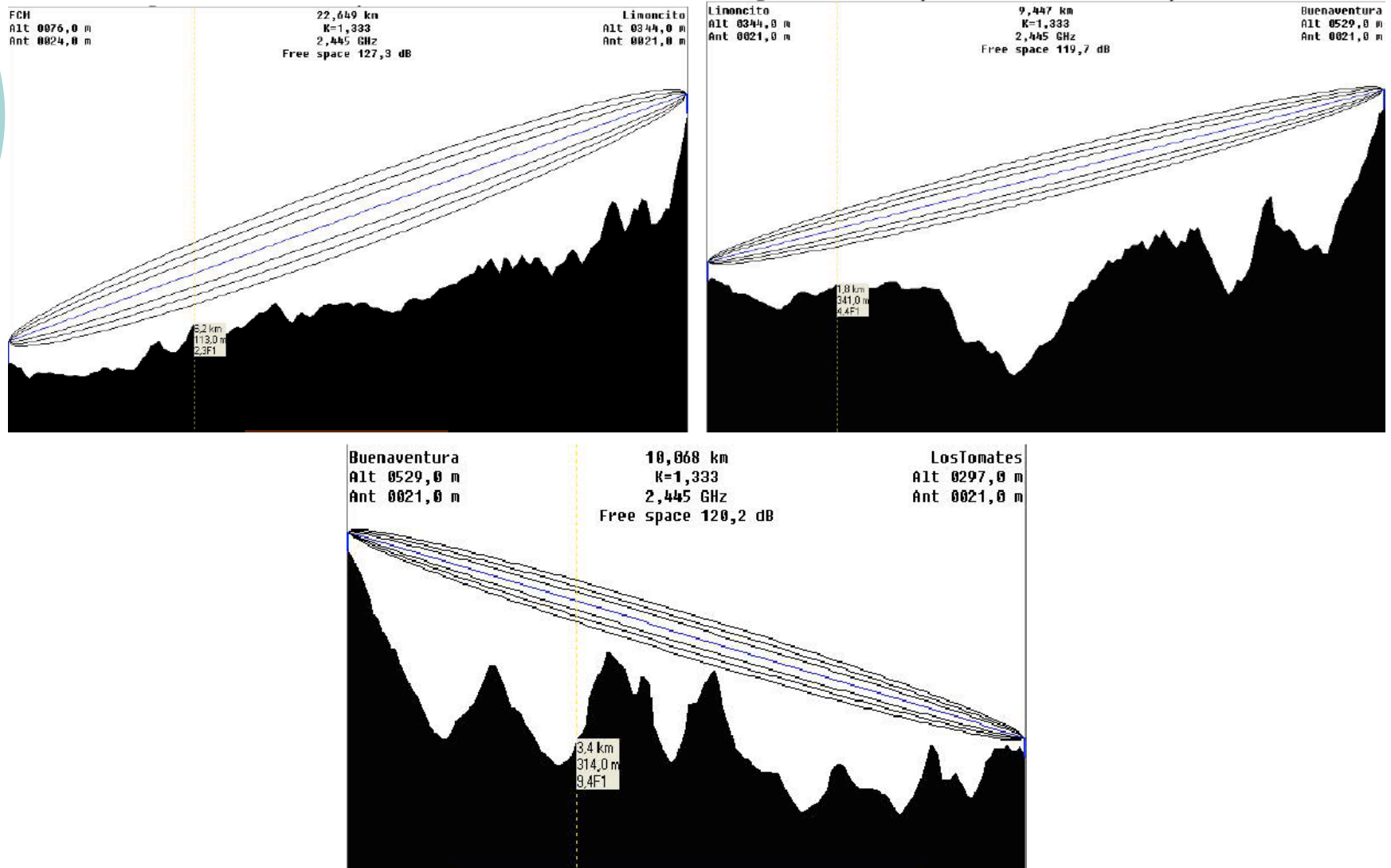


Coverage of the 3 Repeaters





Some profiles in Radio Mobile



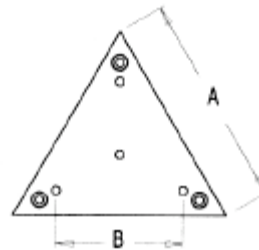
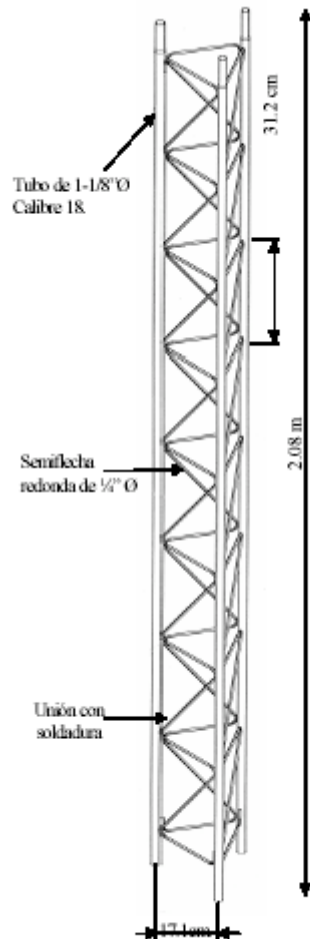


Site Survey





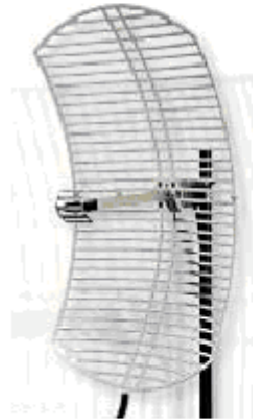
Towers AT-20 and AT-29



Modelo	Espesor (mm.) (plg.)		Dimensiones (mm.)		Anclas "L"
			A	B	
AT-20	3.4	1/8	280	150	SIN
AT-29	4.8	3/16	350	208	1/2" Ø x 8"



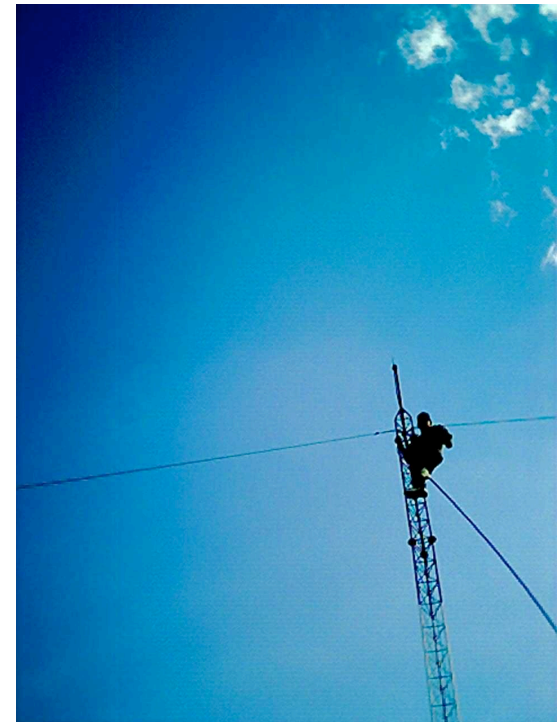
Antenna



Parabolic Grid PG24



Omnidirectional AP 12





Access Point

*air***Point** X0



- Bandwidth Management for high QoS
- Built-in RADIUS client for authentication and individual user SLA
- Independent upload/download control for each user
- Internal MAC table list for small networks
- Supports more clients per Access Point

Bandwidth Management

- Roaming support by external RADIUS control
- Seamless operation in PPPoE networks
- SNMP Access to MAC forwarding tables
- Access control list and IP filters for SNMP requests
- Advanced traffic statistics

Advanced Networking

- Powered by PoE Injector
- Surge suppression
- Regulatory compliant installations
- Weatherproof, rugged thermal design in NEMA4X enclosure
- Device Temperature monitoring by SNMP
- Dedicated Network Processor for secure device management

Carrier Class Reliability

- Access Point mode for Wireless PoPs
- Wireless Bridge Mode for Backhauls
- Client-Bridge mode for extended coverage

Flexible Configurations



Repeater

*air*Point XO²



- Bandwidth Management for high QoS
- Built-in RADIUS client for authentication and individual user SLA
- Independent upload/download control for each user
- Internal MAC table list for small networks
- Supports more clients per Access Point

Bandwidth Management

- Roaming support by external RADIUS control
- Seamless operation in PPPoE networks
- SNMP Access to MAC forwarding tables
- Access control list and IP filters for SNMP requests
- Advanced traffic statistics

Advanced Networking

- Powered by PoE Injector
- Surge suppression
- Regulatory compliant installations
- Weatherproof, rugged thermal design in NEMA4X enclosure
- Device Temperature monitoring by SNMP
- Dedicated Network Processor for secure device management

Carrier Class Reliability

- Wireless Repeater function for high performance backhaul
- Client Bridge mode to provide Cell Extender functionality
- Dual Access Point mode for increased coverage
- Access Point with standby redundancy
- Additional Network Processor for sustained high performance

High Performance Dual Radio Configurations



Outdoor Client Device



Features at a glance

- › Multi-Mac support to connect LAN to the wireless network.
- › Rugged weatherproof design in a compact and stylish enclosure.
- › Ideal for wireless LAN access in all indoor and outdoor areas.
- › Flexible mounting on wall or antenna mast (up to 2 inch diameter).
- › Can be mounted for Horizontal or Vertical Polarities.
- › High receiver sensitivity; provides error free data transfer.
- › Auto Fall back data rate for long distance communication in noisy environments.
- › Powered through Ethernet cable using powerShot™ PoE injector.
- › Driver-less operation with true 'Plug and Play' (in single MAC mode).
- › Works with all Operating Systems.
- › High level security with full 128 bit Key WEP encryption.
- › Compatible with IEEE 802.11b & IEEE 802.3 standards.
- › Firmware is upgradeable to protect your investment.



Solar Panel



CHARACTERISTICS	I-100/12	I-100/24
PHYSICAL		
Dimensions	1310 x 654 x 39,5 mm	
Weight	11,5 kg	
Number of cells in series	36	72
Number of cells in parallel	2	1
NOCT (800 W/m ² , 20 °C, AM 1.5, 1m/s)	47 °C	
ELECTRICAL (1000 W/m ² , 25 °C cell, AM 1.5)		
Nominal Voltage (V _n)	12 V	24 V
Maximum Power (P _{max})	100 W _p ± 10 %	
Short-circuit current (I _{sc})	6,54 A	3,27 A
Open circuit voltage(V _{oc})	21,6 V	43,2V
Maximum power current (I _{max})	5,74 A	2,87 A
Maximum power voltage (V _{max})	17,4 V	34,8 V
CONSTRUCTIVE		
Cells	Single-crystal Si, textured and antireflectivity layered	
Contacts	Redundant contacts on each cell for circuit reliability	
Laminate	EVA (ethylene vinyl acetate)	
Front face	Tempered glass with improved light transmission	
Back face	Tough multi-layered backsheet Tedlar	
Frame	Anodised aluminium	
Connection boxes	2xIP 65 with built-in bypass diodes IP 65 with built-in bypass diodes	
Grounding connection	Yes	
Certifications	IEC 61215 and Class II by TÜV certificate	
Cable Section	4-10 mm ²	
Connection box	Pression screw with possibility of soldering/optional multi-contact	



VoIP

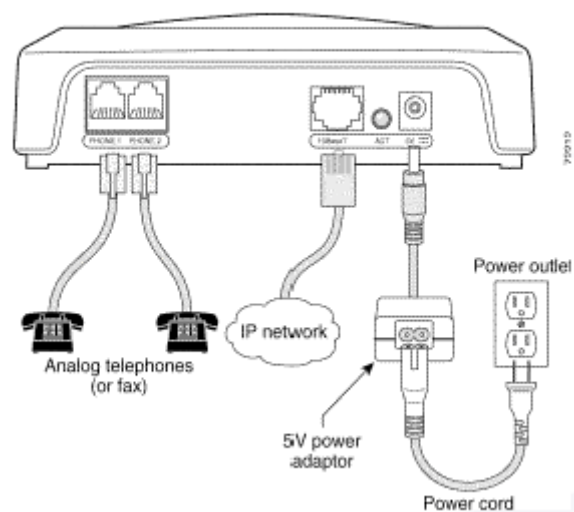


Cisco ATA 186



Cisco ATA 186

Plug & Play diagram for the ATA 186





Installations





Thank you

Any questions?

