Overview

Introduction

This document describes the system features used in the WLAN Cable Access Point 6220 Release 1.0 Product.

The Wireless LAN Cable Access Point 6220 is an outdoor hardened, strand-mountable access point solution designed to extend the reach of the cable operators' hybrid fiber coax network utilizing wireless technologies from existing rights of ways. This solution from Nortel Networks provides cable operators a fast, low-cost alternative for delivering service to new customers by eliminating the time, permits, and construction costs associated with extending aerial or buried drops.

The WLAN Cable Access Point 6220 solution provides :

Flexible service platform

The WLAN Cable Access Point 6220 is a flexible service platform giving cable operators the ability to offer many different wireless services such as Public Hot Spots and Commercial High Speed Data services.

Standard Compliance and Interoperability

The WLAN Cable Access Point 6220 utilizes standard-compliant DOCSIS™ cable modems, thus ensuring interoperability with the existing cable network. Wireless access is accomplished using industry-standard IEEE 802.11 radios approved by government regulatory agencies for use in "unlicensed" ISM frequencies.

Security

Security is of the highest importance when delivering wireless services. The WLAN Cable Access Point 6220 adheres to industry standards for 802.11 devices and augments those standards with additional security features designed to provide both the cable operator and the end-user maximum protection.

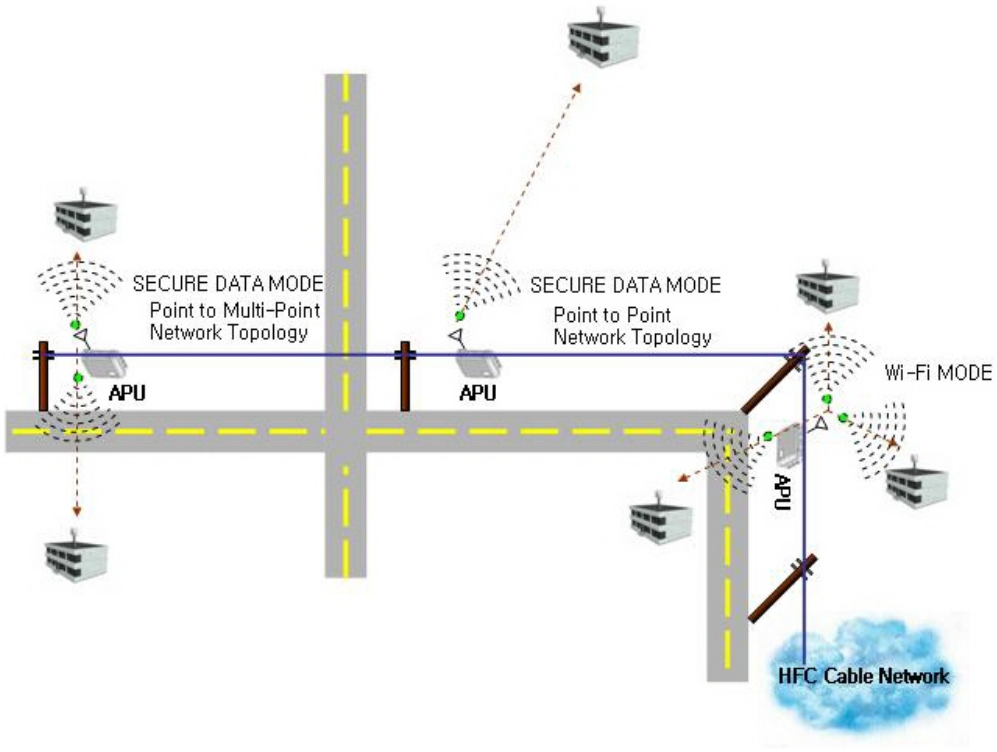
Performance optimization via multiple antenna options

Nortel Networks provides antenna options specifically engineered to enable the WLAN Cable Access Point 6220 to achieve peak link performance in Line of Sight (LOS) and Near LOS applications.

Ease of installation

Designed for simple, fast installation by professional technicians, the WLAN Cable Access Point 6220 is installed in a simple three-step procedure: lock down strand clamps, connect power via coax drop, and attach and align antenna for service optimization

Figure 1-1
WLAN Cable Access Point 6220 Service Concept Diagram



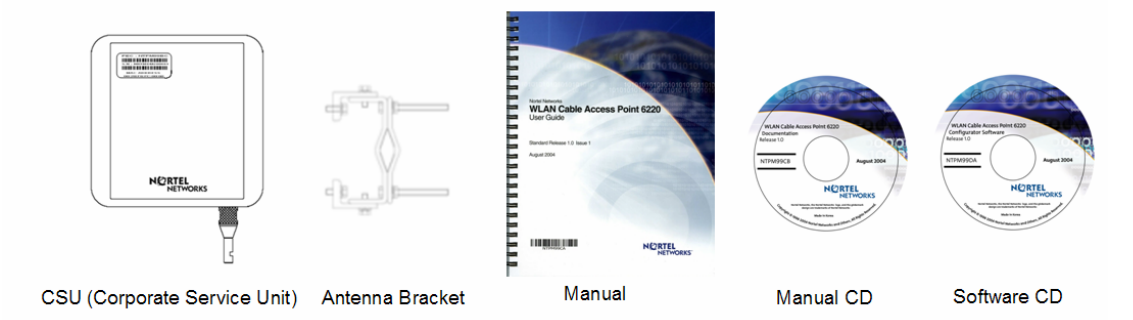
Product Description

Table 1-1
WLAN Cable Access Point 6220 Products

No.	PEC	Description
1	**NTPM99AC**	APU, 2.4G,A/B/G RADIO, CM
2	**NTPM99AE**	APU, 2.4G,FP ANTENNA, 14dB gain
3	**NTPM99AF**	APU, 2.4G,OMNI ANTENNA, 7dB gain
4	**NTPM99AP**	APU, 2.4G,BI-DIRECTIONAL ANTENNA, 9dB Peak
5	**NTPM99AE**	APU Antenna Mounting Kit / Tool
6	**NTPM99CB**	R1.0 WLAN6220 CAP DOC,CD
7	**NTPM99DA**	R1.0 WLAN6220 CAP SOFTWARE, CD
8	**NTPM99CA**	R1.0 WLAN6220 CAP DOC,PAPER
9	**NTPM99BC**	CSU, 2.4G,B RADIO, Flat Panel
10	**NTPM99EG**	CSU Mounting Kit / Tool

Figure 1-2
WLAN Cable Access Point 6220 APU Package Components

Figure 1-3
WLAN Cable Access Point 6220 CSU Package Components



APU(Access Point Unit)

The following is a list of WLAN Cable Access Point 6220 APU features:

Enclosure has three sorts of connector which support the connection to CATV Cable Network, Antenna and Monitoring Equipment.
Coaxial Port has the standard type of connector so that can be efficiently adapted to every connector regardless of the termination type of coaxial cable like “Trunk or Drop Cable”

Operation Power and Data Traffic are mixed at a signal amplifier as TBA(Trunk Bridge Amplifier), PI(Power Inserter) and supplied to the coaxial port on the APU through coaxial cable.

Monitoring Port can provide the safe testing method for measuring CATV signal to an installation engineer by attenuating RF power and protect AC power signal.

Basically, Two kinds of mounting types are available for APU, such as a steel wire strand mounting and wall mounting, but in case of wall mounting, another optional bracket kit will be needed for installation.
The available antennas are totally three types such as ‘Directional Type’, ’Bi-directional Type’ and ‘Omni-directional Type’ , which can be mounted on the front or rear cover of APU with a Universal Bracket.

Cable Modem Module is compliant to DOCSIS 2.0(Cablelabs) as well as DOCSIS 1.1 and WLAN AP support the secure mode connection which mean that wireless traffic from APU and CSU is not scanned and detected by a conventional sniffing program like ‘Netstumbler’.

Figure 1-4
APU (Top head)

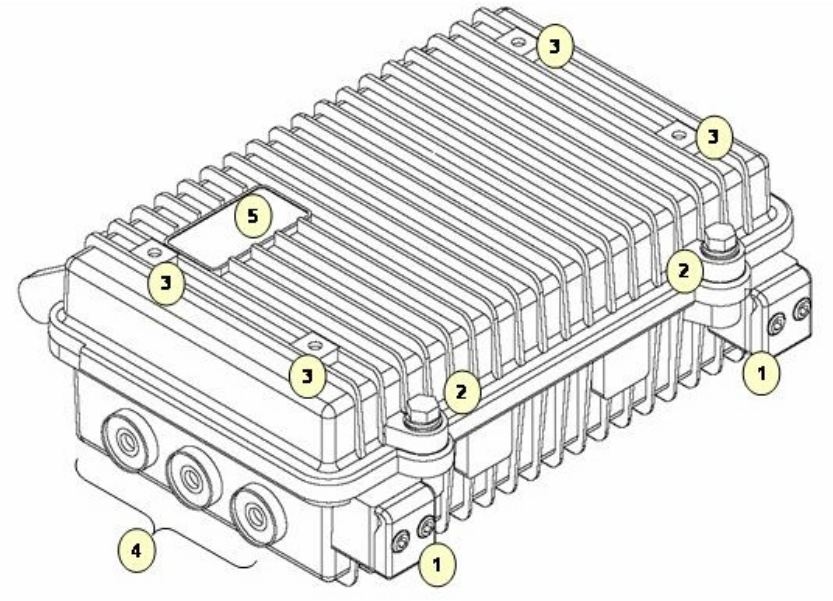


Figure 1-5
APU (Bottom)

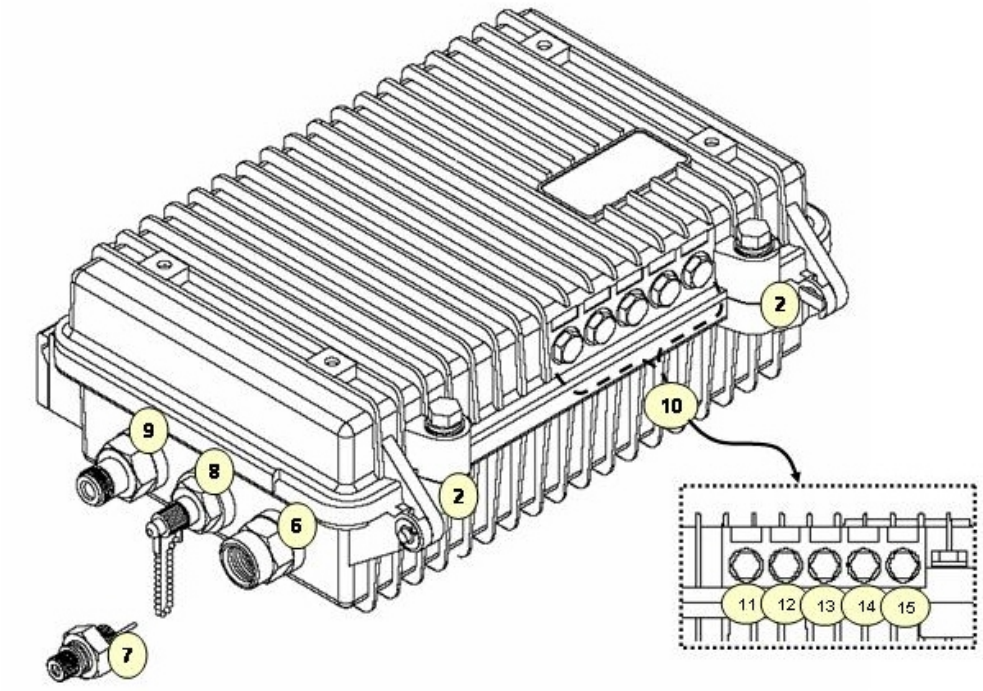


Figure 1-6
Inner Panel (APU)

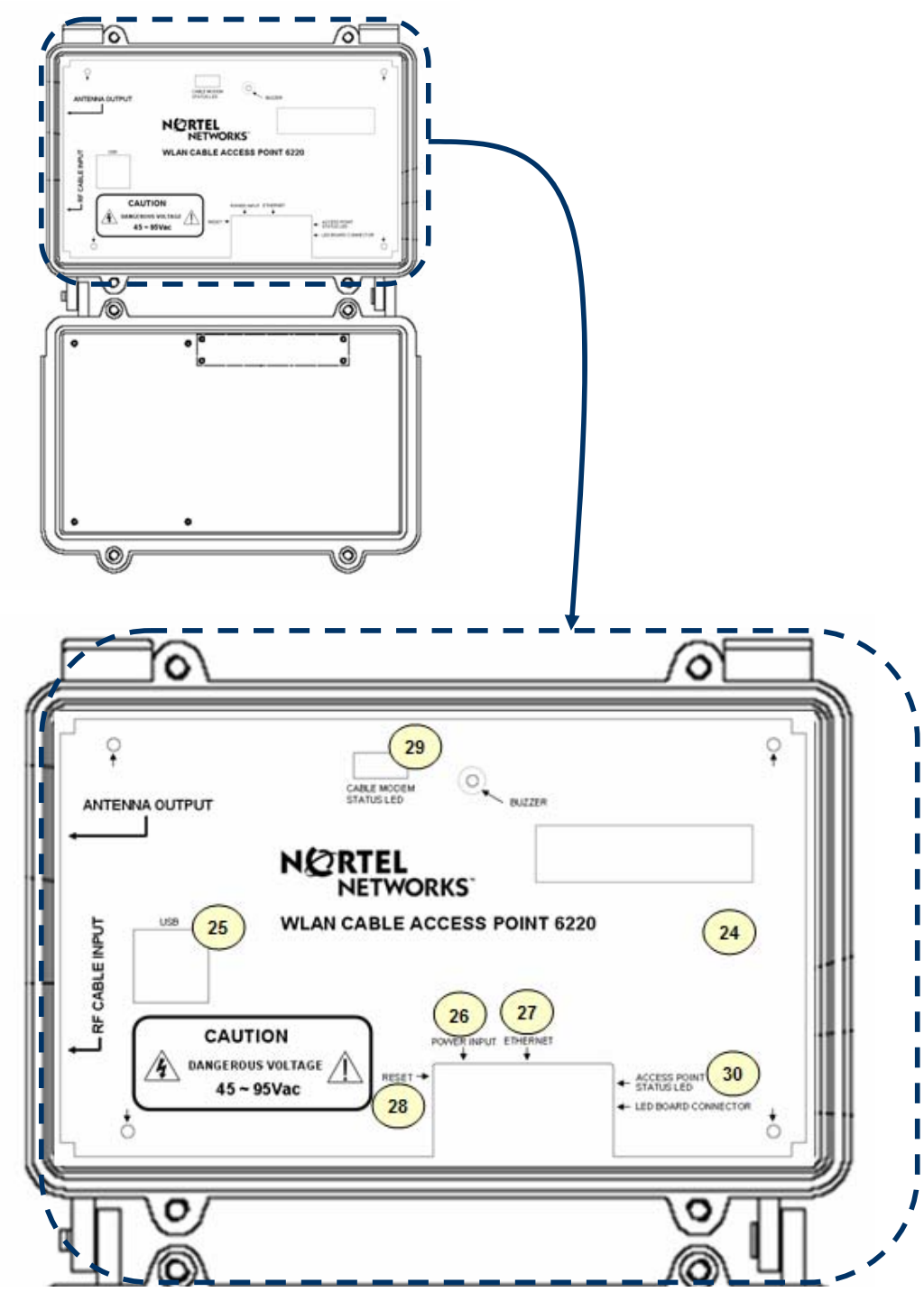


Figure 1-7
APU (Back)

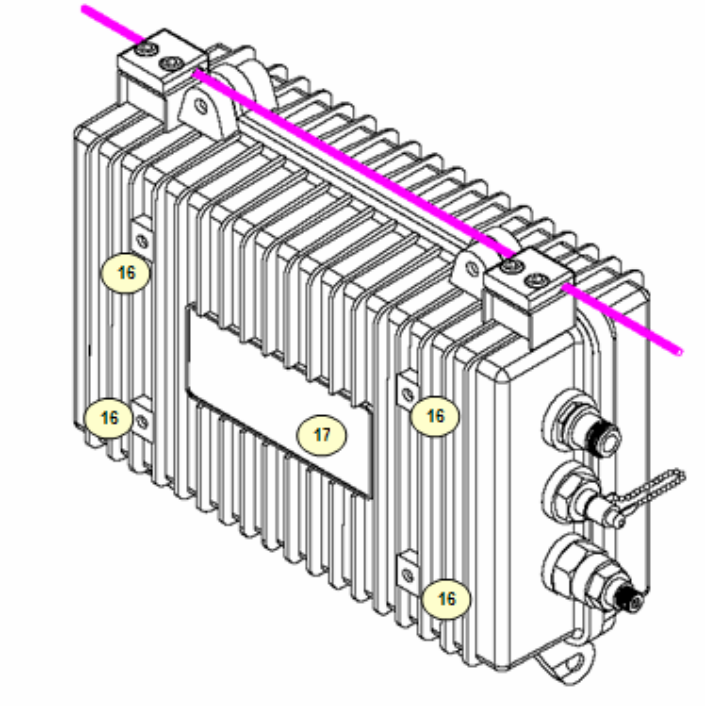


Figure 1-8
APU System Structure and Signal Flow

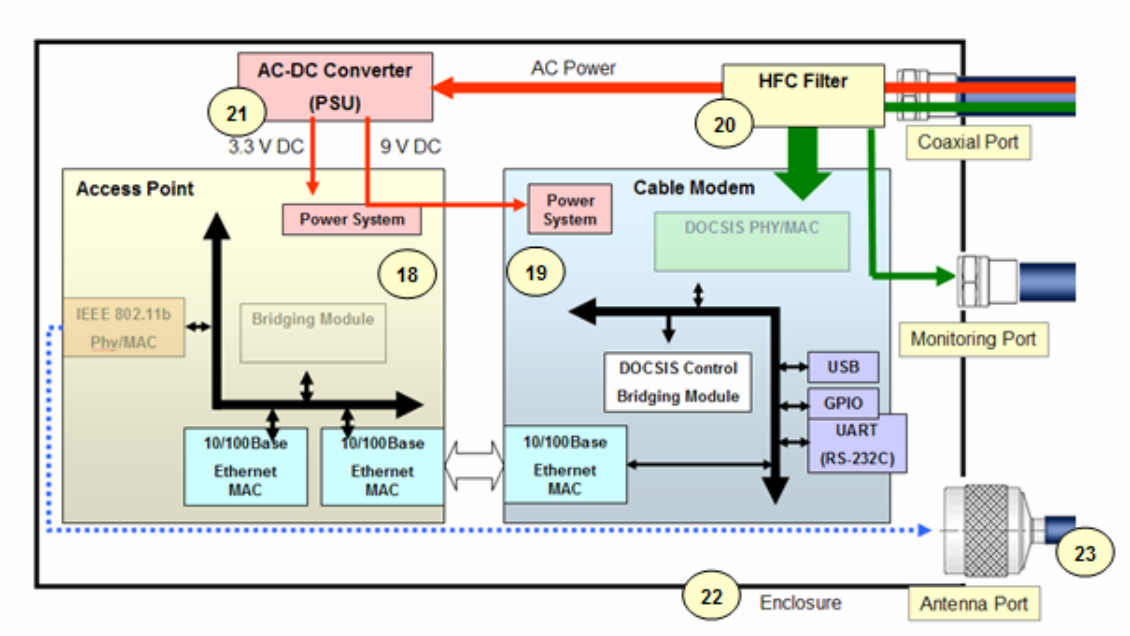


Table 1-2. Modules and Connectors (APU)

Item	Label	Description & Function	
1	Clamp Module	Provide strand mounting function to APU, Strand Clamp and Mount Bosses	
2	Lid Bolt	Lid Bolt for closing a case of APU enclosure	
3	Antenna Mount Hole	Screw Holes for mounting a APU antenna with a universal bracket	
4	Reserved Port	Reserved Location for a future upgrade and revision	
5	Logo Panel	Location for Nortel networks Logo	
6	Cable Entry Port	Port for coaxial cable connection. Trunk and Drop termination types are supported	
7	Cable Adaptor	Coaxial Adaptor Port to connect F-type Drop cable to APU Cable Entry Port	
8	Monitoring Port	Port reserved for safe testing of Cable RF signal. The signal on this port is attenuated by 20 dB	
9	Antenna Port	Port for antenna connection	
10	LED Panel	Provide the information for system operation status through LED Display	
11	LED1(Power)	Indicate Power is turned on	
12	LED2(Link #1)	ON	Indicate a valid cable modem operation
		Flash	Indicate that cable modem is linked up on the HFC network
13	LED3(Link #2)	ON	Indicates a Ethernet link between access point and cable modem
		Flash	Indicates that the access point is transmitting or receiving data
14	LED4(Radio #1)	ON	Indicates the 802.11b radio is enabled and operating
		Flash	Indicate that a frame is transmitted or received on the radio port
15	Reserved		Reserved location for a future upgrade
16	Antenna Mount Hole	Screw Holes for mounting a APU antenna with a universal bracket	
17	Label	Location for attaching a product label which include S/N,PEC,MAC address and so on	
18	Access Point	Mini-PCI type III Radio Card, System Board(Wi-Fi & Secure Data Mode ™)	
19	Cable Modem	DOCSIS 2.0 compliant cable modem	
20	HFC Filter	Split a HFC Signal and AC power from the combined signal	
21	PSU	AC to DC Power converter	
22	Case	Housing case which can be mounted on strand and antenna mounting bracket	
23	Antenna	2.4GHz Radio Frequency Antenna (Flat Panel, Omni-directional and Bi-directional). APU antenna can be mounted on the front or rear cover of APU with universal bracket.	
24	Inner Panel	Cover Panel to secure the main system boards(WLAN AP, Cable Modem)	
25	USB Port	USB type port for testing the Cable Modem Module	
26	DC Connector	3-pin connector to supply DC power to system board from Power Converter	
27	Ethernet Port	Port to connect APU to laptop/PC for testing purpose	
28	Reset S/W	Switch to reset the system to default settings	
29	Cable Modem LED	Indicate the full status of Cable Modem	
30	Access Point LED	Indicate the full status of Access Point	

Appendix A Specification

Access Point Unit(APU)

General

- Case: Aluminum alloy steel (Waterproof, EMI protection, Vibration Robust)
- Size: 300 (W) x 232.6 (L) x 112 (D) (mm)
  11.81 (W) x 9.157 (L) x 4.40 (D) (inch)
- Weight(without antenna): 3.14 Kg / 6.9234 lbs
- Elements: Access Point, Cable Modem, HFC Signal Filter, Power Supply Unit
- Ports: Coaxial Cable Port, Monitoring Port, Antenna Port (N-type)
- LED Panel: Power, Cable Modem Link, LAN, WLAN, CM-AP Link
- Temperature: -40 ~ 65 ºC (Operating)
- Power supply: Input Power 45 ~ 95VAC (Supplied by CATV UPS)
  Output Power 3.3VDC (3A), 9VDC (1.5A)
- Power Consumption : MAX 12W (Current < 0.5A)

Hardware

Radio Card

- Operation Frequency: 2.4 ~ 2.4835GHz (ISM Band; a/b/g ready with radio upgrade)
- Wireless LAN standard: IEEE 802.11b (a/b/g ready w/ radio upgrade)
- Frequency: 2.4GHz ISM band(North America 11 Channels)
- Modulation: Direct Sequence Spread Spectrum (DBPSK, DQPSK, CCK)
- Data rate: 1M, 2M, 5.5M, 11Mbps with auto fall-back
- Receive sensitivity: Min. -83dBm at 11Mbps

HFC Filter

- Input Signal : HFC Signal(-15dBmV ~ +15dBmV), AC Power (45VAC ~ 95VAC/ Max: 135VAC)
- Output : AC Power, HFC Signal, Monitoring Signal(Attenuated by 20dB)

Power Converter (AC-DC)

- Input Voltage Range: 45 VAC ~ 135VAC
- Output Voltage/Current: +3.3Vdc(3A), +9V(1.5A)

Software

- Firmware : APU Secure Data Mode(Base Station), Wi-Fi Access Point
- Wireless Service Protocol : Secure Data Mode, Dynamic Polling
- 802.1x - MD5, TLS, TTLS, PEAP over EAP
- MAC access control – 32 local MAC Address Table
- Standard RADIUS server support
- Wired Equivalent Privacy encryption - 64, 128
- Firewall(ICMP/UDP/TCP/IP Protocol Filtering)
- Layer 2 Protocol Filtering
- BOOTP/DHCP(Server, Relay, Client), Static IP
- NAT(Incoming/Outgoing)
- Routing Protocol(RIP v2, Static)
- Restriction of Broadcast Storm
- SNMP v1, Software upgrade via TFTP
- GUI Program : Windows Based
- Throughput Analysis: Ping Fill
- Radio Performance Testing Tool: Antenna Alignment
- Remote Statistics Monitoring
- SNMP Traps
- MIB II

Cable Modem Specification (Hardware / Software)

- Standard : DOCSIS 2.0 compliant
- Frequency : 5~42MHz (Upstream), 88~860MHz (Downstream)
- Modulation : QPSK/16QAM/64QAM/128QAM(Upstream),
  64QAM/256QAM (Downstream)
- Data Rate: 5.12Mbps/QPSK, 30.34Mbps / 64QAM (Upstream)
  30.34Mbps/64QAM, 42.88Mbps / 256QAM (Downstream)
- Channel Bandwidth
  Upstream: 200 KHz, 400 KHz, and 800 KHz, 1.6 MHz, 3.2 MHz, 6.4 MHz
  Downstream: 6MHz

- Error correction : Reed-Solomon (Upstream), Reed-Solomon Trellis(Downstream)
- Signal Level : + 8dBmV ~ + 53dBmV(All Modulation),
  -15dBmV ~ + 15dBmV
- Input Impedance: 75 Ohm
- Interface: RJ 45 Ethernet port, USB 1.1 port
- SNMP v1, Software upgrade via TFTP