galgus | Maximizing wireless performance

ECOWIFI

ECO-C03DI

ECO-WRT®is a software with many different features that allow to make a great configuration on the WiFi network. ECOW-WRT become a complete distribute smart WiFi solution to cover all your needs, being at the same time powerful, easy to use, configure and maintain.

Firmware information

· Opeating Modes

Access Point and Access Point WDS
Station and Station WDS

· Supported Clients

802.11 b/g/n
802.11 a/n/ac

· WAN Type

Static IP
PPP, PPPoE, PPPtP
DHCPv4 Client and DHCPv6 Client

· Device Management

HTTP/HTTPs Web Server

· Firewall

SYN-flood protection
MSS clamping
NAT
Port forwards
Traffic Rules
Custom Rules

· Supported Protocol

IPv4, IPv6, UDP, TCP, DNS

· QoS

Smart Queue Management
Ingress/Egress shaping
Monitoring per client

· Security and Authentication

WEP64/128, WPA Personal/Enterprise
WPA2 Personal/Enterprise
Key Management, PSK/TKIP Encryption, AES Encryption
TKIP and AES encryption
IEEE 802.11x RADIUS Authentication
Denial of Service Attack
MAC Filtering (Dinamic Blacklist)
Isolate wireless clients

· IEEE 802.11h (DFS)

Enables wordlwide operation through support for standards-based
Dynamic Frequency Selection

· VLAN Management

Can manage the AP through VLAN ID

· VLAN Ethernet Trunk

Map VLAN IDs to multiple SSID
IEEE 802.11q and IEEE 802.11ad

· Alarms Events

Syslog Client

· Log

Syslog and Local Log Support

· Backup and Restores

Save and restore settings via Web Interface

· Rate Limiting

Dynamic per-user or per-WLAN

· STP

Spanning Tree Protocol, is a network protocol that builds a logical loop-free topology for Ethernet networks

· DPI

Deep packet inspection, is a form of computer network packet filtering that examines the data part (and possibly also the header) of a packet as it passes an inspection point

· SCEP

Simple Certificate Enrollment Protocol

· Network Diagnostics

Ping tool
Traceroute tool
Nslookup tool

· DHCP and DNS

DHCP and DNS server settings
Static Leases
Domain whitelist

· Realtime Traffic

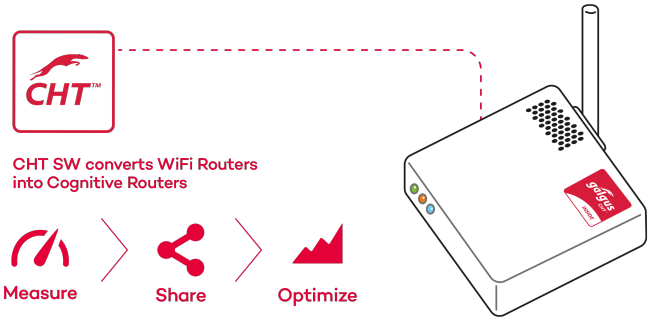
Load
Traffic
Wireless
Connections

· LED Configuration

Different events can be configured with different LED colours

Cognitive Hostspot Technology

Cognitive Hotspot Technology (CHT) is an embedded software that optimises the spectral efficiency for WiFi routers and Access Points (APs), increasing WiFi performance by up to 400 %, while reducing interference levels and power consumption, especially in high user density environments.



Make your WiFi network intelligent

By embedding the CHT software in WiFi APs a fully distributed controlled Wi-Fi network is created, making each AP intelligent.

APs with CHT measure key network metrics, exchange them automatically with neighbouring APs and together optimise radio resources in real time.

A WiFi network with CHT is more reliable, better performing, greener and can guarantee QoS (Quality of Service) for every connected user and thing (IoE).

A fully distributed controlled network

- No central controller required (either physical or virtual).
- No single point of failure.
- No delay in the decision-making.
- No bottleneck in the communication.
- Highly scalable.
- Save money.
- Simply installation.

Increasing wifi performance up to 5x? how?

Advanced Load Balancing

Load Balancing (LB) allows distributing connected users between the 2 radios of the AP, one in 2.4GHz and the other one in 5GHz frequency bands (Intra-AP Load Balancing). Furthermore, Load Balancing distributes connected users among different APs in the network, ensuring there are no bottlenecks (Inter-AP Load Balancing). In this manner, each AP provides service to an optimum number of users, reducing network congestion. The distribution takes into account the type of application that the client is using (streaming, web browsing, etc.), ensuring a high quality of service.

Smart Roaming

Smart Roaming (SR) allows transferring users from one AP to another when their SNIR (Signal-To-Noise-and-Interference) falls below a minimum threshold. This minimum threshold is defined as a value that guarantees enough throughput and therefore QoS (Quality of Service) for every client. The user is only roamed in case there is another AP that offers better SNIR to this client. With SR, access points decide to which node a certain user will connect. This is a transparent process since decisions are made by APs and not the user device. If the conditions change, or if the user changes its location, CHT will act in real-time switching the user to a different access point.

Traffic Congestion Management

Traffic Congestion Management (TCM) is a mechanism that can identify problematic users who are making an excessive use of the available network capacity. To solve this issue, TCM measures and sets limits to control the transmission speed of the problematic client in real-time, ensuring that network resources are fairly shared. TCM acts at a wireless level preventing less effective TCP congestion mechanism to a trigger and improving overall network performance. Thus, traffic peaks of demanding users may be monitored and controlled by CHT.

Automatic Channel Assignment

Automatic Channel Assignment (ACA) is a feature that automatically and dynamically assigns transmission channels to a group of APs, selecting the channel configuration that reduces to the minimum the level of interference in the network and therefore increases the overall throughput. It works continuously, reacting to

any changes in the environment, such as the activation of an additional access point either internal or external ones. As conditions constantly change, suddenly our previously configured network doesn?t work as expected. With CHT, APs detect the interference sources (WiFi or non-WiFi) and recalculate the new optimum channel assignment.

Multicast to Unicast Conversion

Through the multicast to unicast conversion, we ensure high-quality video transmission to a large number of clients, as multicast traffic operates at lower d ata rates due to being prone to packet loss and media congestion. As a result, we are able to support IPTV.

Power Control

Power Control (PC) is a mechanism that adjusts the AP emission power to the optimum level needed to communicate with the users associated with it. Consequently, interferences between networks are reduced, as well as power consumption and electromagnetic radiations to users. PC uses dynamic transmit power to reach the furthest client helping further reducing co-channel interference and improving QoS for the overall network.

Indoor Location

With Indoor Location the network operator may locate the relative position of client devices (STAs), whether they are connected or not. This is very useful to obtain a ubiquitous correlation between performance and location. In addition, this allows the network to learn about the proper settings that it needs to adopt when the STA is in a specific location.

Use just what you need

Different type of licenses:

- **Basic:** Includes Smart Roaming.
- **High User Density, HUD:** Includes Smart Roaming, Load Balancing, Traffic Congestion Management, Automatic Channel Assignment.
- **Premium:** Includes Smart Roaming, Load Balancing, Traffic Congestion Management, Automatic Channel Assignment, Multicast to Unicast Conversion (IPTV support), Power Control, Indoor Location.

The main advantages:

- WiFi network performance by up to 400% in high user density environments.
- Improves the QoS (Quality of Service) for connected users and things (IoE - Internet of Everything).
- Reduces the number of APs needed in a deployment, reducing the costs.
- No central controller needed.
- Fully distributed control technology.
- Autoconfiguration. This feature reduces WiFi configuration time by up to 75%.
- Reduces interference levels and power consumption.
- Avoids congestion and slow data rates.
- Cloud-Based Management.

· ECO-C03DI

•General Overview

System Information	
Processor	Qualcomm-Atheros QCA9558 700 MHZ
Memory	128MB DDR2
NOR Flash	16MB
Antennas	Integrated 4dBi@2.4GHz and 5dBi@5GHz pyramidal omni smart antenna
Ethernet	2 GE ports with Auto-MDI/X
Power (per chain)	5GHz @ 18dBm
Power Supply	DC Jack Input: 24-56V Passive PoE: 24-48V PoE IEEE 802.3af/at
Consumption	13.6W
RoHS	Yes
Humidity	Operating: 5% a 95% (non-condensing) Storage: Max. 90% (non-condensating)
Temperature Range	Operating: -20ºC a 70ºC Storage: -40ºC a 90ºC
LEDs Indicators	LED indicators configurable
Dimensions (H x W x D)	161.5 x 161.5 x 80 (mm)

•RF Performance Table

Transmitted Power and Receiver Sensitivity						
Max of concurrent associations	**Encryption**	**Client Latency**	**TCP** (1 Mbps per 1x1 client)		**UDP** (1 Mbps per 1x1 client)	
			Single radio	**Dual radio**	**Single radio**	**Dual radio**
	WPA2-PSK	<100 ms	40 clients	70 clients	45 clients	80 clients

Qualcomm Atheros QCA9558 (2.4 GHz)								
	Data Rate	Tx Power (per chain)	Tx Power (3 chains)	Tolerance		Data Rate	RX Specifications Sensitivity	Tolerance
2.4 GHz 802.11b	1 Mbps	23 dBm	28 dBm	+/- 2 dB	2.4 GHz 802.11b	1 Mbps	-95 dBm	+/- 2 dB
	2 Mbps	23 dBm	28 dBm	+/- 2 dB		2 Mbps	-93 dBm	+/- 2 dB
	5.5 Mbps	23 dBm	28 dBm	+/- 2 dB		5.5 Mbps	-90 dBm	+/- 2 dB
	11 Mbps	23 dBm	28 dBm	+/- 2 dB		11 Mbps	-88 dBm	+/- 2 dB
2.4 GHz 802.11g	6 Mbps	23 dBm	28 dBm	+/- 2 dB	2.4 GHz 802.11g	6 Mbps	-94 dBm	+/- 2 dB
	9 Mbps	23 dBm	28 dBm	+/- 2 dB		9 Mbps	-94 dBm	+/- 2 dB
	12 Mbps	23 dBm	28 dBm	+/- 2 dB		12 Mbps	-93 dBm	+/- 2 dB
	18 Mbps	23 dBm	28 dBm	+/- 2 dB		18 Mbps	-93 dBm	+/- 2 dB
	24 Mbps	23 dBm	28 dBm	+/- 2 dB		24 Mbps	-90 dBm	+/- 2 dB
	36 Mbps	21 dBm	26 dBm	+/- 2 dB		36 Mbps	-86 dBm	+/- 2 dB
	48 Mbps	20 dBm	25 dBm	+/- 2 dB		48 Mbps	-82 dBm	+/- 2 dB
	54 Mbps	19 dBm	24 dBm	+/- 2 dB		54 Mbps	-79 dBm	+/- 2 dB
2.4 GHz 11n HT20	MCS0	23 dBm	28 dBm	+/- 2 dB	2.4 GHz 11n HT20	MCS0	-94 dBm	+/- 2 dB
	MCS1	22 dBm	27 dBm	+/- 2 dB		MCS1	-94 dBm	+/- 2 dB
	MCS2	22 dBm	27 dBm	+/- 2 dB		MCS2	-92 dBm	+/- 2 dB
	MCS3	22 dBm	27 dBm	+/- 2 dB		MCS3	-88 dBm	+/- 2 dB
	MCS4	21 dBm	26 dBm	+/- 2 dB		MCS4	-84 dBm	+/- 2 dB
	MCS5	21 dBm	26 dBm	+/- 2 dB		MCS5	-81 dBm	+/- 2 dB
	MCS6	20 dBm	25 dBm	+/- 2 dB		MCS6	-78 dBm	+/- 2 dB
	MCS7	18 dBm	23 dBm	+/- 2 dB		MCS7	-75 dBm	+/- 2 dB
2.4 GHz 11n HT40	MCS0	23 dBm	27 dBm	+/- 2 dB	2.4 GHz 11n HT40	MCS0	-93 dBm	+/- 2 dB
	MCS1	22 dBm	27 dBm	+/- 2 dB		MCS1	-93 dBm	+/- 2 dB
	MCS2	22 dBm	27 dBm	+/- 2 dB		MCS2	-90 dBm	+/- 2 dB
	MCS3	22 dBm	27 dBm	+/- 2 dB		MCS3	-85 dBm	+/- 2 dB
	MCS4	21 dBm	26 dBm	+/- 2 dB		MCS4	-82 dBm	+/- 2 dB
	MCS5	21 dBm	26 dBm	+/- 2 dB		MCS5	-78 dBm	+/- 2 dB
	MCS6	20 dBm	25 dBm	+/- 2 dB		MCS6	-75 dBm	+/- 2 dB
	MCS7	18 dBm	23 dBm	+/- 2 dB		MCS7	-72 dBm	+/- 2 dB

Qualcomm Atheros QCA9880 (5GHz)								
	Data Rate	Tx Power (per chain)	Tx Power (3 chains)	Tolerance		Data Rate	RX Specifications Sensitivity	Tolerance
802.11a	6-24Mbps 36 Mbps 48 Mbps 54 Mbps	20 dBm 19 dBm 18 dBm 17 dBm	25 dBm 24 dBm 23 dBm 22 dBm	+/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB	**802.11a**	6 Mbps 36 Mbps 48 Mbps 54 Mbps	-94 dBm -86 dBm -82 dBm -80 dBm	+/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB
5 GHz 11an/ac HT20	MCS0 MCS1 MCS2 MCS3 MCS4 MCS5 MCS6 MCS7 MCS8	20 dBm 20 dBm 20 dBm 19 dBm 19 dBm 17 dBm 16 dBm 16 dBm 15 dBm	25 dBm 25 dBm 25 dBm 24 dBm 24 dBm 22 dBm 21 dBm 21 dBm 20 dBm	+/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB	**5 GHz 11an/ac HT20**	MCS0 MCS1 MCS2 MCS3 MCS4 MCS5 MCS6 MCS7 MCS8	-93 dBm -91 dBm -90 dBm -85 dBm -82 dBm -78 dBm -77 dBm -75 dBm -73 dBm	+/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB
5 GHz 11an/ac HT40	MCS0 MCS1 MCS2 MCS3 MCS4 MCS5 MCS6 MCS7 MCS8 MCS9	20 dBm 20 dBm 20 dBm 18 dBm 18 dBm 16 dBm 15 dBm 15 dBm 14 dBm 14 dBm	25 dBm 25 dBm 25 dBm 23 dBm 23 dBm 21 dBm 20 dBm 20 dBm 19 dBm 19 dBm	+/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB	**5 GHz 11ac/an HT40**	MCS0 MCS1 MCS2 MCS3 MCS4 MCS5 MCS6 MCS7 MCS8 MCS9	-93 dBm -91 dBm -90 dBm -85 dBm -82 dBm -78 dBm -77 dBm -75 dBm -73 dBm -71 dBm	+/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB
5 GHz 11ac HT80	MCS0 MCS1 MCS2 MCS3 MCS4 MCS5 MCS6 MCS7 MCS8 MCS9	20 dBm 20 dBm 20 dBm 18 dBm 18 dBm 16 dBm 15 dBm 15 dBm 14 dBm 14 dBm	25 dBm 25 dBm 25 dBm 23 dBm 23 dBm 21 dBm 20 dBm 20 dBm 19 dBm 19 dBm	+/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB	**5 GHz 11ac HT80**	MCS0 MCS1 MCS2 MCS3 MCS4 MCS5 MCS6 MCS7 MCS8 MCS9	-89 dBm -88 dBm -85 dBm -81 dBm -79 dBm -75 dBm -74 dBm -72 dBm -70 dBm -68 dBm	+/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB +/- 2 dB

•Radiation patterns

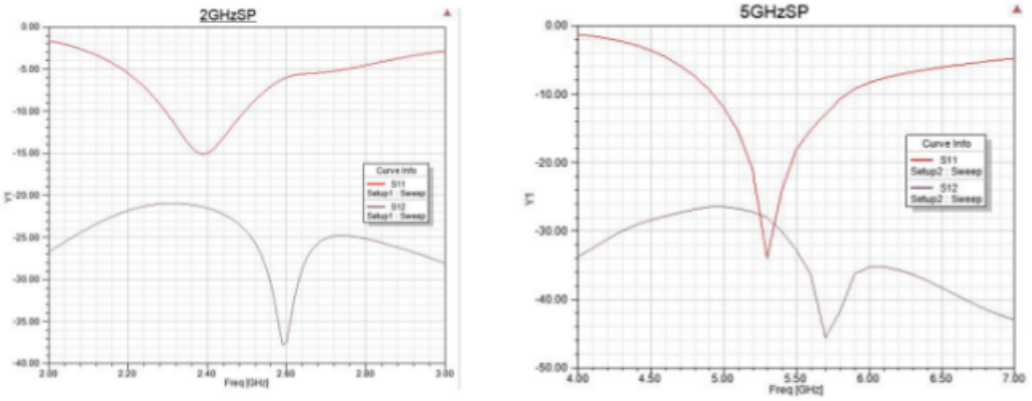


Figure 1. S-parameter Diagrams in the 2.4GHz and 5GHz bands.

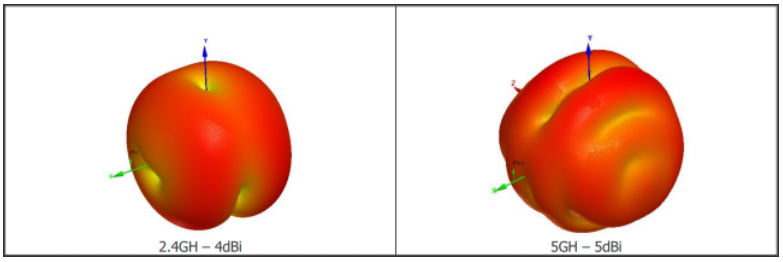


Figure 2. Antenna radiation patterns in the 2.4GHz and 5GHz bands.

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