COMTREND

Harmony Unify AP Mesh & IoT Cloud

TR-069 Basis

- Comtrend NBD
- Version 12 with Trustra Co., Ltd

1. Introduction of Harmony Unify AP Mesh & IoT Cloud
2. Harmony AP Mesh Scenario
3. Harmony Cloud Management System/ CMS for call center
4. Harmony Mobile APP
5. Harmony Product Line Up

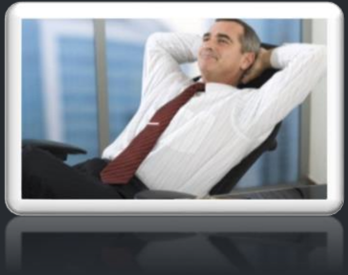
01 Introduction of Harmony Unify AP Mesh & IoT Cloud

HARMONY

Before, the ISP Call Center cannot have any clue for the subscriber's home WiFi network, only the Gateway to the Internet status can be detected...

HARMONY 2.0 is a TR-069 integrated, Telco-centric Managed WiFi Mesh solution.

Now, the Call Center can understand their subscriber's problem just as they are sitting in the user's living room.



COMTREND

Why it’s So Important

THE WIFI EXPERIENCE *IS* THE INTERNET EXPERIENCE

Service Providers typically support WiFi issues
EVEN if they did not sell, lease, or install the equipment.

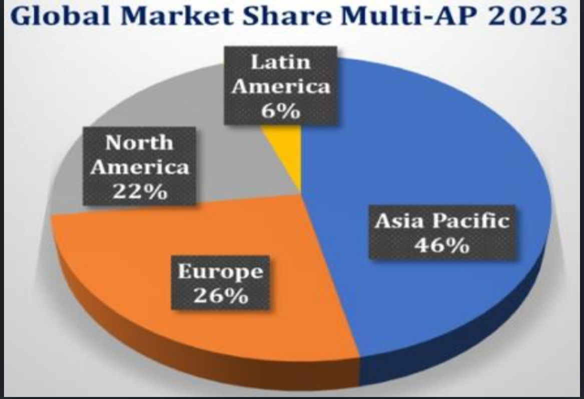
Resulting in…

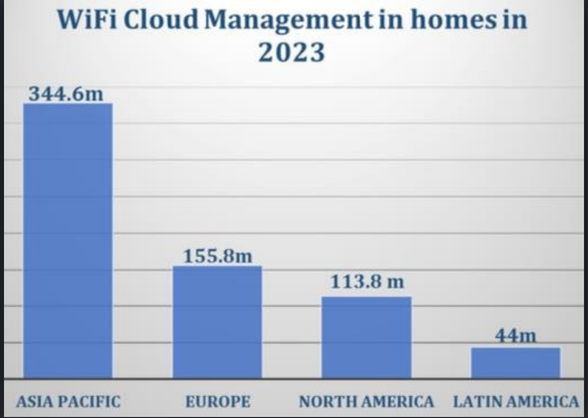
Increased Support Calls

Increased Truck Rolls

Reduced Customer Retention

Why it's So Important





364 million homes could have multi-AP WiFi

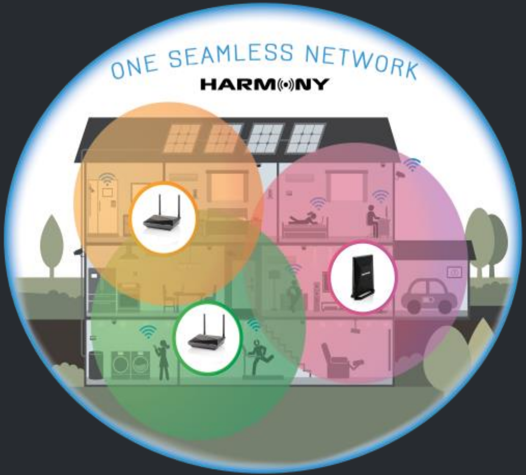
- By2023, cloud management software will control 658 million Wi-Fi homes, some 364 million of those homes will have more than a single access point.
  - Currently, 46 million homes that have **managed Wi-Fi** and 16.8 million have multiple access points installed.
  - Wi-Fi will move from the 50 Mbps service today to reach at least a 500 Mbps signal.
- "There is something of a revolution quietly through the broadband operators, with the potential to upgrade at least one billion homes with Home Gateway and cloud software."
- Today most operator activity is about putting in cloud management software and extra Access Points into each home, rather than simply shifting to 802.11AX.

ACS & Harmony

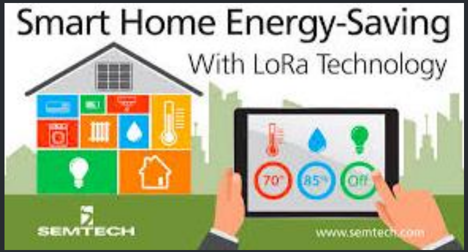
This is how's the things start....

ACS Central
Simple | Hosted | Free

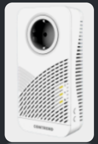
TR-69 Based Management Cloud

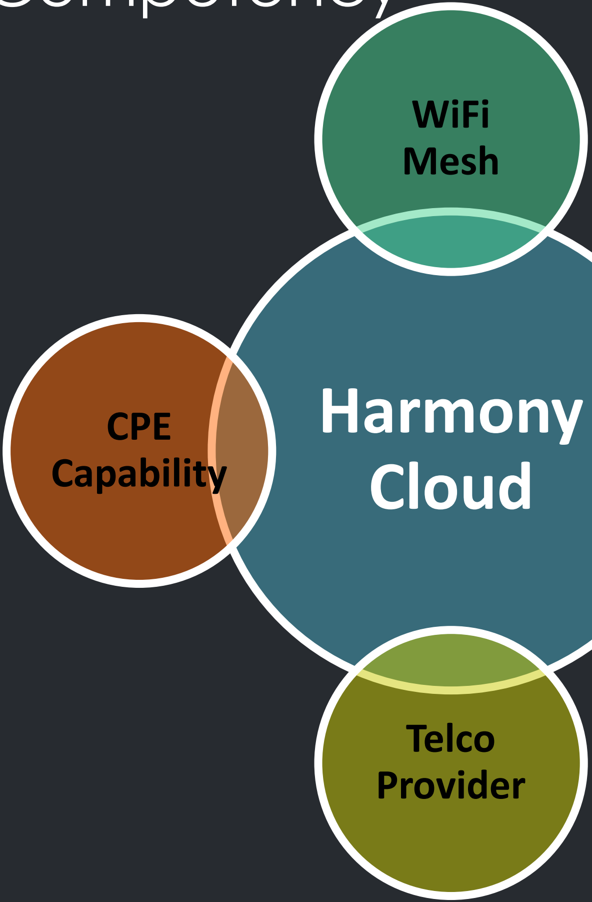

ONE SEAMLESS NETWORK
HARMONY

Chipset Independence AP MESH


Smart Home Energy-Saving
With LoRa Technology
70°
85%
Off
SEMTECH
www.semtech.com

Harmony Core Competency





WiFi Mesh

CPE Capability

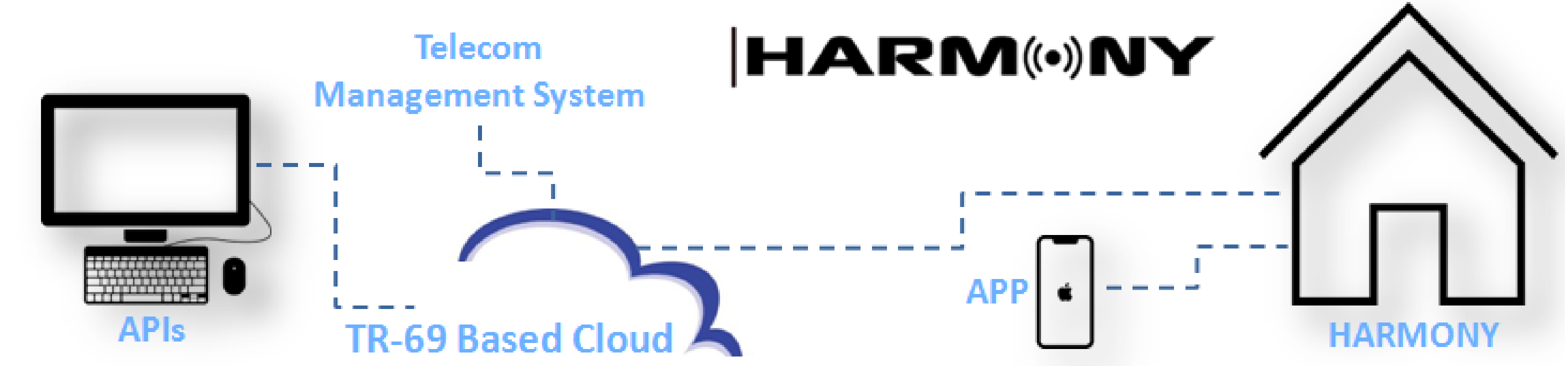
Harmony Cloud

ACS Server

Telco Provider

ACS Central
Simple | Hosted | Free

Harmony Key Element


Telecom
Management System
HARMONY
APIs
TR-69 Based Cloud
APP
HARMONY

APIs
- North bond integration
- 3rd APPs integration

Cloud Mgt.
- Home Network Topology
- WAN Speed test
- Wi-Fi Speed Estimation
- Remote Setting
- Remote Diagnostics
- Remote Optimization

APP
- Network Topology
- Parental Control
- Network Setting

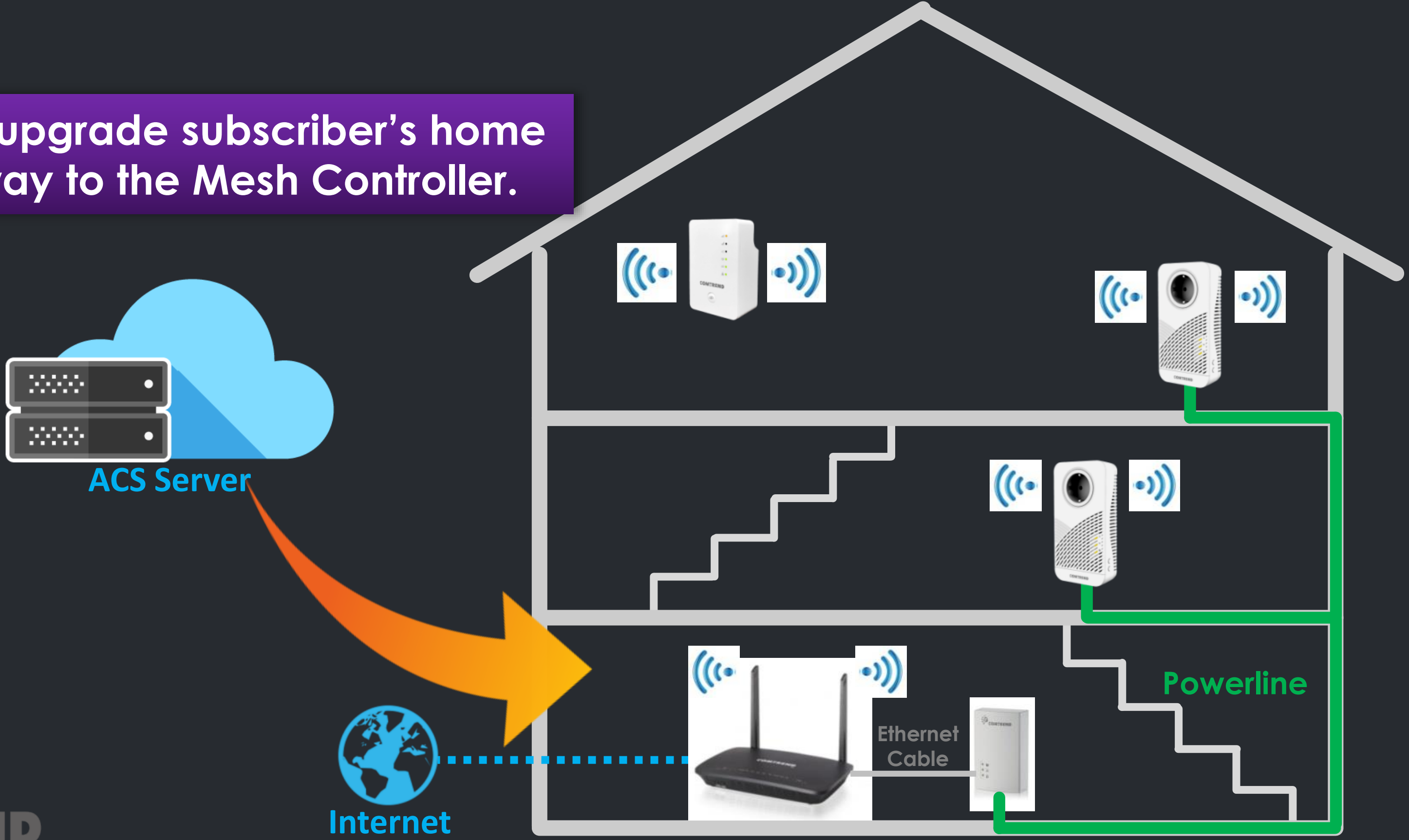
HARMONY
- Whole Home Coverage
- Self Healing
- Self Configuration

Evolution of Harmony

		HARMONY 1.0	HARMONY 2.0
Telco/ISP	Broadband Speed Test		●
	Connection Quality		●
	Network Optimization*		●
	Network Topology		●
	Cross CPE Chipset Platform	●	●
	Northbound API Support		●
	Recommendations*		●
	Remote Firmware Upgrade	●	●
	Using existing ACS Server	●	●
Subscribers	Easy Setup. Plug & Play	●	●
	Smart Roaming	●	●
	Auto-Configuration	●	●
	Auto-Optimizing	●	●
	Network Visibility	●	●
	Parental Control	●	●
	Mobile APP (iOS & Android)	●	●

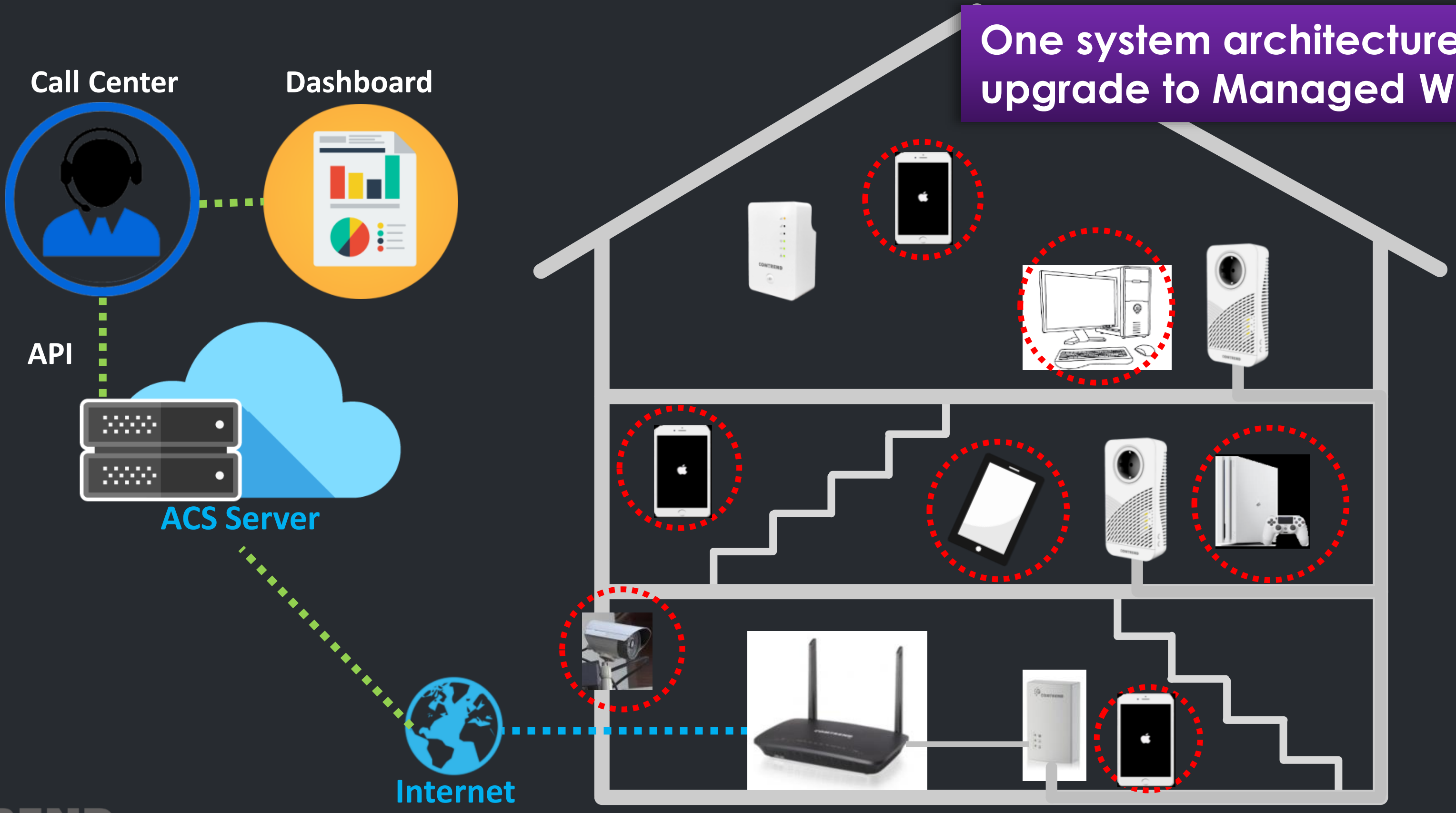
Harmony 1.0: Build-up the Whole Home Wi-Fi

ISP to upgrade subscriber's home gateway to the Mesh Controller.


ACS Server
Internet
Ethernet Cable
Powerline

Harmony 2.0: Upgrade to the Managed Wi-Fi

One system architecture, and upgrade to Managed WiFi.


Call Center
Dashboard
API
ACS Server
Internet

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2. Harmony AP Mesh Scenario
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4. Harmony Mobile APP
5. Harmony Product Line Up

02 Harmony AP Mesh Scenario

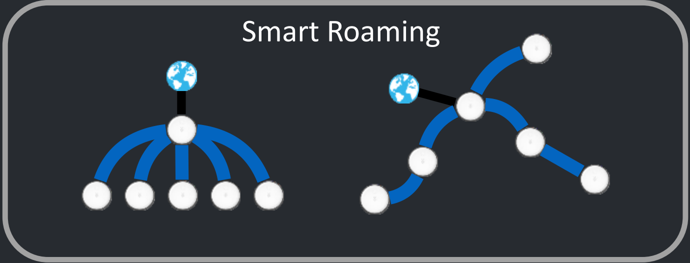
Smart Roaming

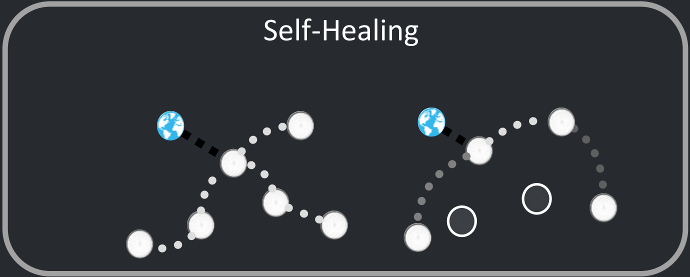
The Smart Wi-Fi technology will calculate the system loading and paths and provides the best network structure for you automatically.

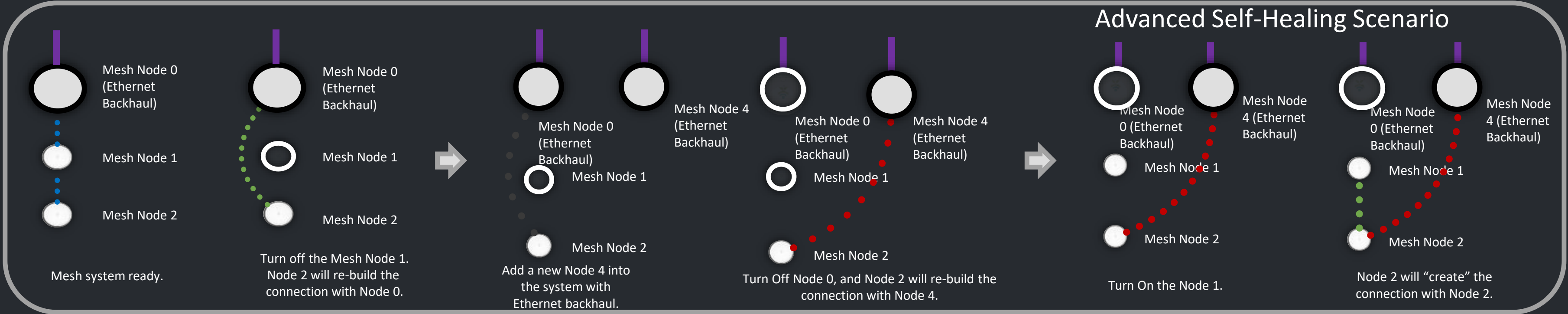
Self-Healing

The network finds alternative connection paths automatically

Advanced Self-Healing


Smart Roaming


Self-Healing


Advanced Self-Healing Scenario
Mesh Node 0 (Ethernet Backhaul)
Mesh Node 1
Mesh Node 2
Mesh system ready.
Mesh Node 0 (Ethernet Backhaul)
Mesh Node 1
Mesh Node 2
Turn off the Mesh Node 1. Node 2 will re-build the connection with Node 0.
Mesh Node 0 (Ethernet Backhaul)
Mesh Node 4 (Ethernet Backhaul)
Mesh Node 1
Mesh Node 2
Add a new Node 4 into the system with Ethernet backhaul.
Mesh Node 0 (Ethernet Backhaul)
Mesh Node 4 (Ethernet Backhaul)
Mesh Node 1
Mesh Node 2
Turn Off Node 0, and Node 2 will re-build the connection with Node 4.
Mesh Node 0 (Ethernet Backhaul)
Mesh Node 4 (Ethernet Backhaul)
Mesh Node 1
Mesh Node 2
Turn On the Node 1.
Mesh Node 0 (Ethernet Backhaul)
Mesh Node 4 (Ethernet Backhaul)
Mesh Node 1
Mesh Node 2
Node 2 will “create” the connection with Node 2.

02 Harmony AP Mesh Scenario

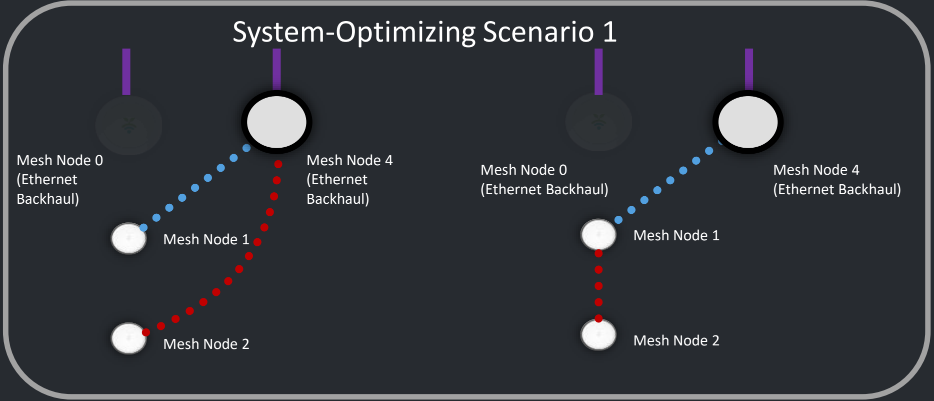
System-Optimizing

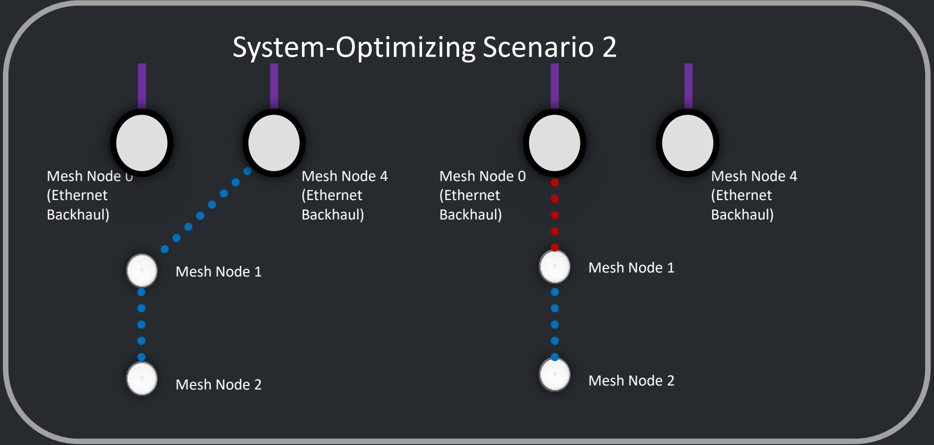
Optimizing System performance

Adaptive Roaming

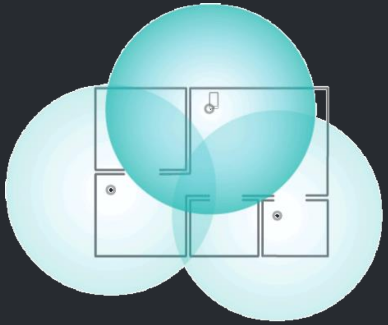
Single Wi-Fi Name and Password.

Always giving you the fastest speed throughout your whole home.


System-Optimizing Scenario 1
Mesh Node 0 (Ethernet Backhaul)
Mesh Node 4 (Ethernet Backhaul)
Mesh Node 1
Mesh Node 2
Mesh Node 0 (Ethernet Backhaul)
Mesh Node 4 (Ethernet Backhaul)
Mesh Node 1
Mesh Node 2

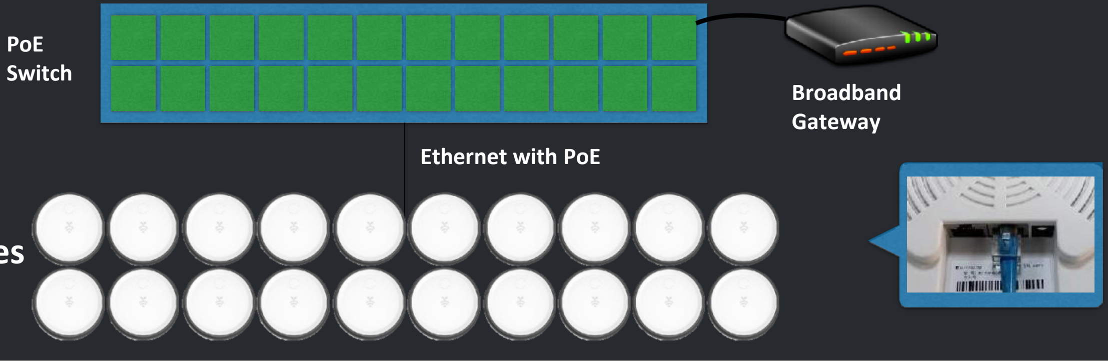

System-Optimizing Scenario 2
Mesh Node 0 (Ethernet Backhaul)
Mesh Node 4 (Ethernet Backhaul)
Mesh Node 1
Mesh Node 2
Mesh Node 0 (Ethernet Backhaul)
Mesh Node 4 (Ethernet Backhaul)
Mesh Node 1
Mesh Node 2

Adaptive Roaming



02 Harmony AP Mesh Scenario

Self- Configuring

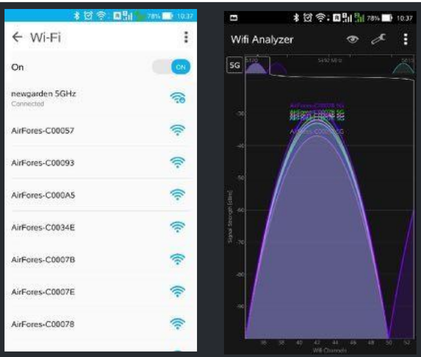

PoE Switch

Broadband Gateway

Ethernet with PoE

1. Installation & Cabling all devices

2. Self- Configuring


Wi-Fi

On

newgarden 5GHz
Connected

AirFores-C00057

AirFores-C00093

AirFores-C000A5

AirFores-C0034E

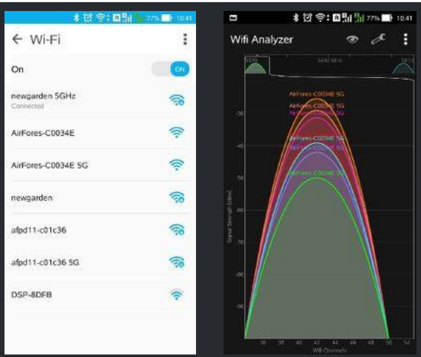
AirFores-C0007B

AirFores-C0007E

AirFores-C00078

Multiple SSID in default channel

After 5 minutes


Wi-Fi

On

newgarden 5GHz
Connected

AirFores-C0034E

AirFores-C0034E 5G

newgarden

afpd11-c01c36

afpd11-c01c36 5G

DSP-8DFB

Single SSID with optimized channel

3. Ready.

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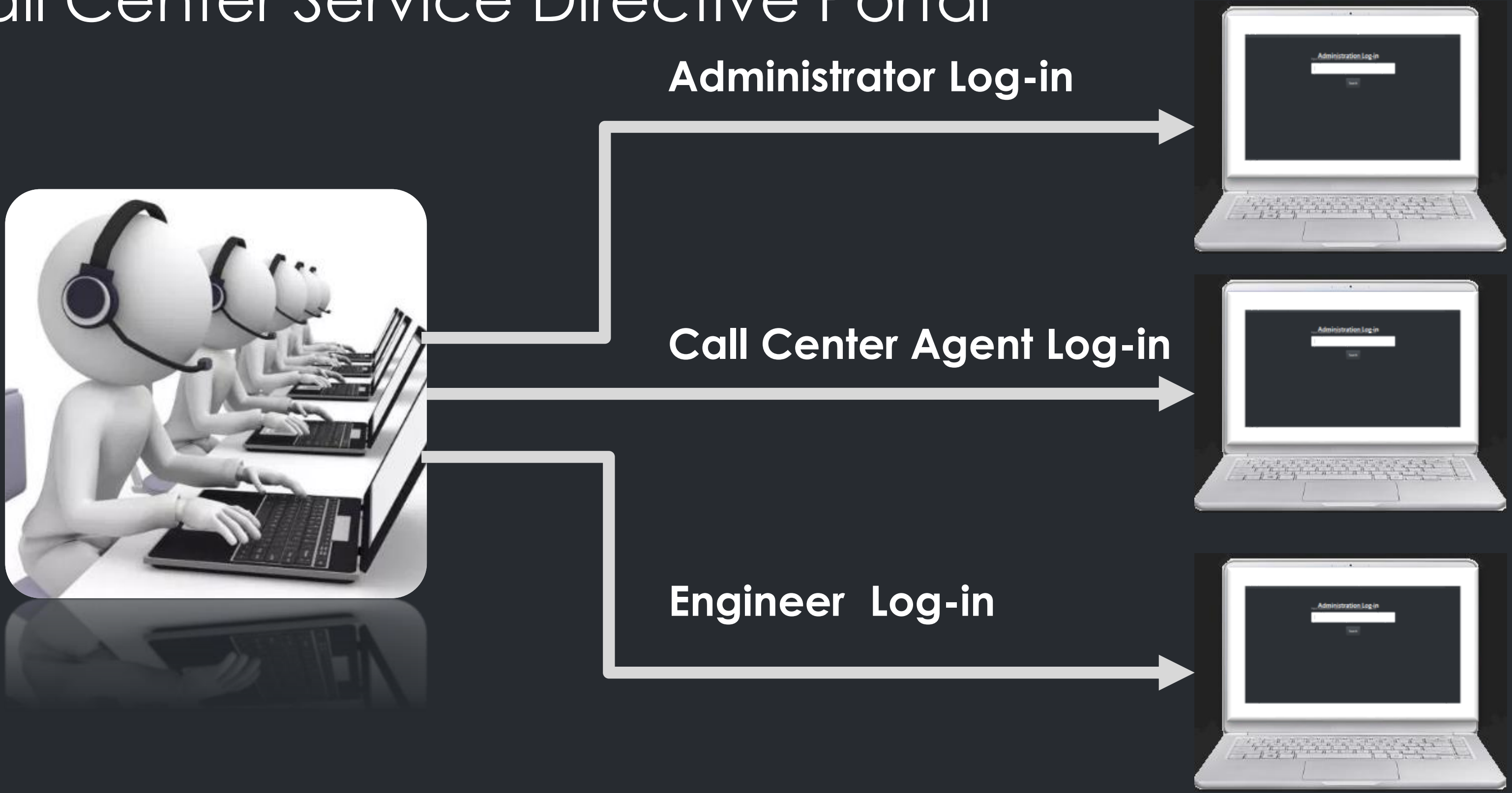
Call Center Service Directive Portal

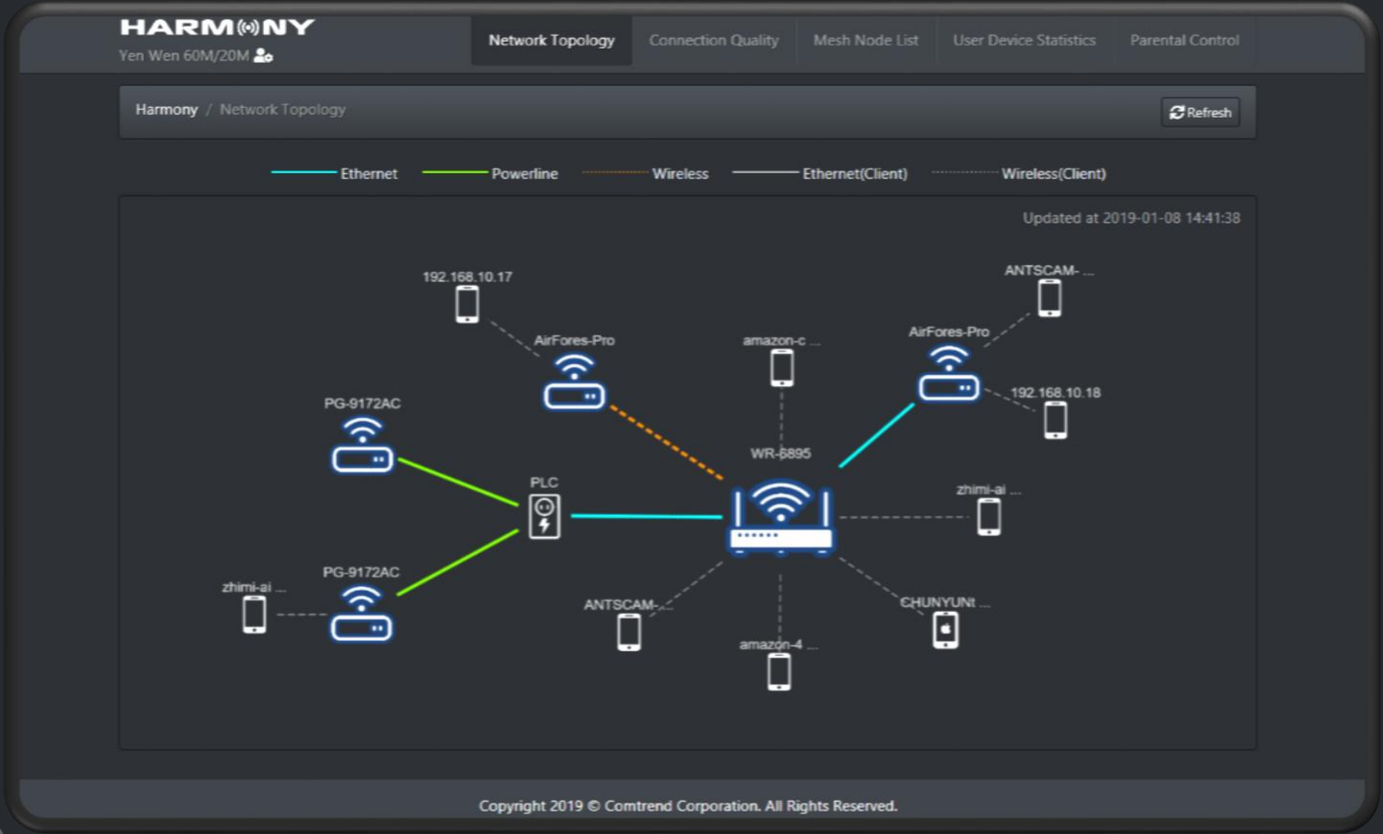

Administration Log-in
Administration Log-in
Administration Log-in

Administrator Log-in

Call Center Agent Log-in

Engineer Log-in

Visibility of the Subscriber's Network Topology



Yen Wen 60M/20M

Updated at 2019-01-08 14:41:38

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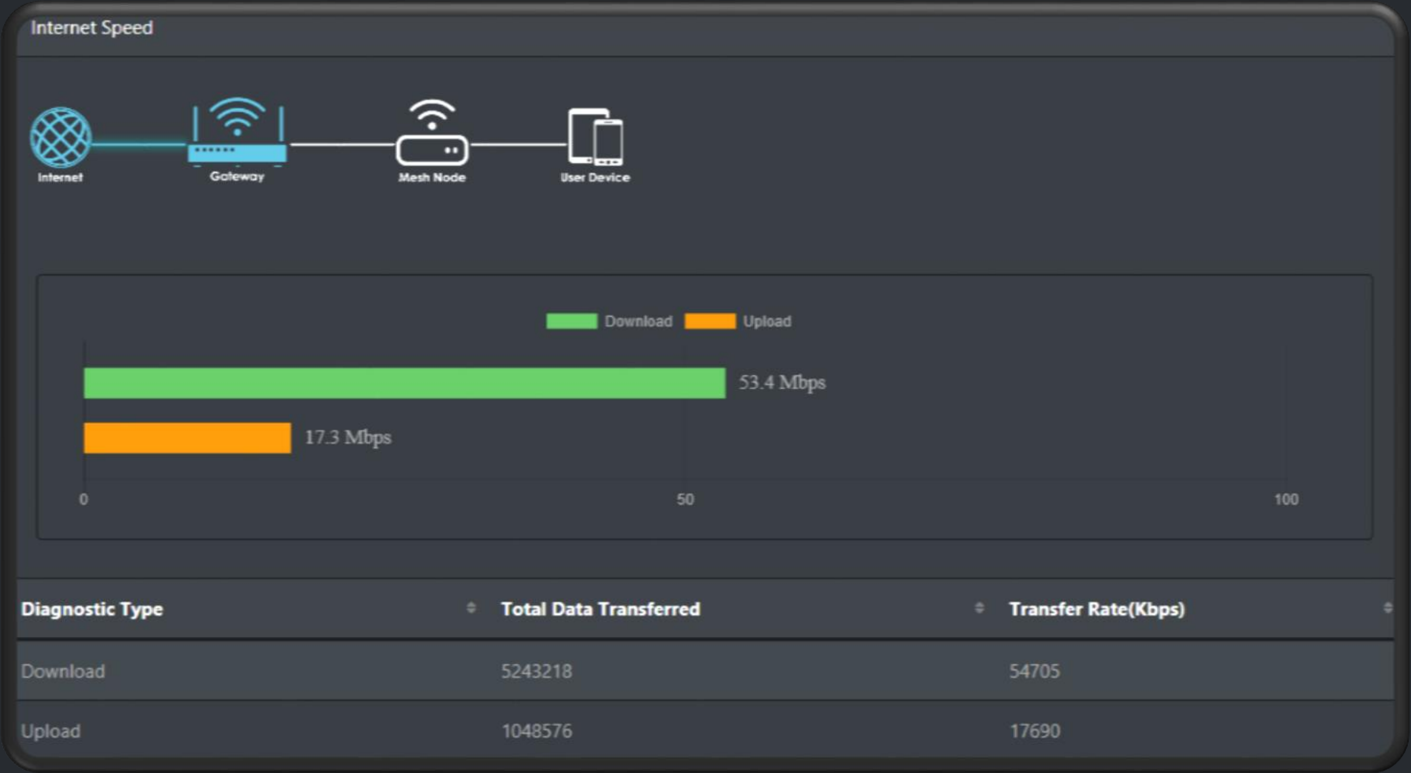
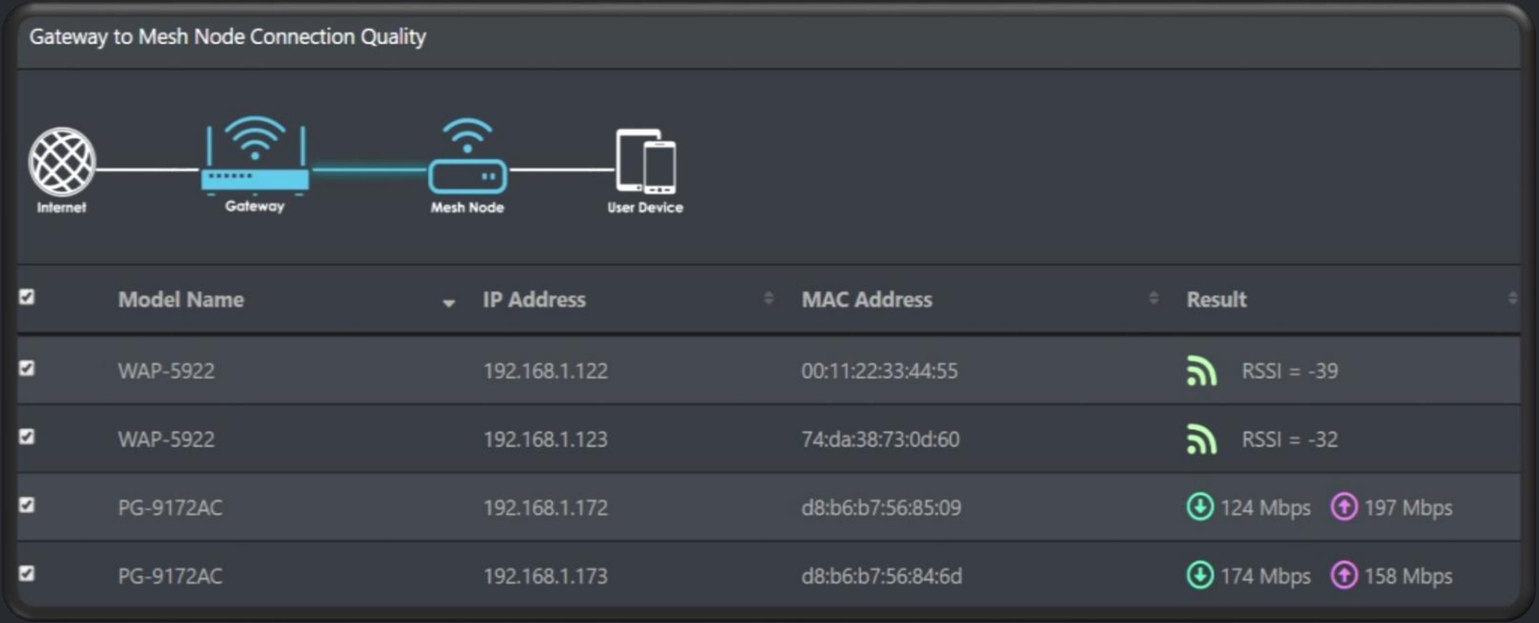
HARMONY
Network Topology
Connection Quality
Mesh Node List
User Device Statistics
Parental Control
Harmony / Network Topology
Refresh
Ethernet
Powerline
Wireless
Ethernet(Client)
Wireless(Client)
192.168.10.17
AirFores-Pro
amazon-c ...
AirFores-Pro
ANTSCAM- ...
192.168.10.18
PG-9172AC
PLC
WR-6895
zhimi-ai ...
PG-9172AC
zhimi-ai ...
ANTSCAM-...
amazon-4 ...
CHUNYUN ...

Subscriber’s Internet Speed Test


Internet Speed
Internet
Gateway
Mesh Node
User Device
Download
Upload
53.4 Mbps
17.3 Mbps
0
50
100

Diagnostic Type	Total Data Transferred	Transfer Rate(Kbps)
Download	5243218	54705
Upload	1048576	17690

Mesh Node Connection Quality Test

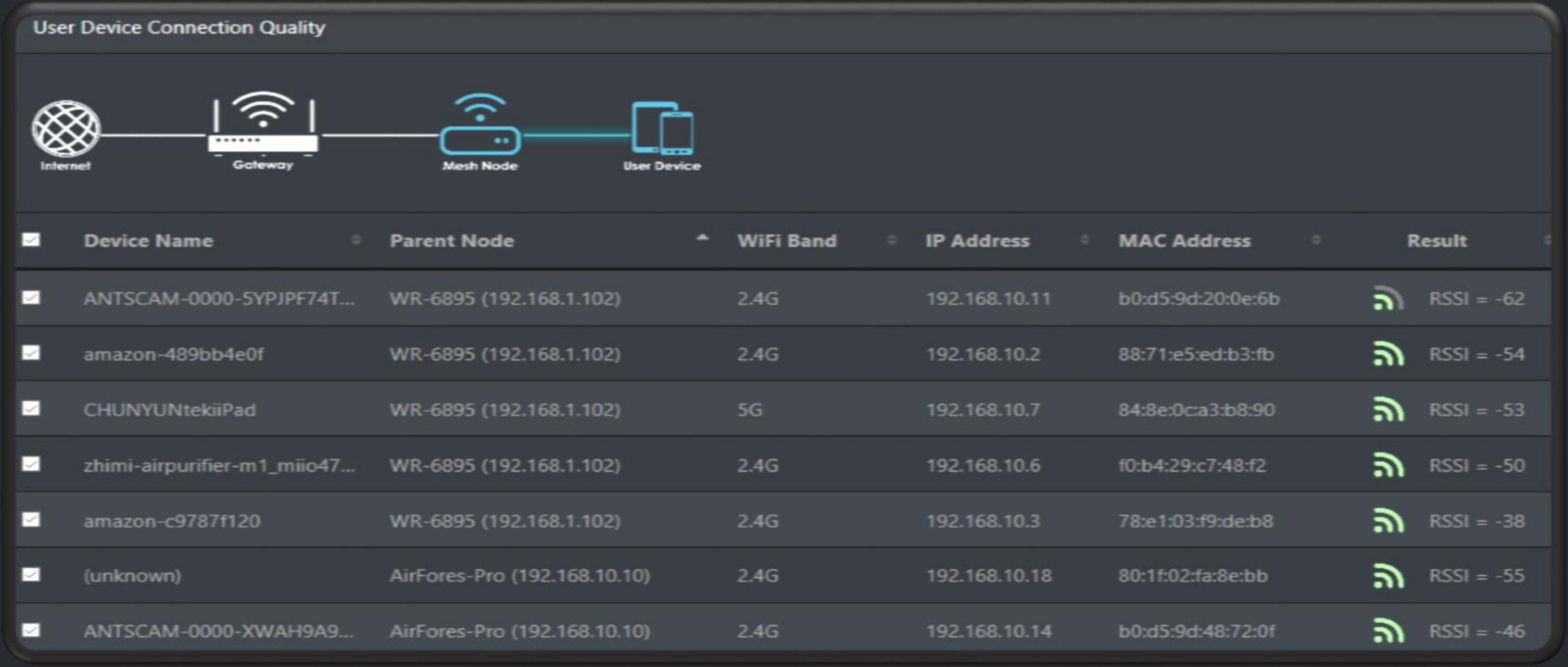


Gateway to Mesh Node Connection Quality

Internet
Gateway
Mesh Node
User Device

☑	Model Name	IP Address	MAC Address	Result
☑	WAP-5922	192.168.1.122	00:11:22:33:44:55	RSSI = -39
☑	WAP-5922	192.168.1.123	74:da:38:73:0d:60	RSSI = -32
☑	PG-9172AC	192.168.1.172	d8:b6:b7:56:85:09	⬇ 124 Mbps ⬆ 197 Mbps
☑	PG-9172AC	192.168.1.173	d8:b6:b7:56:84:6d	⬇ 174 Mbps ⬆ 158 Mbps

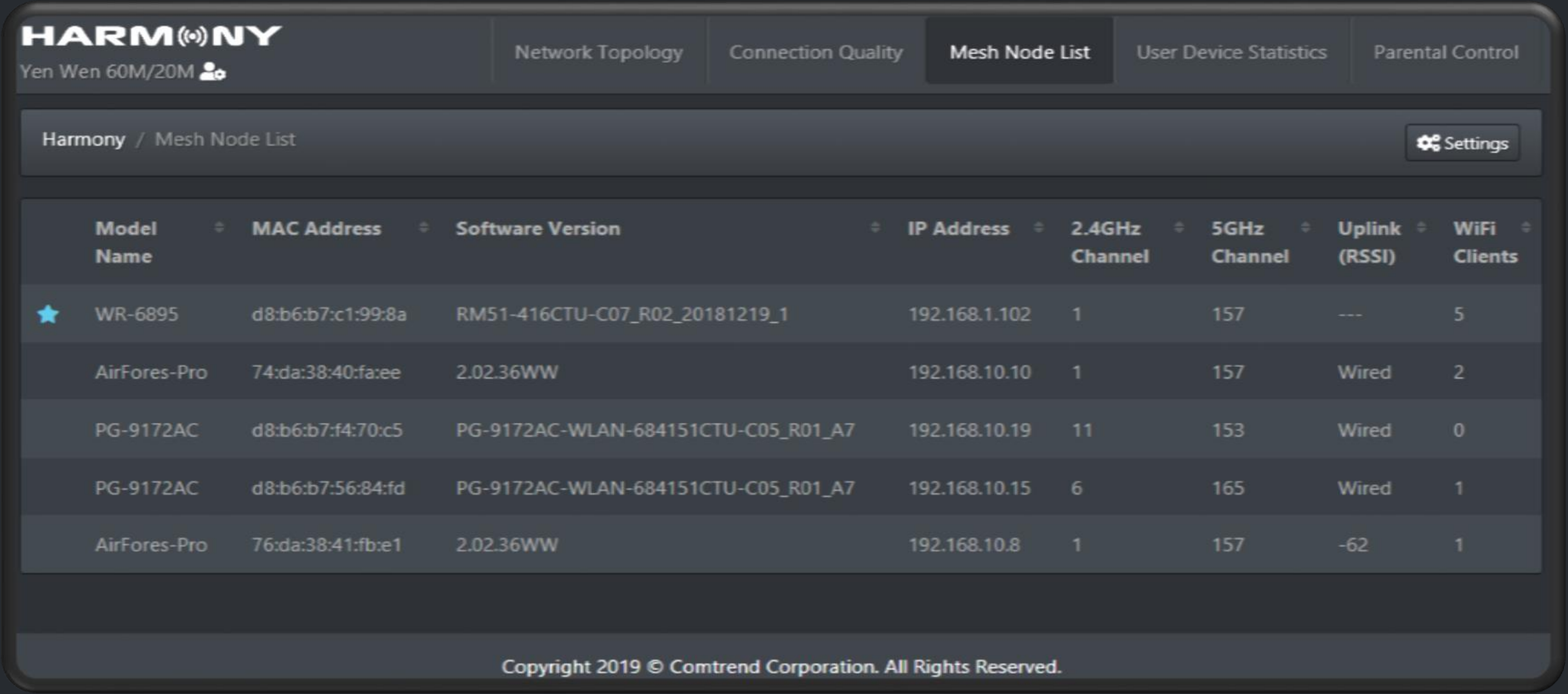
User Devices' Connection Quality Test



User Device Connection Quality

☑	Device Name	Parent Node	WiFi Band	IP Address	MAC Address	Result
☑	ANTSCAM-0000-5YPJPF74T...	WR-6895 (192.168.1.102)	2.4G	192.168.10.11	b0:d5:9d:20:0e:6b	RSSI = -62
☑	amazon-489bb4e0f	WR-6895 (192.168.1.102)	2.4G	192.168.10.2	88:71:e5:ed:b3:fb	RSSI = -54
☑	CHUNYUNtekiiPad	WR-6895 (192.168.1.102)	5G	192.168.10.7	84:8e:0c:a3:b8:90	RSSI = -53
☑	zhimi-airpurifier-m1_miio47...	WR-6895 (192.168.1.102)	2.4G	192.168.10.6	f0:b4:29:c7:48:f2	RSSI = -50
☑	amazon-c9787f120	WR-6895 (192.168.1.102)	2.4G	192.168.10.3	78:e1:03:f9:de:b8	RSSI = -38
☑	(unknown)	AirFores-Pro (192.168.10.10)	2.4G	192.168.10.18	80:1f:02:fa:8e:bb	RSSI = -55
☑	ANTSCAM-0000-XWAH9A9...	AirFores-Pro (192.168.10.10)	2.4G	192.168.10.14	b0:d5:9d:48:72:0f	RSSI = -46

System Mesh Nodes' Information


HARMONY
Yen Wen 60M/20M
Network Topology
Connection Quality
Mesh Node List
User Device Statistics
Parental Control
Harmony / Mesh Node List
Settings

	Model Name	MAC Address	Software Version	IP Address	2.4GHz Channel	5GHz Channel	Uplink (RSSI)	WiFi Clients
★	WR-6895	d8:b6:b7:c1:99:8a	RM51-416CTU-C07_R02_20181219_1	192.168.1.102	1	157	---	5
	AirFores-Pro	74:da:38:40:fa:ee	2.02.36WW	192.168.10.10	1	157	Wired	2
	PG-9172AC	d8:b6:b7:f4:70:c5	PG-9172AC-WLAN-684151CTU-C05_R01_A7	192.168.10.19	11	153	Wired	0
	PG-9172AC	d8:b6:b7:56:84:fd	PG-9172AC-WLAN-684151CTU-C05_R01_A7	192.168.10.15	6	165	Wired	1
	AirFores-Pro	76:da:38:41:fb:e1	2.02.36WW	192.168.10.8	1	157	-62	1

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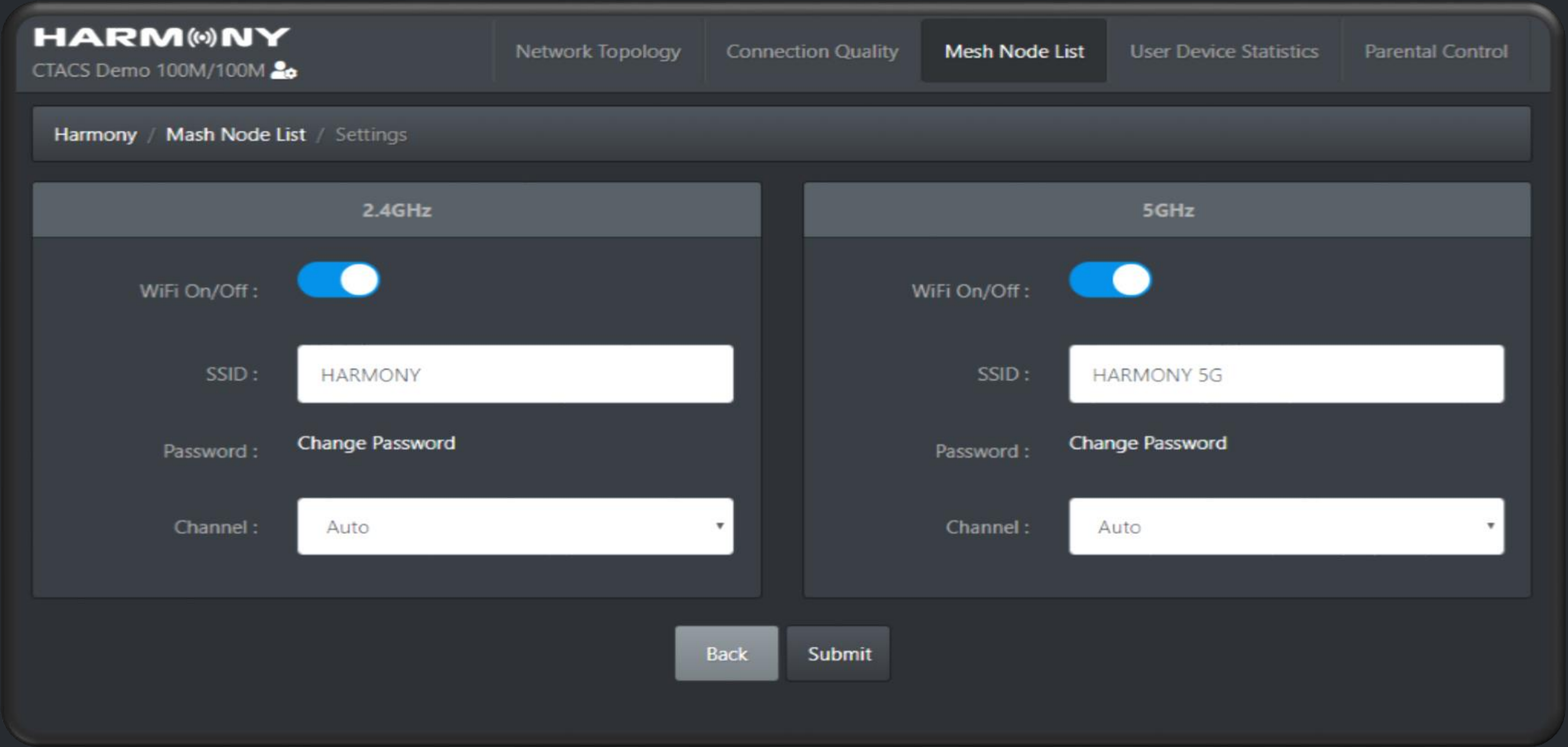
Remote Management for the Subscriber’s Wi-Fi Configurations


HARMONY
CTACS Demo 100M/100M
Network Topology
Connection Quality
Mesh Node List
User Device Statistics
Parental Control
Harmony / Mash Node List / Settings
Back
Submit

2.4GHz

WiFi On/Off : ●

SSID : HARMONY

Password : Change Password

Channel : Auto

5GHz

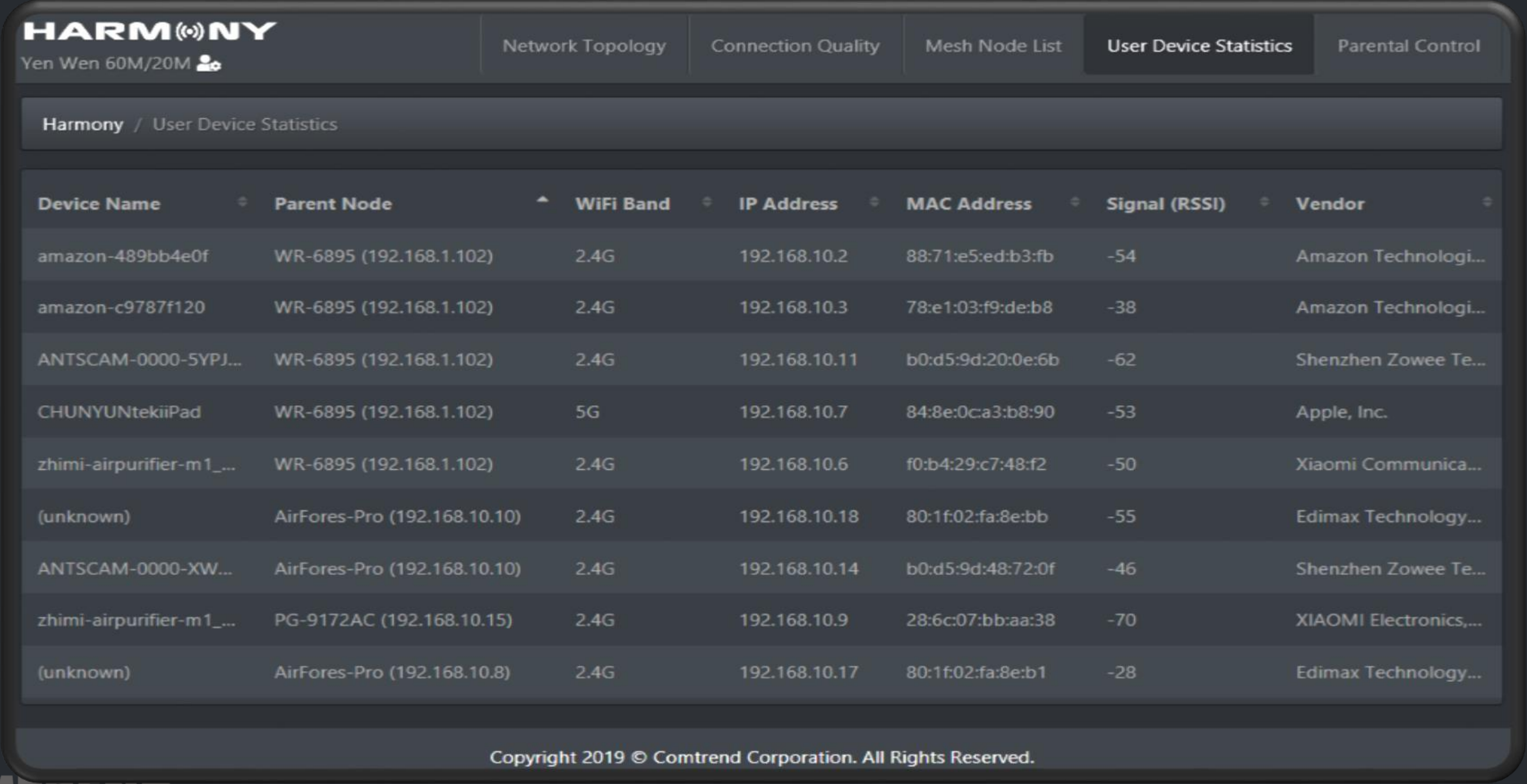
WiFi On/Off : ●

SSID : HARMONY 5G

Password : Change Password

Channel : Auto

System User Devices' Information


Yen Wen 60M/20M
Network Topology
Connection Quality
Mesh Node List
User Device Statistics
Parental Control
Harmony / User Device Statistics

Device Name	Parent Node	WiFi Band	IP Address	MAC Address	Signal (RSSI)	Vendor
amazon-489bb4e0f	WR-6895 (192.168.1.102)	2.4G	192.168.10.2	88:71:e5:ed:b3:fb	-54	Amazon Technologi...
amazon-c9787f120	WR-6895 (192.168.1.102)	2.4G	192.168.10.3	78:e1:03:f9:de:b8	-38	Amazon Technologi...
ANTSCAM-0000-5YPJ...	WR-6895 (192.168.1.102)	2.4G	192.168.10.11	b0:d5:9d:20:0e:6b	-62	Shenzhen Zowee Te...
CHUNYUNtekiiPad	WR-6895 (192.168.1.102)	5G	192.168.10.7	84:8e:0c:a3:b8:90	-53	Apple, Inc.
zhimi-airpurifier-m1_...	WR-6895 (192.168.1.102)	2.4G	192.168.10.6	f0:b4:29:c7:48:f2	-50	Xiaomi Communica...
(unknown)	AirFores-Pro (192.168.10.10)	2.4G	192.168.10.18	80:1f:02:fa:8e:bb	-55	Edimax Technology...
ANTSCAM-0000-XW...	AirFores-Pro (192.168.10.10)	2.4G	192.168.10.14	b0:d5:9d:48:72:0f	-46	Shenzhen Zowee Te...
zhimi-airpurifier-m1_...	PG-9172AC (192.168.10.15)	2.4G	192.168.10.9	28:6c:07:bb:aa:38	-70	XIAOMI Electronics,...
(unknown)	AirFores-Pro (192.168.10.8)	2.4G	192.168.10.17	80:1f:02:fa:8e:b1	-28	Edimax Technology...

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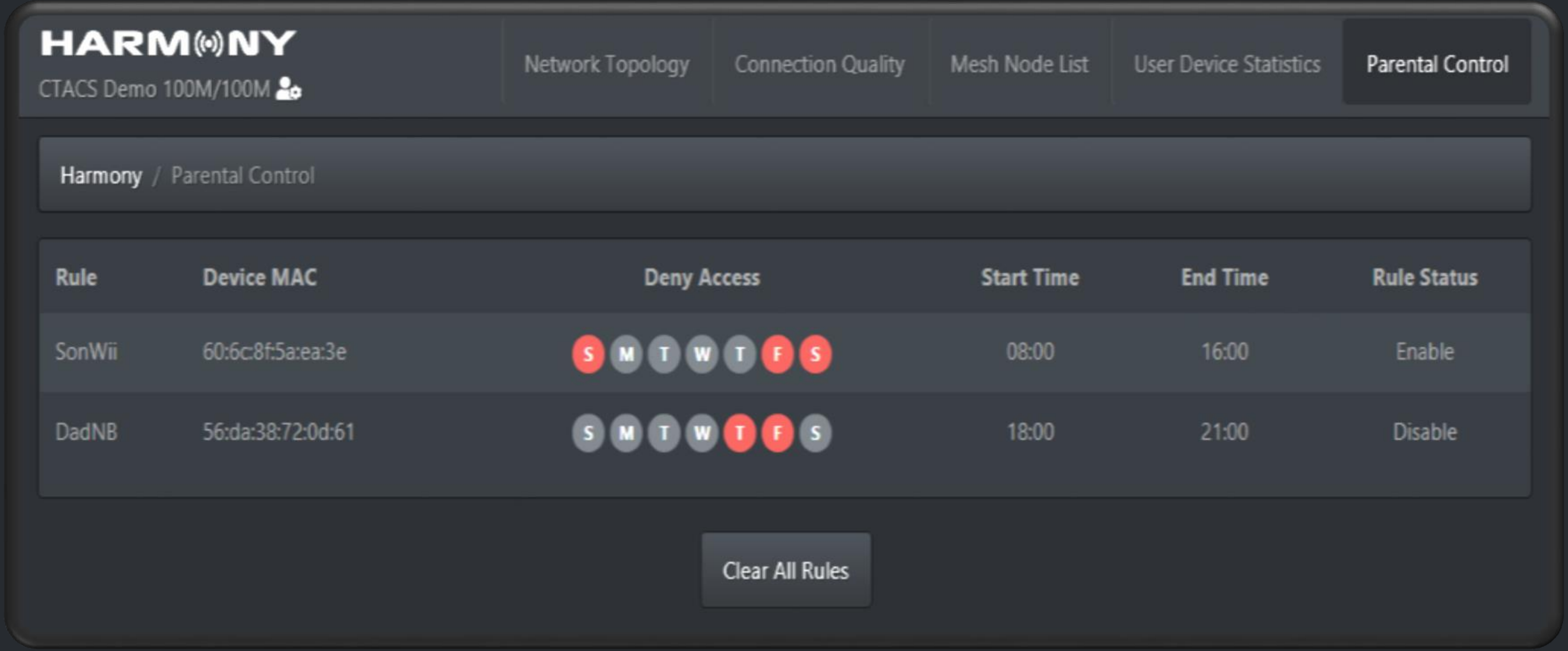
Consideration Service: Reset the Messed-up Configurations


HARMONY
CTACS Demo 100M/100M
Network Topology
Connection Quality
Mesh Node List
User Device Statistics
Parental Control
Harmony / Parental Control
Clear All Rules

Rule	Device MAC	Deny Access	Start Time	End Time	Rule Status
SonWii	60:6c:8f:5a:ea:3e	S M T W T F S	08:00	16:00	Enable
DadNB	56:da:38:72:0d:61	S M T W T F S	18:00	21:00	Disable

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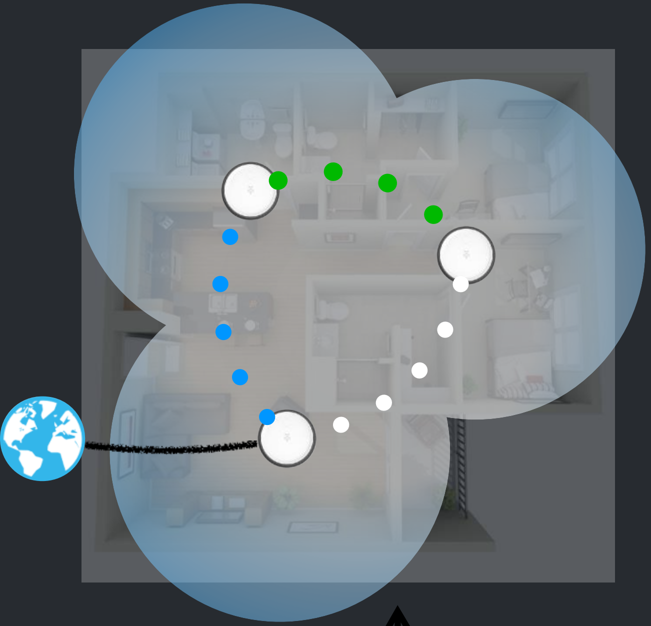
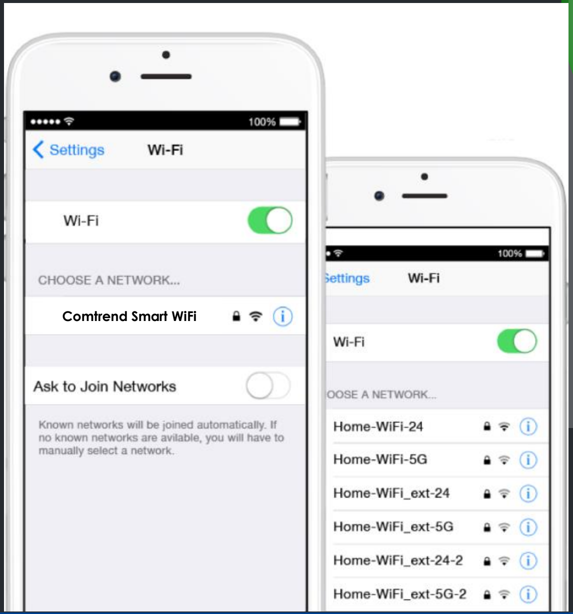
A Single, Seamless Wi-Fi Experience

The Smart WiFi mesh system operates as a singular network that works to ensure a seamless connection as you move throughout your home.



One WiFi
Network Name



Settings Wi-Fi

Wi-Fi ●

CHOOSE A NETWORK...

Comtrend Smart WiFi

Ask to Join Networks ○

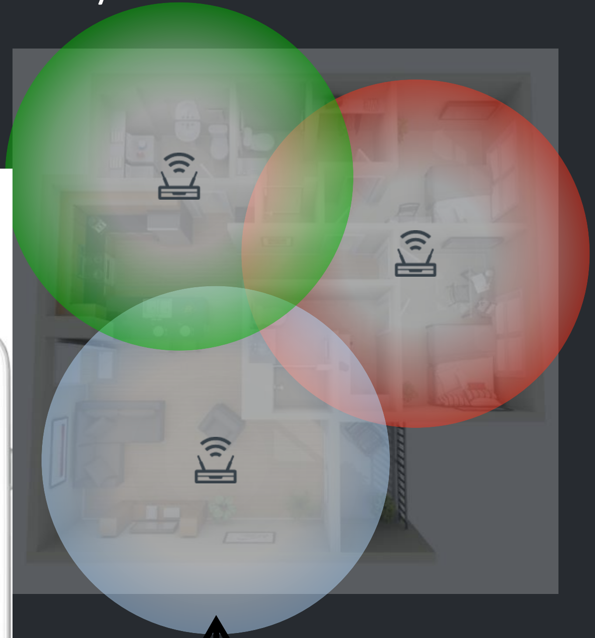
Known networks will be joined automatically. If no known networks are avilable, you will have to manually select a network.

ettings Wi-Fi

Wi-Fi ●

OOSE A NETWORK...

Home-WiFi-24
Home-WiFi-5G
Home-WiFi_ext-24
Home-WiFi_ext-5G
Home-WiFi_ext-24-2
Home-WiFi_ext-5G-2

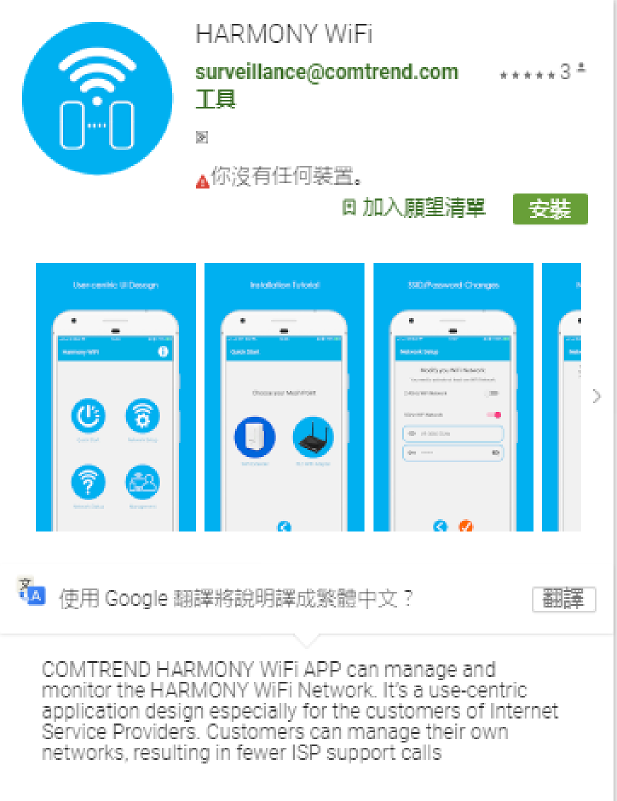


Single SSID →

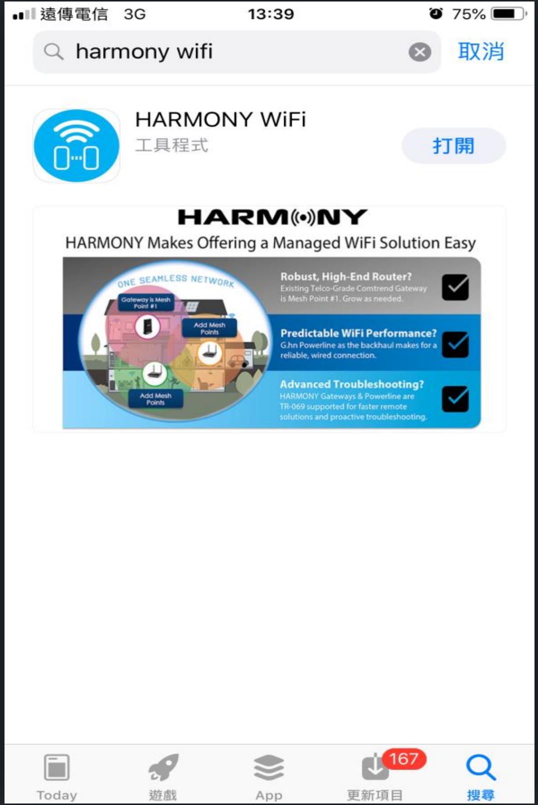
← Multiple SSID

Get Harmony Wi-Fi App

1. Download Harmony Wi-fi App from Google play store or Apple Store.


HARMONY WiFi
surveillance@comtrend.com
工具
★★★★★ 3
你沒有任何裝置。
加入願望清單
安裝
User-centric UI Design
Installation Tutorial
SSID/Password Changes
使用 Google 翻譯將說明譯成繁體中文？
翻譯

COMTREND HARMONY WiFi APP can manage and monitor the HARMONY WiFi Network. It's a use-centric application design especially for the customers of Internet Service Providers. Customers can manage their own networks, resulting in fewer ISP support calls


遠傳電信 3G
13:39
75%
harmony wifi
取消
HARMONY WiFi
工具程式
打開
HARMONY
ONE SEAMLESS NETWORK
Gateway is Mesh Point #1
Add Mesh Points
Add Mesh Points
Today
遊戲
App
167
更新項目
搜尋

HARMONY Makes Offering a Managed WiFi Solution Easy

Robust, High-End Router? ☑
Existing Telco-Grade Comtrend Gateway is Mesh Point #1. Grow as needed.

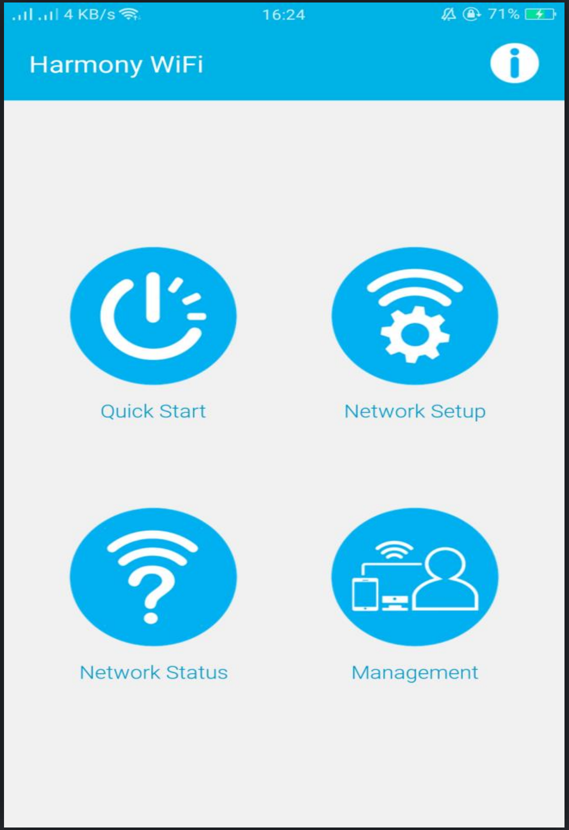
Predictable WiFi Performance? ☑
G.hn Powerline as the backhaul makes for a reliable, wired connection.

Advanced Troubleshooting? ☑
HARMONY Gateways & Powerline are TR-069 supported for faster remote solutions and proactive troubleshooting.

Connect to Harmony device

1. Connecting smart phone Wi-Fi to Harmony device.

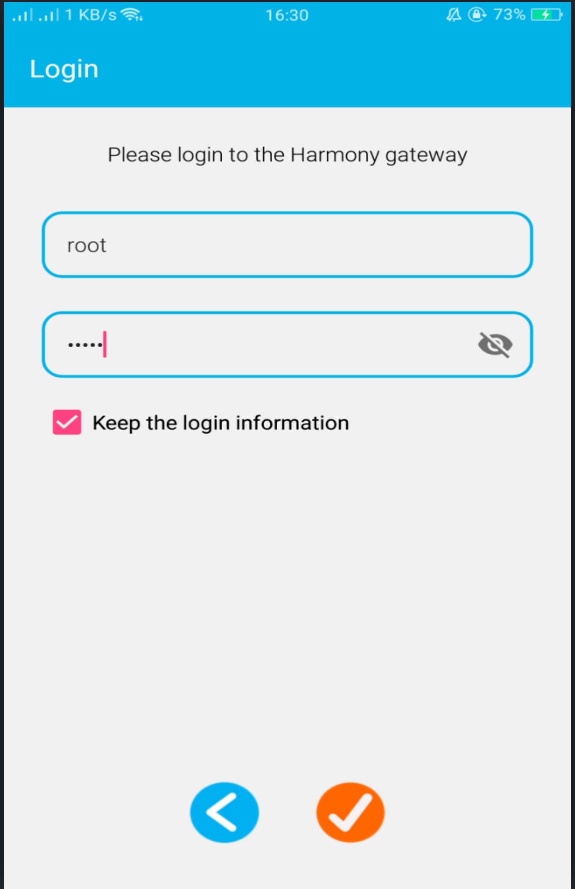
2. Open Harmony Wi-Fi App.


.ıl .ıl 4 KB/s
16:24
71%
Harmony WiFi
Quick Start
Network Setup
Network Status
Management

Checking Basic environment & setting

3. Login the Selected management CPE

Account : root
Password: 12345



Login

Please login to the Harmony gateway

root

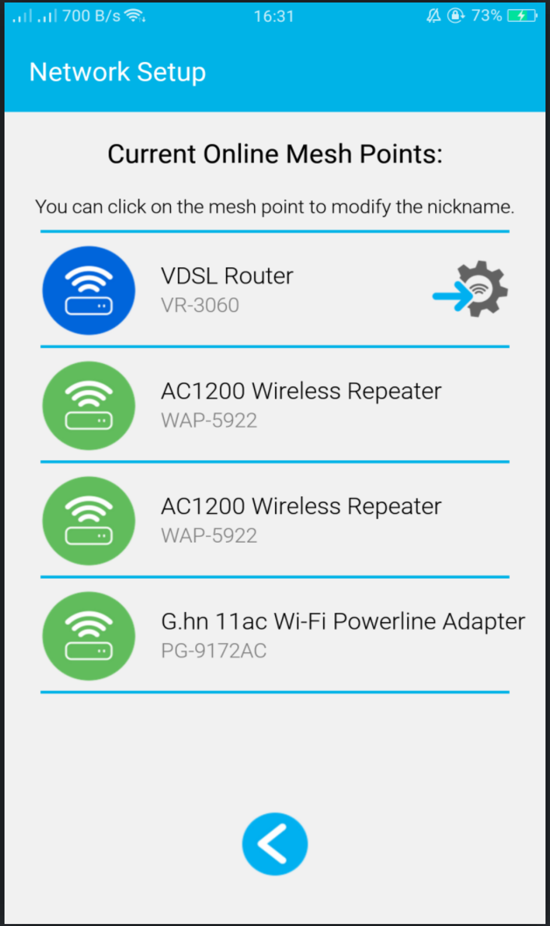
•••••

☑ Keep the login information

Harmony cloud MESH

4. Enter Network Setup

After login selected management CPE, you can enter Network Setup page to select which Wi-Fi device you want to management.



16:31

Network Setup

Current Online Mesh Points:

You can click on the mesh point to modify the nickname.

VDSL Router
VR-3060

AC1200 Wireless Repeater
WAP-5922

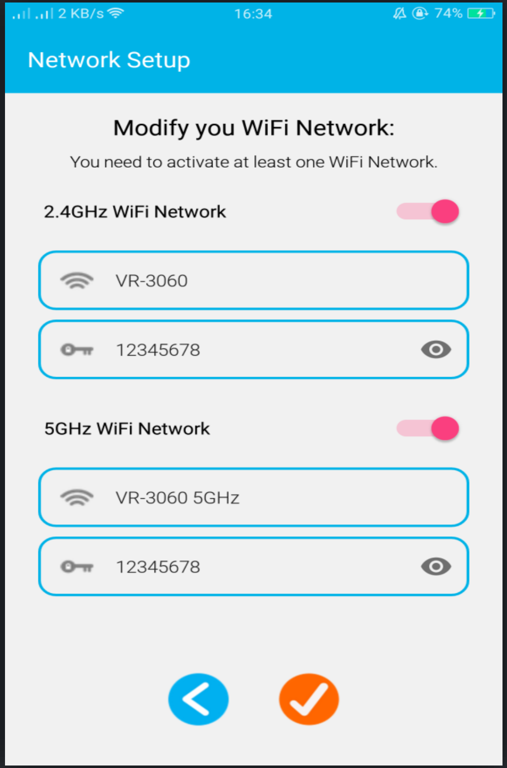
AC1200 Wireless Repeater
WAP-5922

G.hn 11ac Wi-Fi Powerline Adapter
PG-9172AC

Harmony cloud MESH

5. Showing App management

In this page you can showing
  1. Enable or disable WiFi Network.
  2. Change SSID.
  3. Change Wi-Fi Password.



2 KB/s 16:34 74%

Network Setup

Modify you WiFi Network:

You need to activate at least one WiFi Network.

2.4GHz WiFi Network

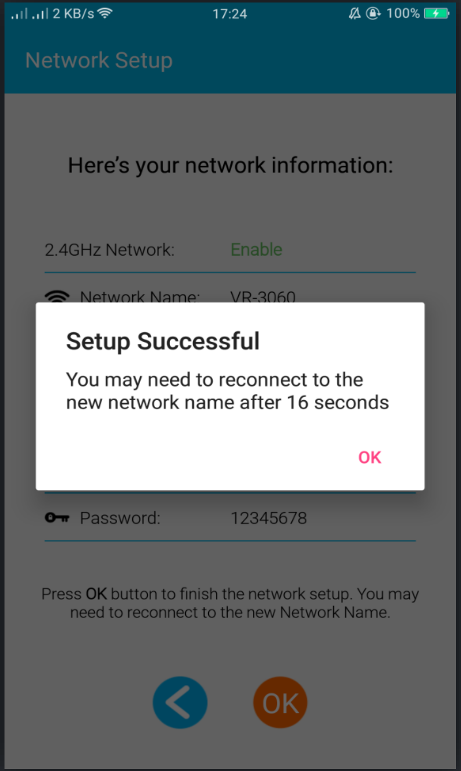
VR-3060

12345678

5GHz WiFi Network

VR-3060 5GHz

12345678



2 KB/s 17:24 100%

Network Setup

Here's your network information:

2.4GHz Network: Enable

Network Name: VR-3060

Setup Successful

You may need to reconnect to the new network name after 16 seconds

OK

Password: 12345678

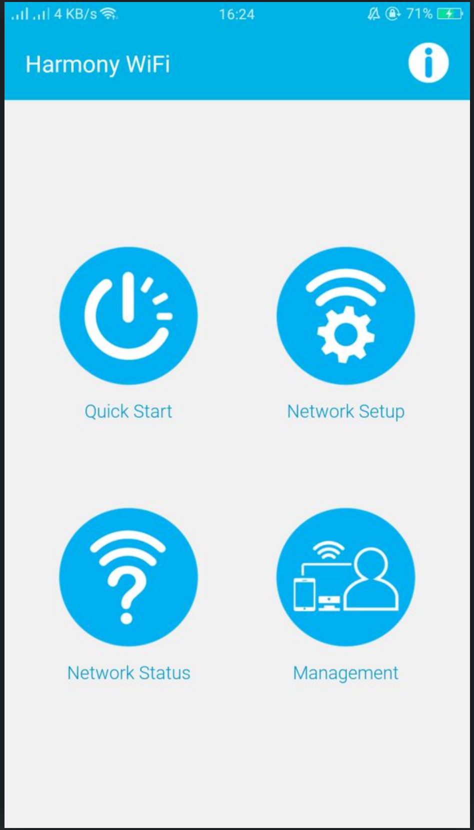
Press OK button to finish the network setup. You may need to reconnect to the new Network Name.

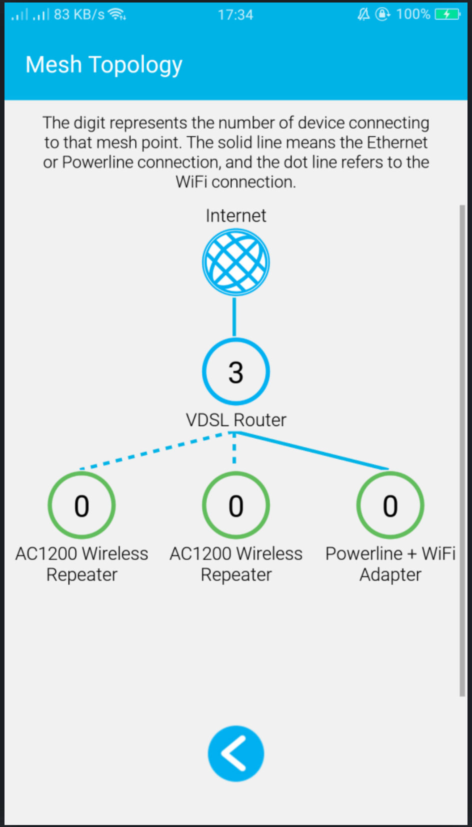
OK

Harmony cloud MESH

6. Showing Network Status

You can enter Network Status to show current Mesh Topology.


4 KB/s
16:24
71%
Harmony WiFi
Quick Start
Network Setup
Network Status
Management


83 KB/s
17:34
100%
Mesh Topology

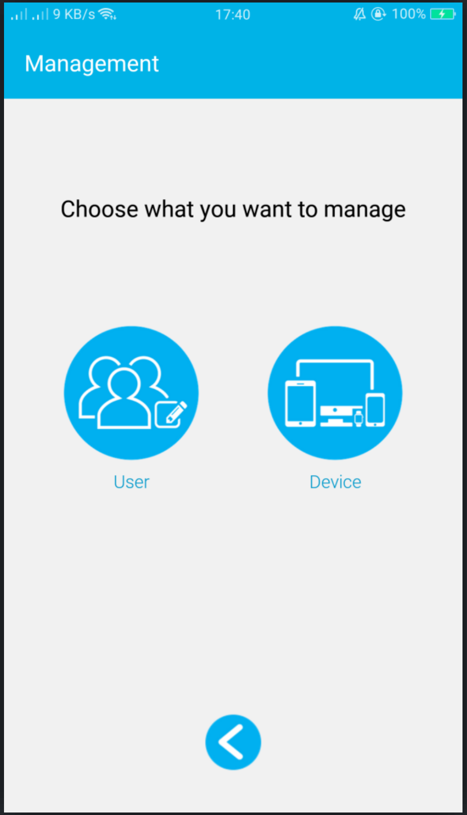
The digit represents the number of device connecting to that mesh point. The solid line means the Ethernet or Powerline connection, and the dot line refers to the WiFi connection.

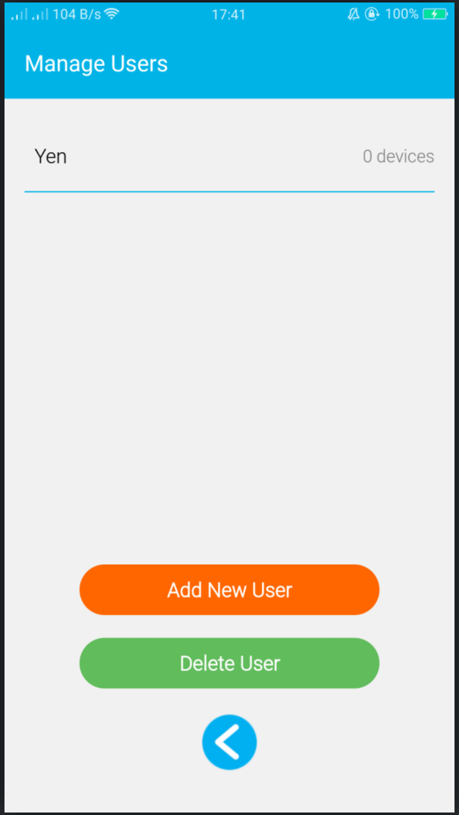
Internet
3
VDSL Router
0
AC1200 Wireless Repeater
0
AC1200 Wireless Repeater
0
Powerline + WiFi Adapter

Harmony cloud MESH

7. Management Device and User

You can enter Management to add more user of your home member.

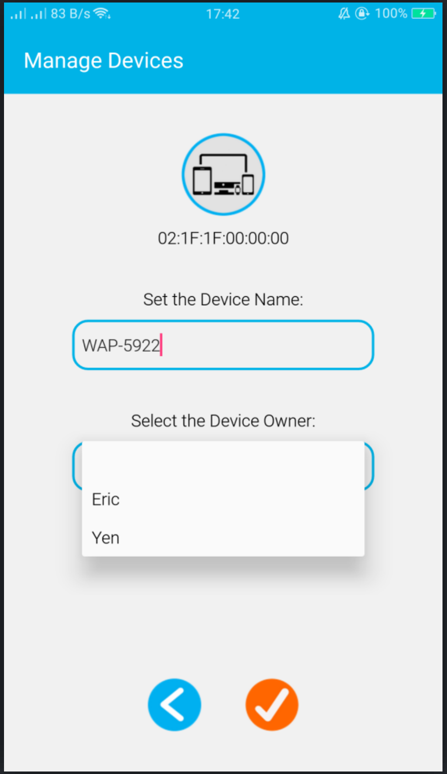

.ıl .ıl 9 KB/s
17:40
100%
Management
Choose what you want to manage
User
Device


.ıl .ıl 104 B/s
17:41
100%
Manage Users
Yen
0 devices
Add New User
Delete User

Harmony cloud MESH

8. Change Preferred Device name and select device owner.

After modify device name, in this page showing each device related information.



.ıl .ıl 83 B/s
17:42
100%
Manage Devices

02:1F:1F:00:00:00

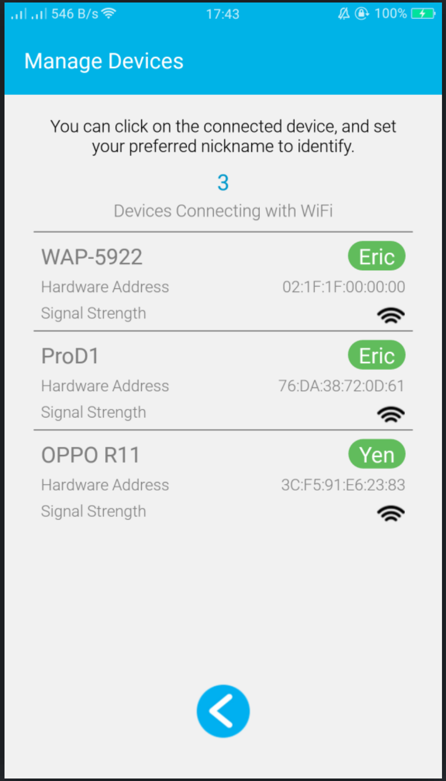
Set the Device Name:

WAP-5922

Select the Device Owner:

Eric

Yen



.ıl .ıl 546 B/s
17:43
100%
Manage Devices

You can click on the connected device, and set your preferred nickname to identify.

3

Devices Connecting with WiFi

WAP-5922 Eric
Hardware Address 02:1F:1F:00:00:00
Signal Strength

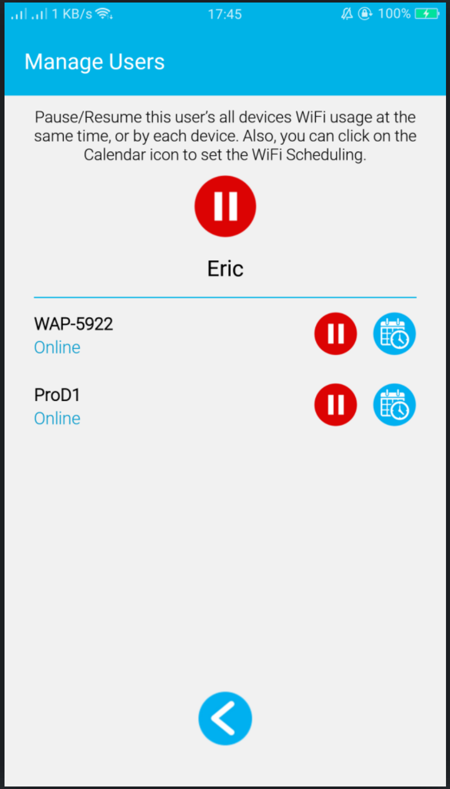
ProD1 Eric
Hardware Address 76:DA:38:72:0D:61
Signal Strength

OPPO R11 Yen
Hardware Address 3C:F5:91:E6:23:83
Signal Strength

Harmony cloud MESH

9. Add schedule for each user.

In management User, you can add user schedule for connecting Wi-Fi.

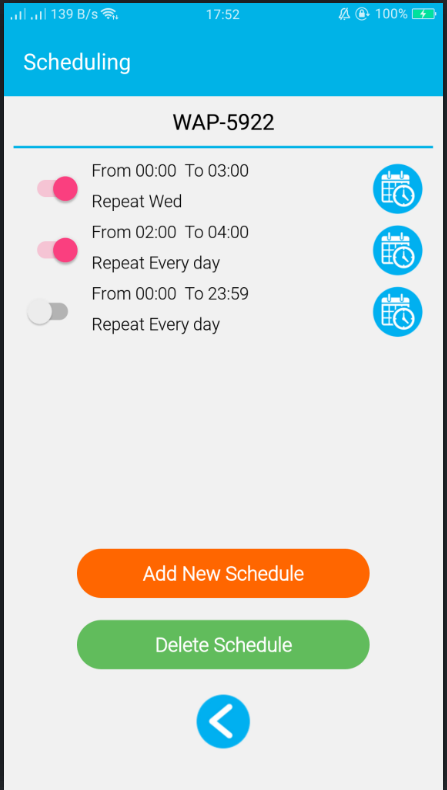

1 KB/s
17:45
100%
Manage Users

Pause/Resume this user's all devices WiFi usage at the same time, or by each device. Also, you can click on the Calendar icon to set the WiFi Scheduling.

Eric

WAP-5922
Online

ProD1
Online


139 B/s
17:52
100%
Scheduling

WAP-5922

From 00:00 To 03:00
Repeat Wed

From 02:00 To 04:00
Repeat Every day

From 00:00 To 23:59
Repeat Every day

Add New Schedule
Delete Schedule

1. Introduction of Harmony Unify AP Mesh & IoT Cloud
2. Harmony AP Mesh Scenario
3. Harmony Cloud Management System/ CMS for call center
4. Harmony Mobile APP
5. Harmony Product Line Up

05 Harmony Product Line Up

HARMONY

Mesh Controller

DSL Gateway

- VR-3060u
- VR-3061u
- VR-3061eu
- VR-3063
- AR-5319u
- AR-5313u
- AR-5310u

G.fast Gateway

- GFR-9510u
- GFR-9511u

GPON Gateway

- GRG-4260u
- GRG-4260us

Bonding Gateway

- NL-3120ua
- NL-3240u
- NL-3241u
- NL-3241eu

Wireless Router

- WAP-5895ua

Mesh Agent

PLC WiFi Adapter

- PG-9074
- PG-9072
- PG-9082
- PG-9085

Wireless Extender

- WAP-5922

05

Harmony Product Line Up

HARMONY

Mesh Controller

Mesh Agent

2018 Q3

VDSL CPE

BCM63138
- VR-3060u
- NL-3241eu
- NL-3241u

ADSL CPE

BCM6318
- AR-5313u

PLC + WiFi

CL1860
- PG-9074
- PG-9072

2018 Q4

GPON CPE

BCM68380
- GRG-4260u
- GRG-4260us

G.Fast CPE

BCM63138
- GFR-9510u
- GFR-9511u

PLC + WiFi

CL1860
- PG-9082

2019 Q1

VDSL CPE

BCM63138
- VR-3063u

ADSL CPE

BCM6318
- AR-5310

2019 Q2

PLC + WiFi

RTL8197FS
- PG-9085

Comply with All Models Across Product Line / Hardware Independence

COMTREND

THANK YOU FOR YOUR TIME