

Wireless Internet Service Provider (WISP): easyWISP Network and Subscriber Management System User Manual



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I M P O R T A N T N O T I C E

Free online technical support is provided for easyWISP customers. Go to the easyWISP website and click on the support tab. The EZ-Cloud management system has been designed to be very intuitive in order to minimize the requirement for technical support. Technical support staff will refer customers to this manual and so we request that customers read this manual carefully before contacting technical support.

1. Introduction to the easyWISP management system

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1.1. What is easyWISP?

The traditional approach to WISP network design and operation requires one router installed at a Network Operations Center (NOC) that has a fast fiber connection to the Internet backbone. The router is programmed for access control and rate plan control for each subscriber. All PtMP towers are backhauled to the NOC. Where a PtMP tower has a backhaul connection a second router can be programmed and managed remotely for that site. The WISP has a physical limit for the distance that PtMP towers can be installed from the NOC due to the latency introduced by many point to point wireless hops between the PtMP tower and the NOC.

The easyWISP access controller and cloud management system offers the WISP entrepreneur much great flexibility with regard to the design of the network infrastructure and the operation of the WISP business. The design flexibility opens up many new types of Internet backhaul alternatives.

- Network Operations Center (NOC) design with a fast fiber access to the Internet and PtMP towers connecting back to the NOC via a wireless distribution network.
- PtMP towers that have Internet access (mobile phone towers) can have access control installed at the tower to service customers using that tower.
- Geo-stationary or LEO satellite backhaul connections can be installed at towers with access control installed at the tower to service customers using that tower.
- A PtMP tower can be installed at a great distance from the NOC via a closer telecom Point of Presence (PoP) with access control installed at the tower to service customers using that tower.

EasyWISP is very flexible as the Cloud management system has been designed from the ground up to manage multiple access control routers. In addition the easyWISP access controller is completely different in operation to a network router. Each easyWISP access controller has software to implement all access control functions giving much better performance than a programmed router. In addition the easyWISP access controller introduces redundancy and resiliency to the network design as it can operate autonomously from the cloud. The reason for this is that it downloads the customer database that is required for the customers being managed by that easyWISP controller. The interaction between the easyWISP access controller is limited to the Cloud sending updated information to the controller when a new customer is added, or the rate plan of an existing customer changes. In addition the easyWISP controller sends network statistics data periodically to the Cloud. Only one additional parameter is added to the Cloud customer database when compared with an alternative WISP management system, this is the name of the easyWISP access controller that the customer will access, and will manage the service for the customer. An unlimited number of easyWISP gateways can be managed by one Cloud account, and there is no limit to the number of subscribers that can be managed by one Cloud account. The best

feature for the WISP is that the use of the Cloud is FREE; there is no recurring or monthly cost for the use of the Cloud. The use of the Cloud account is included with each easyWISP access controller.

The Cloud also has a significant management benefit. The network and business operation can be managed from anywhere that there is Internet access. This means that the WISP can eliminate central office costs and adopt a hybrid workforce approach to managing the business.

1.2. The easyWISP WISP management system.

The easyWISP access gateway combined with the Cloud provides network and subscriber management features for start-up, growing and large WISP's. The easyWISP Cloud functionality provides all the business and network management features that the entrepreneur needs to operate a successful business.

The easyWISP cloud has distributed management architecture providing the WISP with maximum flexibility for the network design. The NOC mode can be implemented with one high performance easyWISP gateway installed in the NOC. As the customer base grows and the NOC performance is increased easyWISP controllers can be stacked to increase data throughput. No need to discard a router and purchase a new higher performance router. The big advantage of easyWISP is that access controller can be installed anywhere to expand the WISP's network; at a PtMP tower, at a new NOC site which will service a new group of PtMP towers, at a different location in another state where the backhaul service is provided by the Starlink LEO satellite network. Management of many easyWISP access controllers is completely transparent for the WISP, it is only required to specify in each customer record the name of the easyWISP controller where they will get access.

The distributed cloud hosted system architecture permits the WISP to dramatically reduce start-up and operational costs, while speeding the implementation process compared with a conventional WISP deployment. Costs are reduced because the WISP can start in business with a simple network design that may not include a Network Operations Center (NOC) and the backhaul network that connects point-to-multipoint wireless towers to the NOC. The WISP can choose installation where an existing PtMP wireless tower provides a service to a local Internet Service provider (ISP). This is common with mobile phone tower where the WISP can rent space for the PtMP antenna and equipment.

Due to the simplicity of easyWISP it is now possible for an entrepreneur to begin WISP operations with limited technical knowledge and with a small financial investment. The WISP can begin operations upon installing the point-to-multipoint (PtMP) antenna at a tower site together with an easyWISP controller and an ISP connection. The WISP can quickly see a return on investment and become profitable in the first few months of operation. The easyWISP Cloud technology is built around design requirements that will enable an entrepreneur to start a new WISP business, with minimum technical knowledge and minimum investment.

EasyWISP gateway and Cloud features:

- Multi-language system, English and Spanish is available now. Other languages will be added.
- easyWISP minimizes the investment and operating costs for the WISP, total cost per subscriber is the lowest in the industry.
- easyWISP provides the most economical method of starting a WISP business and offers a powerful financial incentive for any entrepreneur considering a WISP start-up.
- easyWISP permits the entrepreneur to build a network with small investment increments by installing easyWISP access controllers when and where needed.
- The easyWISP cloud has powerful WISP business management features to establish a profitable WISP business quickly and support growth.
- The easyWISP Cloud network technology is plug and play, no advanced technical networking skills are required; the WISP owner must be able to install and configure the PtMP radio and the CPE radios, and install point-to-point (PtP) wireless links to connect the PtMP tower to the NOC.
- The Cloud technology permits the entrepreneur to simplify the network design.
- There are no charges for using the Cloud after the easyWISP gateway purchase, the cost of the Cloud is included with each easyWISP controller.
- The easyWISP gateways have a high data throughput.
- The easyWISP gateways operate with any type of wireless equipment.
- The distributed network design has advantages for developing markets like Latin America.
- Time to market is fast with easyWISP, the WISP can begin billing sooner in the business development cycle.
- Simplicity of easyWISP installation is especially important in parts of the world like Latin America, where access to technical knowledge is limited, and investment capital is not available.
- The WISP can expand the network incrementally, adding a new PtMP radio tower requires the installation of the PtMP radio with a low cost easyWISP access control gateway. There is no limit to the number of easyWISP gateways that can be managed by a Cloud account.
- The easyWISP Cloud platform is highly scalable; it can be expanded from a single PtMP tower with a few subscribers to a network with many towers and thousands of subscribers. The WISP will not lose an easyWISP investment when expanding the subscriber base.

1.4. No recurring charges to use the easyWISP Cloud.

All WISP management software systems require the payment of a monthly fee to use the system. The charges are usually calculated per subscriber, or per block of subscribers. Therefore as the WISP's business grows, so do the monthly charges. The charge can be in the range of \$1 to \$2 per subscriber per month.

The WISP has an alternative to paying monthly charges: build a network operations center (NOC) with servers that have free open-source software. The WISP will require a high level of technical knowledge to write router scripts that implement subscriber authentication at the network level and configure Linux servers. Building a NOC using free open source software has a significant purchase and operating cost, computer servers have to be purchased and maintained.

The easyWISP and Cloud system has been designed to have no on-going charges, no monthly charge, no software charge, and no charge per subscriber. In addition the easyWISP access controller with Cloud management system is very easy to install and use by people who do not have a technical networking background. This is made possible because each easyWISP gateway is a very powerful dedicated router that performs all transaction processing to manage subscribers. The Cloud is limited to batch processing tasks and therefore has a minimum operating cost and so the purchase cost of each easyWISP access controller includes lifetime access to the easyWISP cloud management system. Alternative cloud systems charge a high fee per subscriber per month.

EasyWISP is a very advanced technology solution that is the result of many years of R&D development. We have built on years of development work to reduce the cost of operations for the WISP when comparing alternative systems, through our ability to integrate powerful access control hardware with a cloud server platform.

1.5. Service rate plans.

The easyWISP Cloud system design permits the WISP to offer a range of rate plans for each subscriber. The WISP can determine the type and number of rate plans offered to subscribers, and set the tier selected in the subscriber database. Some examples of tiers are:

- Tier 1: data maximum download speed 1Mb/s, maximum upload speed 100Kb/s, monthly charge \$5.
- Tier 2: data maximum download speed 5Mb/s, maximum upload speed 500Kb/s, monthly charge \$15.
- Tier 3: data maximum download speed 10Mb/s, maximum upload speed 1Mb/s, monthly charge \$25.
- Tier 4: data maximum download speed 20Mb/s, maximum upload speed 2Mb/s, monthly charge \$45.

The data maximum speed and monthly charge are registered as part of the subscriber record. The billing cycle process will access the charge value in the subscriber record to issue invoices for the subscriber. There is no limit to the number or types of rate plans that the WISP can offer to subscribers.

1.6. Hotspot login.

The easyWISP Cloud is designed to manage two types of user, the subscriber who is paying a monthly service charge, and the anonymous user who connects to a hotspot for temporary Internet access. The two types of users are managed differently by easyWISP.

The monthly subscriber is a fixed broadband customer who connects to the WISP PtMP wireless tower over an encrypted link to a CPE wireless device installed by the WISP. The MAC address of the CPE wireless is registered as part of the subscriber database entry. A subscriber is authenticated onto the network through recognition of the CPE wireless installed by the WISP. The only occasion that a subscriber will see a login page is when the monthly payment is past due and the service has been suspended by the easyWISP billing system. Payment is always due on the monthly anniversary of the activation first use date.

The WISP can also install an unencrypted PtMP wireless for mobile broadband customers. These customers are anonymous and will purchase an access code to get Internet access for a limited period of time. When a Hotspot user connects to the unencrypted PtMP wireless with a MAC address that is not recognized the connection is passed to a captive portal and the user is presented with the guest login screen. The user can then enter the access code into the login screen.

1.7. Long product life expectancy.

easyWISP has a long life expectancy for several reasons:

- The easyWISP access controller hardware is extremely robust and field-tested over many thousands of units already installed. The high performance hardware uses multi-core processors.
- Our policy of free lifetime software upgrades ensures that the easyWISP access controller hardware always includes free upgrades with the latest features.
- We provide free online support for product questions and there is no charge for support to help our customers with their network design issues.
- We offer a 1-year warranty on access controller hardware.

The WISP can relocate easyWISP access controller units to a different tower site and use with a different set of subscribers so the investment is not lost if the WISP has to make changes to the wireless distribution network.

1.8. easyWISP gateways operate with any type of wireless equipment.

The easyWISP access controllers will operate with any type of PtMP wireless access point and client radios. This means that the WISP can build a wireless network using low cost wireless equipment, which will further reduce the WISP's investment costs.

Wireless products from different manufacturers can be used together on the same network. This ensures that the WISP always has access to the lowest cost products, irrespective of the manufacturer. This is in contrast to some manufacturers who offer a comprehensive WISP solution, however all products must be from the same manufacturer, which will increase the WISP's investment expense.

The ability to work with any type of wireless product also protects the WISP's investment. When wireless equipment becomes end of life or fails then it can be replaced with any type of equipment. This is not the case with most WISP solutions.

1.9. Total cost per managed subscriber is lower than any alternative.

By purchasing the easyWISP access controller and using the Cloud management system, the WISP's total management system cost per subscriber is the lowest possible. In addition the WISP can eliminate infrastructure costs to minimize investment by implementing the easyWISP and Cloud system. The WISP implements access controllers and Cloud management system that requires no specialist skills to install and operate. The low cost easyWISP Cloud technology will empower many thousands of potential WISP entrepreneurs to begin building WISP businesses.

1.10. Designed for global markets where operating cost must be low.

The easyWISP Cloud products support both English and Spanish language use. More languages will be added. A WISP can source locally available wireless and network products to build out the network offering a cost and deployment speed advantage. Individuals with limited technical knowledge and limited financial resources will be able to start a WISP business and grow it successfully. The easyWISP Cloud technical solutions will ensure that potential WISP owners have no obstacles to impede establishing their business and subsequent growth.

1.11. Contention Ratio Planning.

The contention ratio describes how an Internet service provider can oversell the backhaul capacity. Overselling backhaul network capacity will increase the profit of the Internet service provider business. All Internet service providers oversell capacity and there are rules that should be followed to determine the contention ratio.

The following example explains the meaning of contention ratio.

A wireless Internet service provider tower has a backhaul of 100 Mb/s. The Internet service provider sells rate plans of 2 Mb/s to subscribers. This means that when 50

subscribers are connected to the network and each is using their maximum data capacity of 2 Mb/s then the backhaul circuit will be operating at the maximum data capacity of 100 Mb/s. In practice not all subscribers will be connected at the same time, and many of the connected subscribers will not be using the maximum data capacity. Data capacity use depends on the type of application being used. Email will generate a very low aggregate data rate while video streaming will generate the maximum data rate. Voice over IP (VoIP) applications like Skype will generate a medium to high data rate.

Knowing the data use characteristics of subscribers it is possible to oversell the backhaul capacity by a factor of 5:1 or 10:1, this factor is the contention ratio. With a contention ratio chosen of 5:1 then the 100 Mb/s backhaul capacity can be sold as 500 Mb/s capacity. This means that 250 data rate plans of 2 Mb/s can be sold to subscribers.

There are simple rules for maximizing the contention ratio in order to improve the business profitability.

The rate plan that is sold to subscribers must be a very small fraction of the backhaul capacity. For example, with a backhaul of 100 Mb/s then it is not possible to sell the service to more than one subscriber if the rate plan is 100Mb/s. The contention ratio can only be 1:1 as adding a second subscriber will cause the data rate of the first subscriber to fall considerably.

However if the Internet service provider sells rate plans of 1 Mb/s then there is a high probability that not all subscribers will be connected, and not all connected subscribers will be using high data rates. The Internet service provider can then sell a 1 Mb/s service to many more subscribers than the theoretical 100, possibly to 500 1Mb/s subscribers with a contention ratio of 5:1. In practice the Internet service provider will offer several rate plans, from low-cost low speed plans to high-speed high cost plans. The Internet service provider should try to concentrate sales to more customers at the low-cost low-speed end of the scale so that the contention ratio can be increased which will increase profits. The Internet service provider can also set priorities for different types of data traffic (streaming, VoIP, etc) in order to improve the contention ratio.

1.12. easyWISP access control gateway products.

WISPs can implement the easyWISP Cloud management system by upgrading the NOC access control router with an easyWISP product. Alternatively the easyWISP access controller can be installed at the tower when the tower has a fast Internet connection, which is usually the case with mobile phone towers.

For easyWISP products are currently available for both NOC and tower installations. Information about the products is shown on the following pages. Data sheets for easyWISP products can be downloaded at the easyWISP website (www.easywisp.com).

EZ-250R: Access control gateway with a throughput suitable for dual NOC wireless or landline backhauls up to 250Mb/s. There is no limit to the number of remote PtMP towers that can be connected to the EZ-250R. Subscriber authentication uses the PPPoE protocol to avoid upgrading the tower wireless distribution network. 110/220 volt operation, suitable for NOC installations.

EZ-250R Technical Specifications		
Features <ul style="list-style-type: none"> ▶ Integration with the Cloud management system ▶ The cloud monitors each EZ product for failure ▶ Plug and play with the setup wizard ▶ Authentication of each client CPE radio ▶ Monitoring of each CPE link for failure ▶ Download local database of subscribers from Cloud ▶ Apply the rate plan for each subscriber ▶ Activate/deactivate subscribers on Cloud command ▶ Monitor for any attempt of unauthorized access 	Ethernet <ul style="list-style-type: none"> ▶ WAN1, RJ-45 Gb ▶ LAN1, LAN2, LAN3, LAN4, RJ-45 Gb Throughput <ul style="list-style-type: none"> ▶ 250 Mb/s for subscriber data traffic Authentication <ul style="list-style-type: none"> ▶ CPE MAC address authentication ▶ External RADIUS authentication for WPA2-enterprise 	Operation <ul style="list-style-type: none"> ▶ Commercial grade equipment suitable for installation in any non-industrial environment, 32degF to 100degF Power <ul style="list-style-type: none"> ▶ 110v/220v supply 5W Dimensions: 19in rack mounting <ul style="list-style-type: none"> ▶ Enclosure: 44cm x 24cm x 4.5cm Warranty <ul style="list-style-type: none"> ▶ 1 year for product defects

EZ-1000R: Access control gateway with a throughput suitable for quad NOC wireless or landline backhauls up to 1000Mb/s. There is no limit to the number of remote PtMP towers that can be connected to the EZ-1000R. Subscriber authentication uses the PPPoE protocol to avoid upgrading the tower wireless distribution network. 110/220 volt operation, suitable for NOC installations.

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EZ-250G: Access control gateway with a throughput suitable for dual NOC wireless or landline backhauls up to 250Mb/s. There is no limit to the number of remote PtMP towers that can be connected to the EZ-250G. Subscriber authentication uses the PPPoE protocol to avoid upgrading the tower wireless distribution network. 12 volt operation, suitable for NOC and for towers installations.

EZ-250G Technical Specifications		
Features <ul style="list-style-type: none"> ▶ Integration with the Cloud management system ▶ The cloud monitors each EZ product for failure ▶ Plug and play with the setup wizard ▶ Authentication of each client CPE radio ▶ Monitoring of each CPE link for failure ▶ Download local database of subscribers from Cloud ▶ Apply the rate plan for each subscriber ▶ Activate/deactivate subscribers on Cloud command ▶ Monitor for any attempt of unauthorized access 	Ethernet <ul style="list-style-type: none"> ▶ WAN: RJ-45 Gb ▶ LAN1, LAN2, LAN3, LAN4: RJ-45 Gb Throughput <ul style="list-style-type: none"> ▶ 250 Mb/s for subscriber data traffic Authentication <ul style="list-style-type: none"> ▶ CPE MAC address authentication ▶ External RADIUS authentication for WPA2-enterprise 	Operation <ul style="list-style-type: none"> ▶ Commercial grade equipment suitable for installation in any non-industrial environment, 32degF to 100degF Power <ul style="list-style-type: none"> ▶ 12v 110v/220v supply 5W Dimensions: shelf mounting <ul style="list-style-type: none"> ▶ Enclosure: 22cm x 13.5cm x 3cm Warranty <ul style="list-style-type: none"> ▶ 1 year for product defects

EZ-1000G: Access control gateway with a throughput suitable for quad NOC wireless or landline backhauls up to 1000Mb/s. There is no limit to the number of remote PtMP towers that can be connected to the EZ-1000G. Subscriber authentication uses the PPPoE protocol to avoid upgrading the tower wireless distribution network. 12 volt operation, suitable for NOC and for towers installations.

EZ-1000G Technical Specifications		
Features <ul style="list-style-type: none"> ▶ Integration with the Cloud management system ▶ The cloud monitors each EZ product for failure ▶ Plug and play with the setup wizard ▶ Authentication of each client CPE radio ▶ Monitoring of each CPE link for failure ▶ Download local database of subscribers from Cloud ▶ Apply the rate plan for each subscriber ▶ Activate/deactivate subscribers on Cloud command ▶ Monitor for any attempt of unauthorized access 	Ethernet: dual WAN for fail-over <ul style="list-style-type: none"> ▶ WAN1, RJ-45 Gb ▶ LAN1 to LAN3, RJ-45 Gb Throughput <ul style="list-style-type: none"> ▶ 1000 Mb/s for subscriber data traffic Authentication <ul style="list-style-type: none"> ▶ CPE MAC address authentication ▶ External RADIUS authentication for WPA2-enterprise 	Operation <ul style="list-style-type: none"> ▶ Industrial grade equipment suitable for environment, 32degF to 100degF with fanless low-voltage operation Power <ul style="list-style-type: none"> ▶ 12volt supply, 2A, 24W Dimensions: <ul style="list-style-type: none"> ▶ Enclosure: 154mm x 127mm x 36mm Warranty <ul style="list-style-type: none"> ▶ 1 year for product defects



easyWISP is a comprehensive business and network management system for Wireless Internet Service Providers (WISP's). The EZ-250R access control router is managed by the easyWISP EZ-Cloud to implement subscriber data controls.

EZ-Cloud Overview

Sales: Add and manage subscribers.

Provisioning: Schedule subscriber installation work orders.

Activation: Activate new subscribers onto the network.

Authentication: CPE MAC verification with RADIUS server for WPA2-enterprise.

Subscriber rate plan management: Create multiple cost/performance tiers for subscribers.

Fixed broadband billing: Subscriber pre- and post-paid billing, with invoicing, collection notification and past-due disable.

Mobile broadband sales: Access code generation and authentication for non-subscribers.

Network monitoring: Detection and alarm of easyWISP and subscriber data link failures.

Customer relationship management: A CRM portal that subscribers use to access account data and submit a support ticket.

Reports: Report categories include billing, maintenance, data traffic and support.

For further information: See the easyWISP Cloud data sheet for additional information about Cloud features.

EZ-250R

250Mb/s WISP Network Access Controller



The technology to start a WISP is now plug and play

Until recently, starting a WISP business required many years of network experience with a high degree of technical skill. The current generation of cloud managed WISP systems has reduced the technical knowledge requirements to start a WISP business. Now easyWISP has further simplified the process of starting and growing a WISP business; easyWISP controllers are self-configuring and the easyWISP EZ-Cloud management system is as simple to use as accounting software. The only technical skills required are for the configuration of wireless access points.

Functions of the easyWISP access controller

Each easyWISP router is a dedicated access controller that processes several tasks, which are essential for fixed broadband subscriber management:

- Authenticate each subscriber CPE wireless onto the network.
- Apply the rate plan that each subscriber chooses.
- Enable/disable access according to the billing system status.
- Monitor the connection status with each subscriber CPE.
- Update the EZ-Cloud with network status and traffic.
- Captive portal to display CRM access and off-line status.
- Mobile broadband access code authentication.

A world-class WISP management system with no charges

WISP's are accustomed to paying a fee which might be \$1 for each subscriber each month when using a cloud management system. Not with easyWISP, the unlimited EZ-Cloud service is included free with each easyWISP access controller. There is no limit to the number of subscribers and multiple easyWISP access controllers can be added to one easyWISP EZ-Cloud account. This is possible because each easyWISP controller is a computing element in the Cloud network and processes all access transactions. The EZ-Cloud manages batch tasks, which greatly reduces the cloud operating overhead. After programming each easyWISP controller manages network access without EZ Cloud supervision.

www.easywisp.com



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EZ-1000R

1Gb/s WISP Network Access Controller



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Customer relationship management: A CRM portal that subscribers use to access account data and submit a support ticket.

Reports: Report categories include billing, maintenance, data traffic and support.

For further information: See the easyWISP Cloud data sheet for additional information about Cloud features.

EZ-1000G 1Gb/s WISP Network Access Controller



The technology to start a WISP is now plug and play

Until recently, starting a WISP business required many years of network experience with a high degree of technical skill. The current generation of cloud managed WISP systems has reduced the technical knowledge requirements to start a WISP business. Now easyWISP has further simplified the process of starting and growing a WISP business; easyWISP controllers are self-configuring and the easyWISP EZ-Cloud management system is as simple to use as accounting software. The only technical skills required are for the configuration of wireless access points.

Functions of the easyWISP access controller

Each easyWISP router is a dedicated access controller that processes several tasks, which are essential for fixed broadband subscriber management:

- Authenticate each subscriber CPE wireless onto the network.
- Apply the rate plan that each subscriber chooses.
- Enable/disable access according to the billing system status.
- Monitor the connection status with each subscriber CPE.
- Update the EZ-Cloud with network status and traffic.
- Captive portal to display CRM access and off-line status.
- Mobile broadband access code authentication.

A world-class WISP management system with no charges

WISP's are accustomed to paying a fee which might be \$1 for each subscriber each month when using a cloud management system. Not with easyWISP, the unlimited EZ-Cloud service is included free with each easyWISP access controller. There is no limit to the number of subscribers and multiple easyWISP access controllers can be added to one easyWISP EZ-Cloud account. This is possible because each easyWISP controller is a computing element in the Cloud network and processes all access transactions. The EZ-Cloud manages batch tasks, which greatly reduces the cloud operating overhead. After programming each easyWISP controller manages network access without EZ Cloud supervision.

www.easywisp.com

2. easyWISP network design

2. easyWISP network design.

2.1. WISP network design criteria.

easyWISP technology offers great network design flexibility for the WISP with a range of network configurations. Follow conventional WISP network design building out a Network Operations Center (NOC), or else implement a minimum cost distributed network design that eliminates the NOC. Most WISP's will build a hybrid solution where a NOC services tower via a high bandwidth fiber connection and where there is an opportunity to connect towers to a local wholesale provider, in the case of sharing space on mobile phone tower, or else connecting a tower via a LEO satellite service that has become available.

The key element for the easyWISP network design is the flexibility of access control; one or many easyWISP access controllers can transparently implement access control, and the easyWISP controllers can be distributed throughout the network where it is convenient to have the backhaul access.

The design and construction of WISP networks is primarily determined by the location of access to a high bandwidth Internet connection, usually fiber of 1Gb/s or higher. The network radiates from this point over point-to-point (PtP) links out to the point to multi-point (PtMP) tower, which provides local access for each customer client premise equipment (CPE) wireless. The WISP can only begin building a network where there is a high bandwidth circuit available, and access to the high bandwidth circuit determines where the WISP will build the NOC.

Backhaul technology is evolving and the WISP now has, or will soon have, access several competing backhaul technologies. Satellite technologies permit the WISP to install service for customers almost anywhere. Geo-stationary satellites, such as HughesNet, are already used by WISPs to provide Internet access at PtMP towers. Very soon WISP's will have access to the Starlink service that is currently being implemented. The Starlink business service will offer up to 500Mb/s backhaul access for a tower, with a very low latency. A WISP can begin planning new network expansions with the Starlink service.

The following sections illustrate several network configurations that centralize and distribute the access control functions according to the local services available.

With conventional access control implemented using routers that are programmed via a command line with scripts then managing multiple distributed routers is a difficult task and one that most WISP's would avoid.

With easyWISP however the access control is transparent. The WISP only has to add the easyWISP access controller name to the subscribers profile and the easyWISP cloud system the manages of access control.

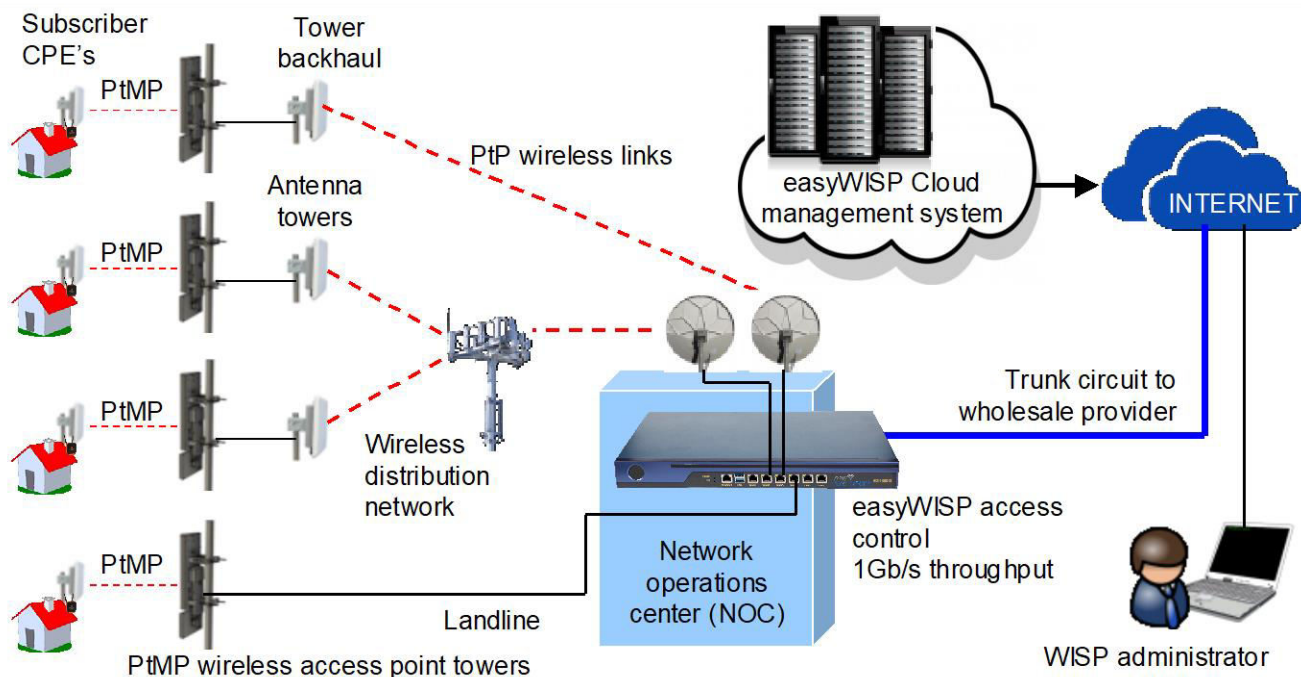
The easyWISP access control gateways are simple to install and operate because they minimize network configuration parameters. Each easyWISP gateway is a DHCP server and issues IP addresses to CPE wireless unit that are configured in router mode. The

CPE issues the IP addresses for the customer devices and network. Authentication of the customer is done through CPE MAC address recognition. Therefore any point-to-point links between the PtMP wireless tower and the NOC must have WDS enabled so that the MAC address of the CPE is passed back to the easyWISP gateway. MAC authentication is simple to implement; the alternative is to implement a RADIUS server, which will require PtMP wireless units to support and be configured for WPA2-enterprise. The easyWISP MAC authentication includes measures to detect and prevent fraudulent use, which may be the case if the WPA encryption key that is used for the CPE to the tower connection, is shared with unauthorized personnel.

2.2. Network Operations Center (NOC) with remote PtMP towers.

Most WISP's build a network architecture that has a NOC installed at a point where the access to the wholesale fiber circuit is available. From the NOC a star network is built to each PtMP tower using point-to-point wireless links. Each tower must have line of sight (LoS) to the NOC which restricts the placement of towers. Without LoS it may be possible to add a repeater or relay site that has LoS to both the PtMP tower and the NOC. Point-to-point wireless links must have WDS enabled. Each PtMP tower is located with a good LoS to the area where the prospective customers are located. A CPE wireless is installed at each of the customer premises to provide a wireless connection to the PtMP tower.

The network diagram for the easyWISP NOC configuration is shown in the next diagram.

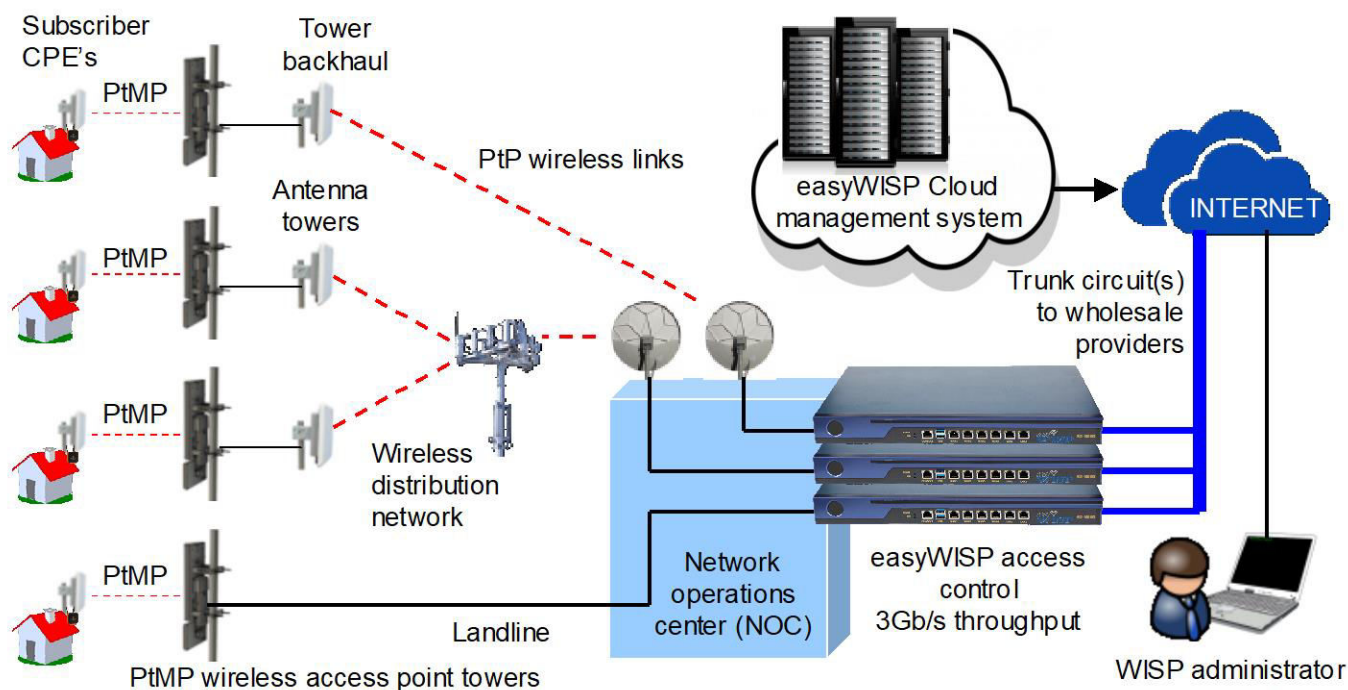


A easyWISP gateway is installed at the NOC to implement access control for subscribers connecting to the PtMP towers. Two rack mounting gateway models are available, the EZ-250R with 250Mb/s throughput, and the EZ-1000R with 1Gb/s throughput. The choice depends of the bandwidth of the wholesale circuit.

2.3. High throughput Network Operations Center (NOC) with remote PtMP towers.

As the WISP adds subscribers to the network then it will be necessary to increase the bandwidth of the wholesale circuit, or else add additional wholesale circuits. As the WISP increases data capacity it is not necessary to replace the easyWISP access controller with a faster product because the easyWISP controllers can be stacked, and are added as wholesale circuits are added. This reduces deployment costs for the WISP because there is no requirement to build a NOC that can handle the expected data for one or two years ahead. The WISP builds the NOC with the data capacity for the current customer base and increments capacity as customers are added. Having multiple easyWISP gateways increases resiliency of the installation as gateways are redundant. If a gateway fails then it can be replaced in a few seconds by giving a replacement gateway the same name as the failed gateway. Customers continue to have Internet access.

The network diagram for the easyWISP NOC configuration with multiple wholesale connections and multiple easyWISP gateways is shown in the next diagram.

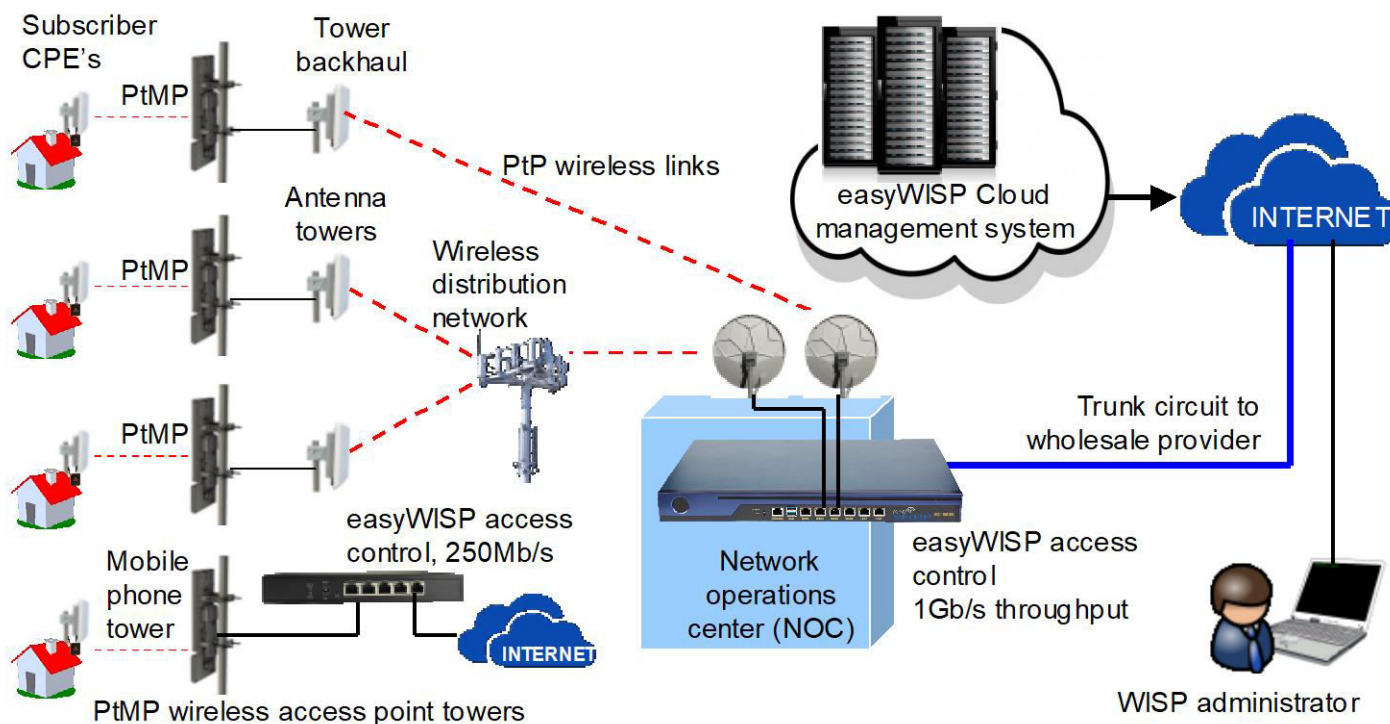


2.4. PtMP towers that have a network connection.

As the WISP builds out the wireless network there will be opportunities to lease PMP antenna space on a tower that has a wholesale connection to the Internet. Although the cost of leasing space on a mobile phone tower is higher than an antenna tower or high building, the WISP has two advantages. The tower has power with a backup supply, and the WISP does not have to build a PtP wireless network from the tower to the NOC. A further advantage is that the WISP can provide service to areas where there is no LoS back to the NOC, with no possibility of installing a wireless relay site.

The tower installation requires a 12volt operation easyWISP access controller, this can be the EZ-250G with 250Mb/s throughput, or the EZ-1000G with 1Gb/s throughput. It is unlikely that the tower operators can offer a circuit bandwidth greater than 1Gb/s.

The network diagram for the easyWISP NOC and tower connection configuration is shown in the next diagram.

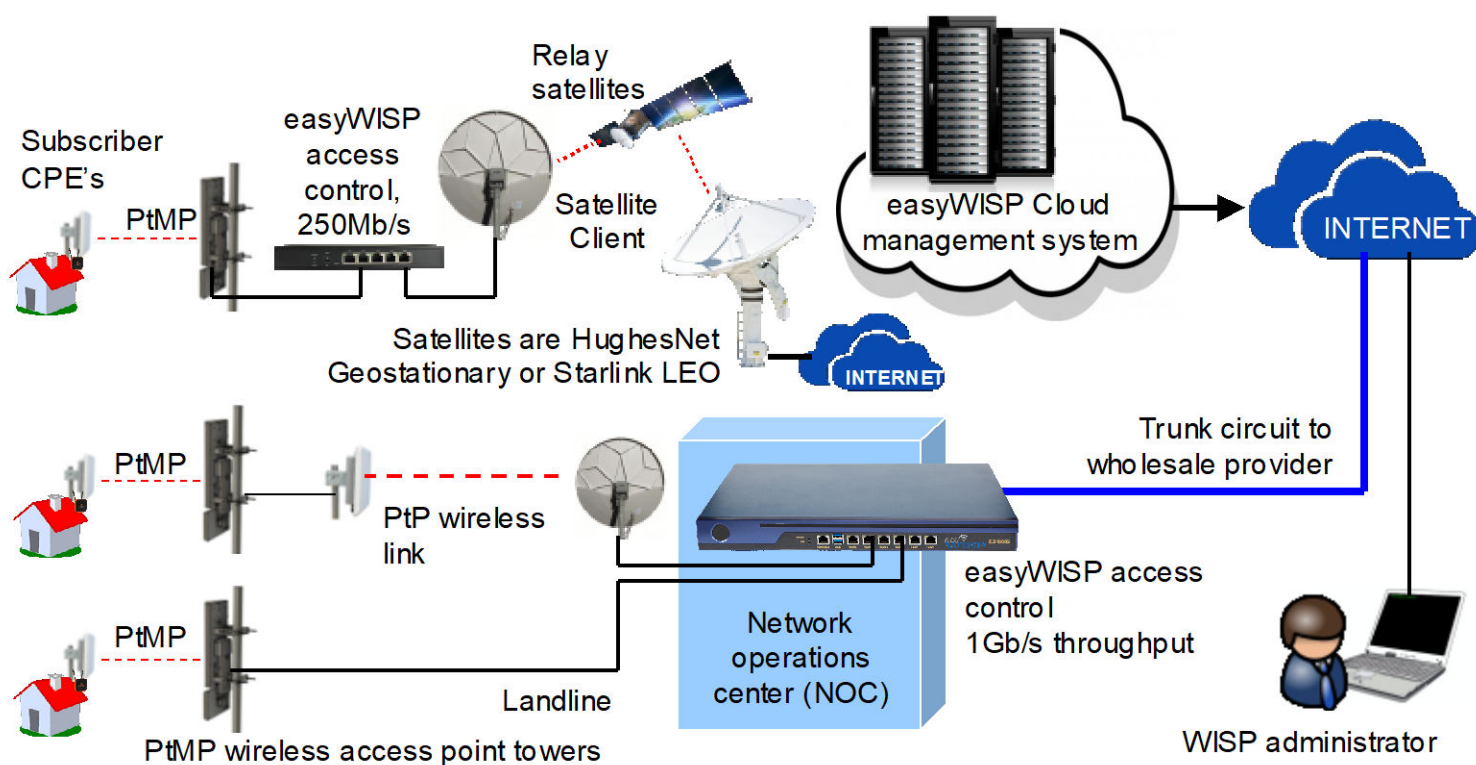


2.5. Installation of a satellite backhaul at a PtMP tower.

Some WISP's already install a satellite backhaul at a PtMP tower using the HughesNet Geo-stationary satellite service. Data bandwidths up to 100Mb/s are available however the latency is high. Also the service availability is limited, covering most parts of North America and four countries in South America.

WISP's located in some geographies now have access to a high bandwidth satellite backhaul using the Starlink Business service. A backhaul speed of up to 500Mb/s is available with low latency. Starlink has a lower cost residential service with the backhaul speed up to 150Mb/s, however under the terms and conditions resale of this service is not permitted. Eventually Starlink will have global coverage of the Starlink service and therefore a WISP will be able to install a tower anywhere. The Starlink satellite antenna is installed at a high point on the tower so that there is a visibility of 180 degrees in the sky. The tower installation requires a 12volt operation easyWISP access controller, this should be the EZ-1000G with 1Gb/s throughput when the Starlink Business service is contracted.

The next diagram shows the NOC installation with a satellite connection for one tower.

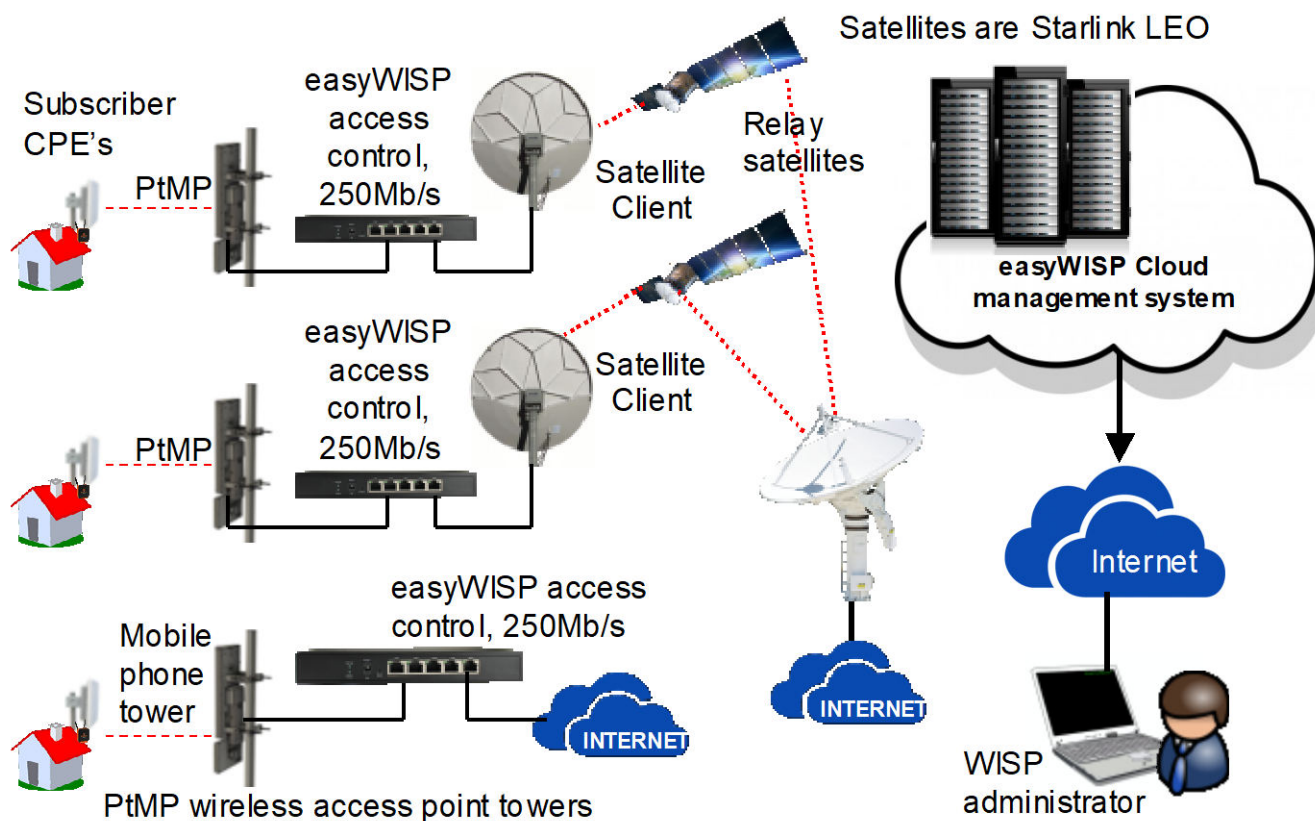


2.6. PtMP towers with backhauls eliminating the NOC.

As the Starlink Business service becomes available globally it will be possible to build a WISP network that has no NOC, where each PtMP tower connects to a local backhaul, which can be a fiber circuit provided at the tower or a LEO satellite antenna installed at the tower.

When a WISP is able to build a network with no NOC then a large part of the investment expense will be eliminated and the WISP will reduce the time between initiating the investment and billing the first subscribers for the service. The WISP business can be managed from anywhere with an Internet connection. Staff will still be needed for the business tasks; customer support, installation technician, finance for billing and collections, and sales to capture customers. However the WISP can further reduce operating costs when employees work in a hybrid mode, with most of the work done remotely and occasional meetings at a central location for job training, staff progress follow up and presentation of new services.

The next diagram illustrates a WISP network that has no NOC, each PtMP tower has a backhaul connection to the Internet and an easyWISP access control gateway is installed at each tower to manage subscribers.

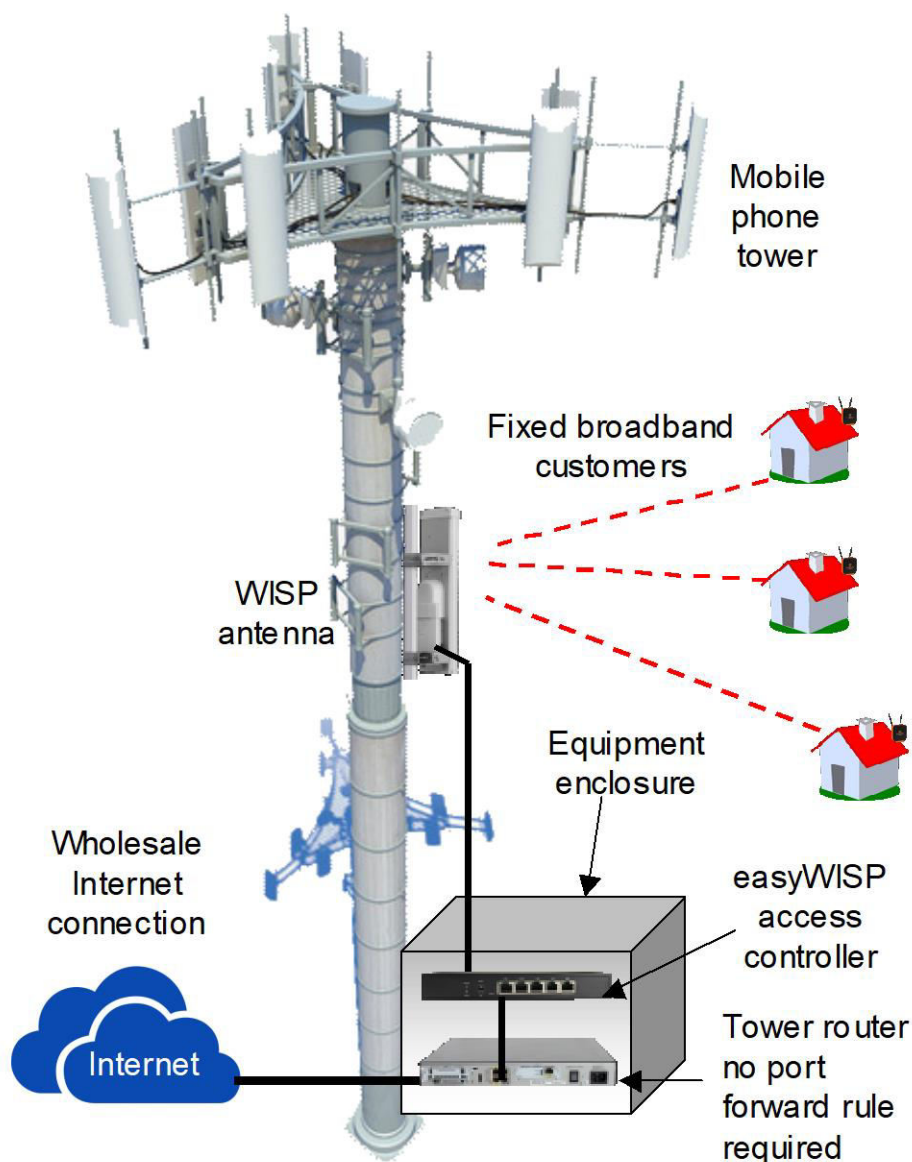


2.7. easyWISP does not require router port forwarding at remote sites.

If a network router is installed at a PtMP tower site and managed remotely then it is necessary to request the tower service provider to provide a port forward service, as it is unlikely that the WISP will receive a public IP with the backhaul service.

The installation of an easyWISP access controller does not require the configuration of a port forward service by the tower provider. This is possible because the easyWISP access controller has routing functions, but also has a suite of access control management software that polls the easyWISP cloud when any type of cloud service is required.

The next figure illustrates a mobile phone tower installation with the easyWISP access controller connected to the tower router for the wholesale backhaul connection.

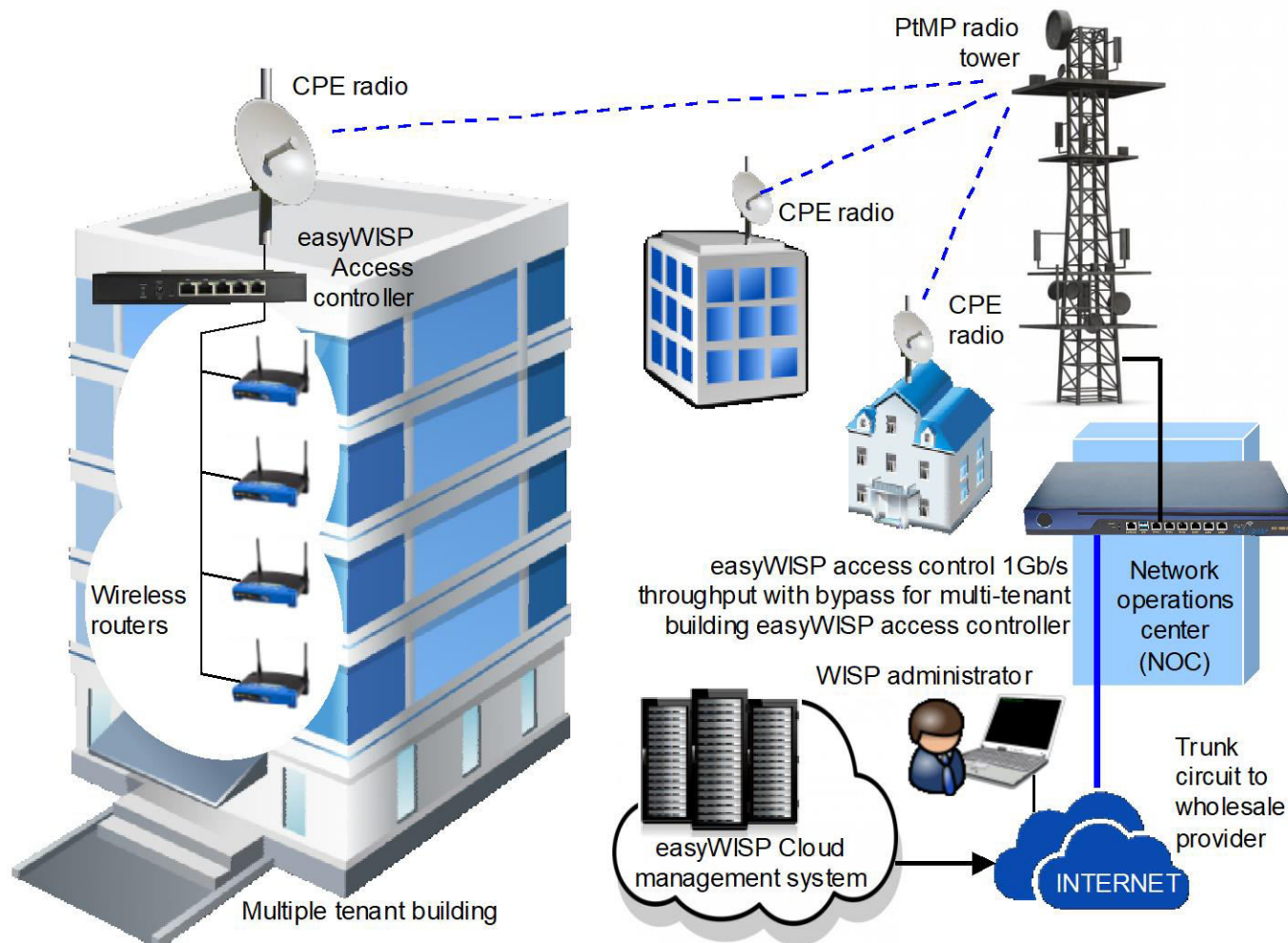


2.8. WISP configuration for a multi-tenant building.

When a WISP is providing service in an urban area the WISP will frequently have to install Internet service in a multi-tenant building. In this case the building will be wired internally with cat5/6 cable to each unit, and a wireless router installed in each unit. The multi-tenant building connects back to the WISP PtMP tower through a wireless link. An easyWISP access controller is installed in the building to manage the wired subscribers. Each wireless router will be wired back to the easyWISP access controller and authenticated with the MAC address of the router.

The PtP wireless link from the building to the PtMP tower must have WDS enabled to pass the MAC address of the easyWISP gateway back to the tower. An easyWISP access control gate will be installed at the tower to manage clients connecting to the tower. As the access control for the multi-tenant building is done at the tower then the MAC address of the building easyWISP gateway is added to the allowed MAC table of the tower easyWISP gateway in order to bypass access control at that gateway.

The next diagram illustrates the connection of a multi-tenant building to the WISP's network.



2.9. Summary of advantages for network design using easyWISP.

The easyWISP access control gateway and Cloud technology offers a series of advantages for both new and established WISPs by dramatically reducing the investment and operating costs compared with any other technical solution. By reducing the technical complexity it is possible for a person with limited technical skills and financial resources to start a WISP business. WISP entrepreneurs can accelerate the time to service deployment and initiate revenue generation earlier in the startup cycle.

- The distributed operation of easyWISP gateways makes it possible to easily deploy access control at a tower site that has a data link installed at the tower.
- The time to deployment and subsequent revenue generation is shortened due to the plug-and-play nature of the EasyWISP Cloud technology. The WISP requires one tower site connected to the Internet to start in business.
- The easyWISP Cloud solution is redundant. With distributed access control there is no one point in the network where failure will bring the whole network down.
- Any failure of the Cloud servers will not affect the operation of all easyWISP controllers in the network as they operate autonomously to the Cloud service.
- When PtMP tower backhaul service like LEO satellites become available then the WISP can consider eliminating NOC expenses.
- The initial cost of implementation is dramatically reduced, as the network infrastructure can be built out as needed and easily incremented in performance.
- There is no on-going operating cost for easyWISP, with no monthly, annual or per subscriber administration fees, unlike other WISP management systems.
- The easyWISP gateway is a high performance access control product and offers much greater performance and functionality than an equivalent router product.
- The easyWISP Cloud technology is very easy to deploy and the WISP entrepreneur does not need specialized network skills; as would be the case if the entrepreneur was scripting routers and configuring RADIUS servers; the easyWISP controller and Cloud platform is plug and play.
- There is no limit to the number of easyWISP access controllers that can be assigned to a Cloud account, and no limit to the number of subscribers that can be managed by an easyWISP Cloud account.

3. easyWISP subscriber and network management

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3.1. Management tools for a WISP business.

The telecommunications industry has a methodology for the management of a telecommunications business. The management processes were first developed for the PSTN (public switched telephone network) system and then evolved to support digital data circuits and then consumer Internet access. The management system concept is called OSS/BSS, which refers to operations support system and business support system. The OSS part of the system includes order management, network inventory management and network operations while the BSS part of the system includes order capture, customer relationship management (CRM) and telecommunications billing.

WISP management systems follow the OSS/BSS model although at a smaller scale than the big telecommunications company counterparts. This section summarizes the functions and features that a WISP should expect from a management system, which are industry best practices for WISP operations.

Readers can learn more about the OSS/BSS architecture and processes by consulting the telecommunications forum (www.tmforum.org/oda/) where current and future management methodologies are documented.

3.2. Powerful easyWISP Cloud management features.

The easyWISP gateway products provide the access control function, that is the process of allowing the subscriber access to the Internet, and imposing the terms and conditions, including the rate plan and monthly billing cycle access for the subscriber, as part of the subscribers agreement with the WISP. One or many easyWISP controllers are managed through a single Cloud account. There is no limit to the number of easyWISP controllers that can be managed by one Cloud account.

The easyWISP Cloud management system provides the WISP with the following management features:

- **Provisioning:** A new subscriber entry is created in the Cloud database. The subscriber information is then linked to a usage account when the subscriber is activated. The subscriber information also contains the rate plan agreement; download/upload maximum speeds and monthly charge for this service. The WISP can create several different rate plans determined by the WISP's choice to commercialize the Internet service. The subscriber information can also be modified when a change occurs in the subscriber's information (change of address, etc). A subscriber can also be removed from the database when the subscriber decides to terminate the service. Adding a new subscriber entry will generate a work order to initiate the subscriber's installation and activation.
- **Activation:** Activation is the process of enabling the subscriber to use the service. Activation requires setting several parameters, the MAC address of the client premise equipment (CPE) radio to be installed at the client's site, and the

download/upload speed settings for the subscribers chosen rate agreement. When the field service technician has completed the subscriber activation process, by verifying the subscribers connection then a billing cycle is initiated and will commence with the subscriber's first on-line payment.

- **Billing:** The WISP can bill the customer either through a pre-pay or a post-pay plan. Pre-pay requires the subscriber to pay before the start of the next billing cycle. Post-pay permits the customer to pay within a period after the end of the billing cycle. The billing system will issue invoices and is used to record when the customer payment is received.
- **Rate Plan:** Each customer selects a rate plan that is offered by the WISP and that is recorded as part of the billing account. A rate plan is the maximum download and upload speed of a service and optionally a data cap for downloads. The WISP sets a price for each rate plan. EasyWISP does not have a limit for the number of rate plans that can be set for each Cloud account.
- **Hotspot:** This is a mode of activation and billing for anonymous users who are not subscribers. The WISP may wish to install a public wireless Internet service in an airport or hotel and this feature eliminates the necessity to have a separate product to manage anonymous Internet users. The Hotspot feature is provided by the same easyWISP controller that is serving activated subscribers.
- **Traffic management:** easyWISP has several features that the WISP can use to manage data transmission over the network. Traffic management features can include web content filtering, IP/Domain white-list and black-list, and MAC white-list and black-list.
- **Network management and monitoring:** network management features permit the WISP to manage and monitor easyWISP gateways. The Cloud monitors each easyWISP controller and the backhaul circuit to the easyWISP controller for performance and failure. In case of failure the Cloud sends out an email notification to a field service technician to initiate the repair process. In addition each easyWISP controller can be configured to give remote access to the wireless access points and CPE devices via port forwarding. A feature is included for support staff to check the circuit through to the customers CPE to assist in locating network faults.
- **Inventory:** The network inventory is a list of the easyWISP access controllers associated with the Cloud account and the status of each controller.
- **Customer Relationship Management (CRM):** CRM has two components. The first is a subscriber portal that permits the subscriber to log in to the subscribers account and view account details, payments and use. The second component is a support request portal that permits a subscriber to submit a support request ticket to the WISP staff. The subscriber receives a response to the ticket from the support staff. A ticket can be a request for information, or can report a network problem.

- **Helpdesk:** The customer can open a support ticket through the CRM system and the ticket is sent to the helpdesk. The support and technical staff have access to the helpdesk and should answer customer support tickets quickly.
- **Multi-language:** The easyWISP Cloud user interface has a selector for the English or Spanish language.
- **Reporting:** Reports are generated by the easyWISP Cloud to provide the WISP with data to monitor the performance of the business and performance of the network. The reports are listed below.
 - Reports for billing.
 - List of subscribers, status enabled/disabled, billed date, due date.
 - List of invoices issued to subscribers.
 - Reports for data traffic, time graphs can be selected from 1-hour to 1-week.
 - Time graph of easyWISP gateway connected and authenticated users.
 - Time graph of easyWISP gateway performance as a %.
 - Time graph of backhaul WAN usage in Mb/s.
 - Authenticated user login information (currently using the network).
 - Connected user login information (connected but not currently using the network).
 - Report for maintenance.
 - Monitoring status of all access control gateways on-line/off-line.
 - Check subscriber CPE circuit status.
 - Report for support.
 - List of support ticket requests via the CRM portal.
 - List of outstanding work orders with status.

3.3. easyWISP staff roles.

The easyWISP management system supports five staff roles that will login to the system to manage parts of the business. Each staff role has specific login permissions for that role. There is no limit to the number of staff who can login with each role. The following is a list of the staff roles.

- **Managerial:** The manager has access to all parts of the easyWISP cloud management system. 1. Access all settings and functions. 2. Add, change and remove staff. 3. Escalate support issues via the Cloud.

- **Technical:** The responsibilities of the technical staff are subscriber installation, tower PtMP installation, network monitoring, network repairs, and network maintenance. As the WISP business grows technical staff may be divided by function; for example tower installers, subscriber installers, network maintenance and repair. 1. Update helpdesk tickets and work orders. 2. Add, update and remove gateways. 3. Update monitoring settings.
- **Customer service:** The responsibilities of customer service are subscriber data entry and editing, including adding the subscriber rate-plan chosen by the customer, which determines the billing rate, responding to subscriber questions that may come via the CRM portal, or customer may call by phone. 1. Update helpdesk tickets and work orders. 2. Update customer details. 3. Create login codes & bill customers.
- **Finance:** The responsibilities of financial staff are issuing invoices, accounts receivable; receiving customer payments and entering the payment into the system, follow up with late billing payments, and bookkeeping. The WISP will require bookkeeping and accounting software as many parameters such as taxes, vary from country to country and state to state. The WISP may have to add appropriate telecommunications taxes to the subscriber invoice. 1. Update helpdesk tickets and work orders. 2. View customer details. 3. Bill customers.
- **Sales:** responsible for acquiring new subscribers and up-selling to existing subscribers. The sales person will add a new subscriber into the database and update that information as required. 1. Update helpdesk tickets and work orders. 2. Add customers. 3. Create login codes & bill customers.

3.4. easyWISP Cloud management processes.

The WISP management system has a graphic user interface (GUI), which provides a secure login for five different roles in the company. The WISP divides the business responsibilities between staff.

The manager configures the subscriber rate plans in the service charge database. The rate plan that a new subscriber selects is added to the subscriber account.

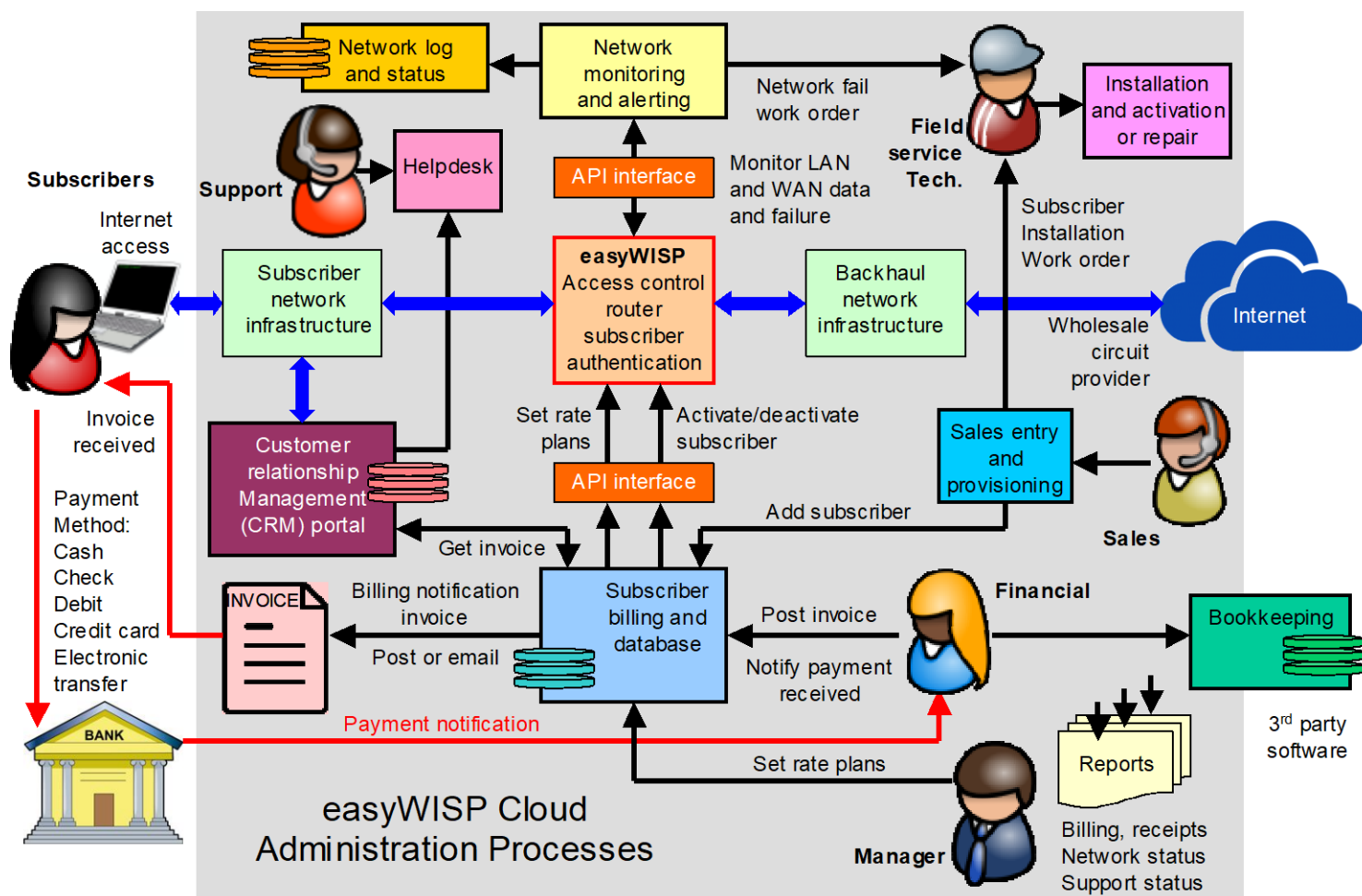
When the sales person acquires a new subscriber then the subscriber provides personal billing and address information which the sales person adds to the billing system subscriber database, including the billing rate plan that the subscriber has chosen.

The provisioning module takes the new subscriber data and creates a subscriber installation work-order, which is sent to the technician. The technician will add the MAC address of the CPE device that will be installed for the subscriber. The MAC address is checked during the activation and authorization process. The technician will prepare the subscriber installation kit and schedule a field service technician for the installation.

The technician will install and activate the subscribers CPE device at the subscribers premises. Activation will initiate the billing cycle to determine when the customer is

charged each month for the service, before the start of the next billing cycle when prepaid, or at the end of the billing cycle when post-paid.

The easyWISP Cloud management system functional diagram with process flow is shown in the next figure.



The billing module is used to print an invoice (or send an email) at the monthly billing cycle due date. When the subscriber's payment is received by the WISP then the receipt of payment is notified to the billing module by the financial staff. If the billing module is not notified of payment then the subscriber will be de-activated and will lose access to the Internet.

Guest (Hotspot) billing is also part of the billing sub-system. The billing module can print vouchers used for cash sales for the Hotspot function. Voucher printing is initiated by selecting the access code parameters, for example download and upload speeds.

Hotspot users can purchase Internet access using credit cards or by purchasing access vouchers using cash.

Each easyWISP access controller constantly gathers network traffic statistics and forwards this information to the Cloud. The data provides the network manager with a diagnostic tool to evaluate link conditions, and to identify links that are working at capacity and need upgrading. The manager may wish to make adjustments with the tower contention ratios.

The Customer Relationship Management (CRM) portal is a service provided to subscribers. A subscriber can login to access invoices and other billing information, which is obtained from the billing system. The customer can also open a support ticket and this is sent to the helpdesk.

The differences between the small-scale WISP management system and the larger scale systems implemented by the telecom companies rests with the degree of automation and the size of the databases. For example, a WISP will receive payments manually via cash or checks and a member of the finance staff will update the system with payment notifications on a daily basis. The large-scale telecom systems will automate the payment processing procedures through links to banks for direct debit and other forms of automatic payment processing, which will eliminate human intervention. This level of automation is not practical for smaller WISPs due to the cost and volume requirements of setting up a links with all banks for direct debit processing. WISPs in developing countries will have subscriber's who don't have bank accounts or credit cards, and so the WISP may have a retail point where subscribers can pay cash, and the WISP will also use cash payment systems provided by 3rd parties; the 3rd party transaction processing systems will vary from country to country and be subject to local laws.

3.5. EasyWISP Cloud sub-systems and sub-system processes.

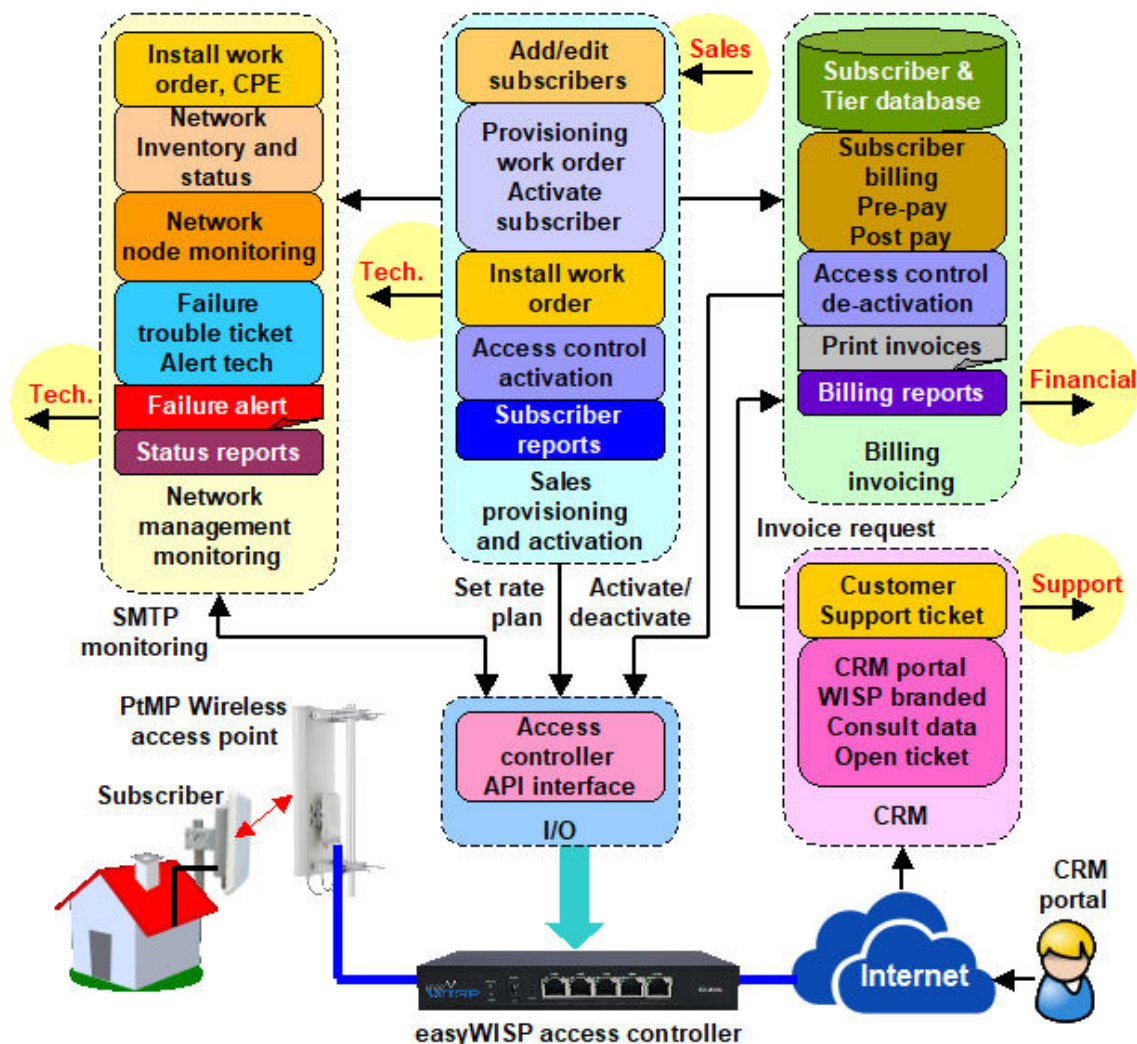
The easyWISP Cloud has five software subsystems that share information and communicate with each easyWISP access controller, and this follows from the previous diagram.

- Sales, provisioning and activation.
- Billing and invoicing.
- Network management and monitoring.
- Customer relationship management (CRM).
- API interface for the easyWISP access controllers.

The modular system is shown in the next diagram, with data paths between each subsystem.

Sales, provisioning and activation: Sales staff can add new subscribers and change subscriber information. The subscriber chooses a rate-plan. Entry of a new subscriber initiates a workflow process that will generate a work order for technical staff to install the CPE wireless equipment at the subscriber premises. Subscriber billing information is

added to the billing database. On completion of the subscriber installation the technician activates the subscriber and initiates the billing cycle.



Subscriber billing: The WISP can install an unlimited number of rate plans for fixed broadband subscribers. Each rate plan specifies a maximum download / upload speed and the corresponding plan charge. When enrolling a new subscriber the rate plan is chosen based on cost or data speed. Billing invoices charge the customer at the chosen rate plan. The billing system sends the customers chosen data speed to the easyWISP access controller. A new subscriber chooses a rate plan that is added to the subscriber's profile. Activation of the subscriber initiates the start of the billing cycle. An invoice is issued for each billing cycle and the subscriber payment is noted in the billing system by the financial staff. The billing system sends the subscriber activation and rate

plan instructions to the respective easyWISP access controller. In the case of non-payment the subscriber is deactivated.

Network monitoring and reporting: The easyWISP EZ-Cloud monitors all easyWISP controllers for failure and sends an alert to the administrator if this occurs. Support staff can test the circuit to the subscriber CPE wireless when the subscriber reports no connection. Data traffic through each easyWISP controller is monitored and a bandwidth use time graph indicates when a WAN circuit is nearing congestion. The administrator can see a status report for each easyWISP controller.

Customer relationship management (CRM): Each new subscriber receives a login credential for the CRM portal. This is a WISP branded website that the subscriber can login to see information about the account and retrieve billing invoices. The subscriber can open a customer support ticket that is sent to the support staff for answer. On-line payments can be made through the CRM portal. In the case that the Internet is not available due to circuit failure or non-payment then the captive portal displays a message.

3.6. The new subscriber provisioning process.

Provisioning is the process of adding a new subscriber to the easyWISP Cloud and initiating the installation process for the customer:

- Enter the subscriber's personal information and billing information in the subscriber database.
- Create a work order for the field service technician to install the CPE and wireless router at the subscriber's premises.

The tower PtMP radio coverage that will service the customer's address must be verified before the WISP can accept the subscriber for service; the WISP should prepare a map of the service area and be able to estimate the area of wireless coverage.

Each subscriber database entry has the following fields:

- Subscriber name.
- Installation address.
- Billing address if different from the installation address.
- Contact telephone.
- Contact email address.
- Password chosen by the subscriber to access the CRM portal (force minimum strength of password). The username is the subscribers email address.
- Rate plan selected by the subscriber, the data speed with the corresponding monthly charge.

The following parameters are added later by the technician.

- Start date for billing cycle, this should be the date of activation, entered by the activation module.
- The name of the easyWISP access controller that the customer will be assigned to.
- MAC address of the CPE wireless installed at the customers premises.

The easyWISP cloud system will create a work order for provisioning the subscriber's service. The work order will contain the following information:

- Title.
- Subscriber name.
- Installation address.
- Contact telephone.
- Contact email address.
- Date and time for the installation agreed with the customer.

The installation technician will then add the following information to the work order and on completion of the installation.

- Tower radio which will service that address:. The technician may need to visit the customers site to verify wireless reception if the location is a fringe area.
- Box for installer's comments regarding the installation (or repair to the installation). For example, the installer might create a WPA encryption key for the wireless router installed at the customer's premises and enter in this box.
- Box for the subscriber's signature accepting that the work has been done correctly and that Internet access has been provided.
- Start date for the billing cycle after customer acceptance of the service.

The installation technician will have an inventory of equipment that has to be taken to the subscriber's site. Equipment includes: CPE radio, radio roof mounting bracket, PoE supply, Ethernet cable, wireless router with power supply, installation tools.

Mobile broadband provides Internet access for customers who are not subscribers and requires an unencrypted PtMP wireless access point to be connected to the easyWISP access controller. Provisioning for mobile broadband requires the financial staff to use the billing system for issuing access codes as printed vouchers that have the parameters of duration and data speed. The customer will purchase the access code voucher to access the unencrypted WiFi PtMP wireless access point using a mobile device. Mobile broadband eliminates the cost of fixed broadband premises installation for the customer and the monthly payment obligation.

3.7. New WISP subscriber premises installation.

Subscriber installation and activation is the process of installing the CPE and network equipment at the subscriber site and testing the Internet connection. The technician will enter the MAC address of the CPE radio into the subscriber record. The CPE MAC address provides a key to recognize the user, and also adds a layer of security because an unrecognized or duplicated MAC is directed to the Hotspot login page. A duplicated MAC is also flagged for attempted fraud.

The equipment required for the installation includes the following:

- CPE radio, note the radio MAC address.
- Mounting bracket to install the CPE radio on the building roof.
- Ethernet cable to connect the CPE radio to the location of the wireless router installation.
- PoE power supply for CPE radio.
- Wireless router.
- Power supply for wireless router.

The services to install this equipment are:

- The MAC address of the CPE must be entered on the subscriber activation page.
- Installation of the CPE radio on the building roof, align with the PtMP radio tower.
- Installation of Ethernet cable from CPE radio to a point inside the premises.
- Installation of CPE radio PoE power supply.
- Verify that the CPE radio is powered and that the signal strength of the remote PtMP tower radio is correct.
- Install the wireless router, connect the Ethernet cable to the WAN port, and connect the power supply.
- Configure the wireless router with a unique WPA key, note the key on the work order document.
- Test the installation, verify that there is Internet access, verify the download and upload speed settings.

On completion of testing the technician sets the billing cycle start date. The billing cycle renews each calendar month on that date.

3.8. The Cloud API interface for easyWISP access controller products.

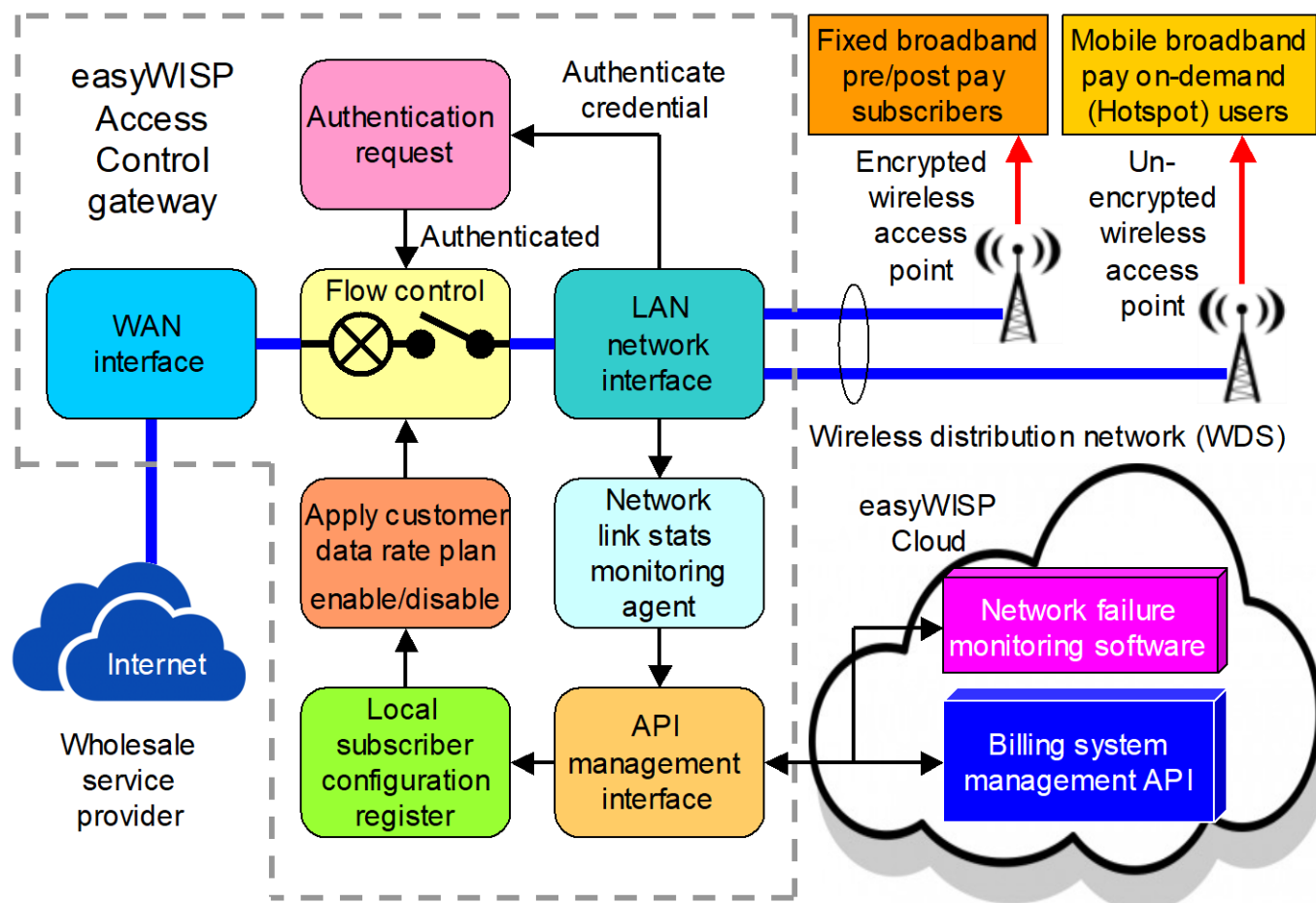
Each easyWISP access controller implements several tasks:

- Authenticate each subscriber CPE onto the network.
- Apply subscriber rate plans.

- Enable/disable subscriber access.
- Monitor CPE status.
- Update the Cloud with network status and traffic.
- Captive portal for CRM and status.
- Mobile broadband authentication.

Each easyWISP access control gateway communicates with the Cloud over the WAN circuit through the Cloud Application Program Interface (API). There is no limit to the number of easyWISP access controllers that can be added to one WISP Cloud account. The easyWISP access control gateway does not have a subscriber limit, only a data throughput limit. However gateways can be stacked to increase overall throughput. Each easyWISP gateway can connect to several PtMP wireless access products simultaneously.

The functional diagram for the easyWISP gateway is shown in the next figure.





The wireless access point is connected to the network interface, which authenticates the customer then routes the subscriber data to the billing access control module. After access control the subscriber data is router to the WAN interface and then on to the Internet via the ISP backhaul circuit.

The API management interface communicates with the Cloud system via the WAN interface. Upon boot and upon changes to the easyWISP database relevant to the specific controller, the API management interface refreshes the local subscriber and configuration database. Data is extracted from this database by the subscriber authentication module in order to apply the access control rules to the subscriber data. The wireless link to each subscriber is monitored and the network stats information is combined with the subscriber information and sent to the Cloud server to add to the WISP's data traffic log. The network interface constantly monitors each wireless subscriber link and in the event of a link failure the information about the occurrence is sent to the Cloud server.

4. Easy steps to configure a new easyWISP installation

4. Easy steps to configure a new easyWISP installation.

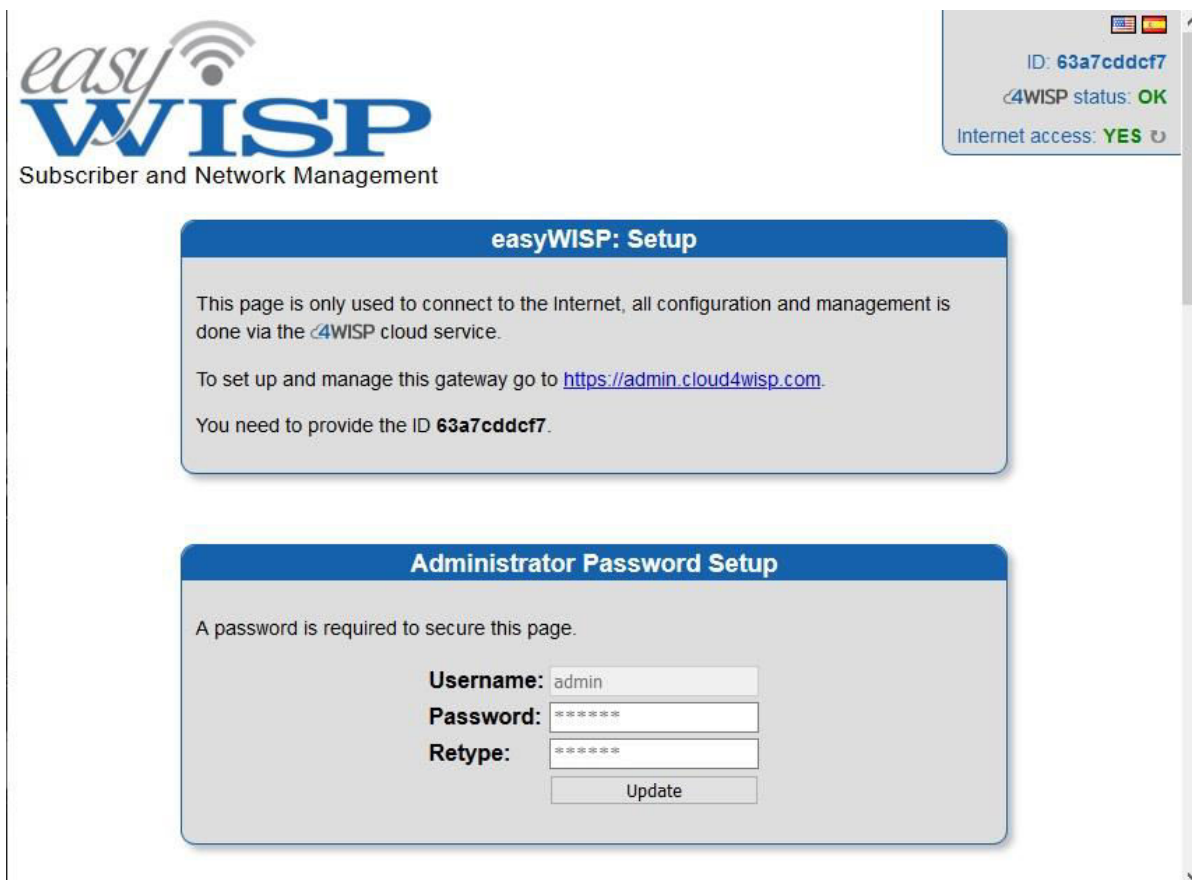
4.1. easyWISP gateway Initial setup.

Each easyWISP product has a simple graphic user interface. The purpose of the interface is to ensure that the easyWISP product can connect to the Internet and is recognized by the Cloud account. All subsequent configurations are done via the Cloud account.

Connect the LAN port of a computer to the LAN port of the easyWISP product. The computer Ethernet port will get an IP address from the easyWISP DHCP server.

Open a browser and the page will be redirected to the easyWISP setup GUI, shown in the screen shot below. Ensure that the browser home page does not use encryption (https://) otherwise the browser page will not be redirected. Some browsers detect the login page and advise the user that a button must be clicked to login.

When the browser page opens to show the GUI select the preferred language (English or Spanish). The first box shows the device ID, which will be required to register the easyWISP product with the Cloud management account.



easyWISP
Subscriber and Network Management

ID: 63a7cddcf7
4WISP status: OK
Internet access: YES

easyWISP: Setup

This page is only used to connect to the Internet, all configuration and management is done via the 4WISP cloud service.

To set up and manage this gateway go to <https://admin.cloud4wisp.com>.

You need to provide the ID **63a7cddcf7**.

Administrator Password Setup

A password is required to secure this page.

Username:

Password:

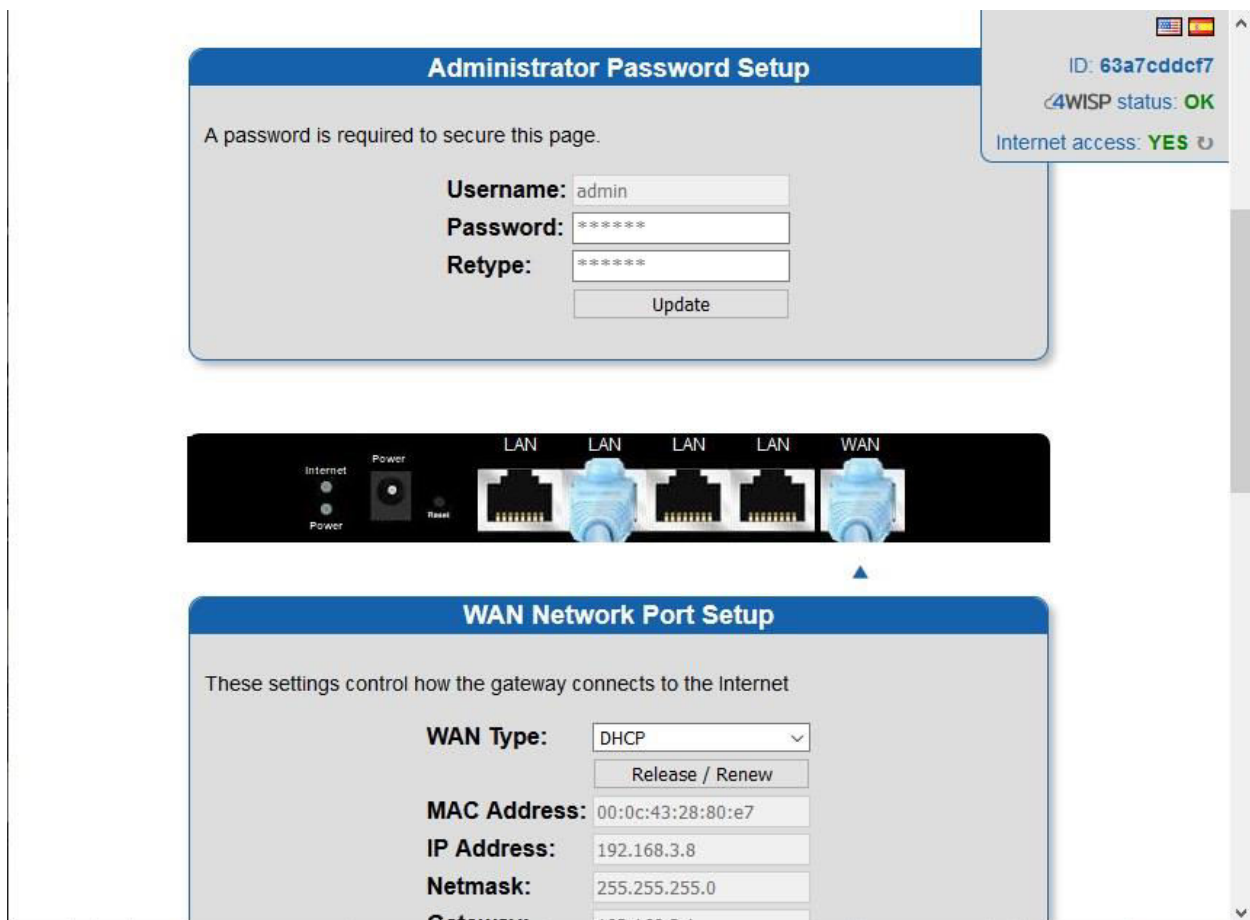
Retype:

The box at the top right corner shows the device ID and the Internet connection status. If the Internet access shows a red 'NO' then verify the physical connection and also determine if a static IP address is required for the WAN port.

The first box shows the device ID, which will be required to register the easyWISP product with the Cloud management account. The link to create and manage the Cloud account is also shown in the first box.

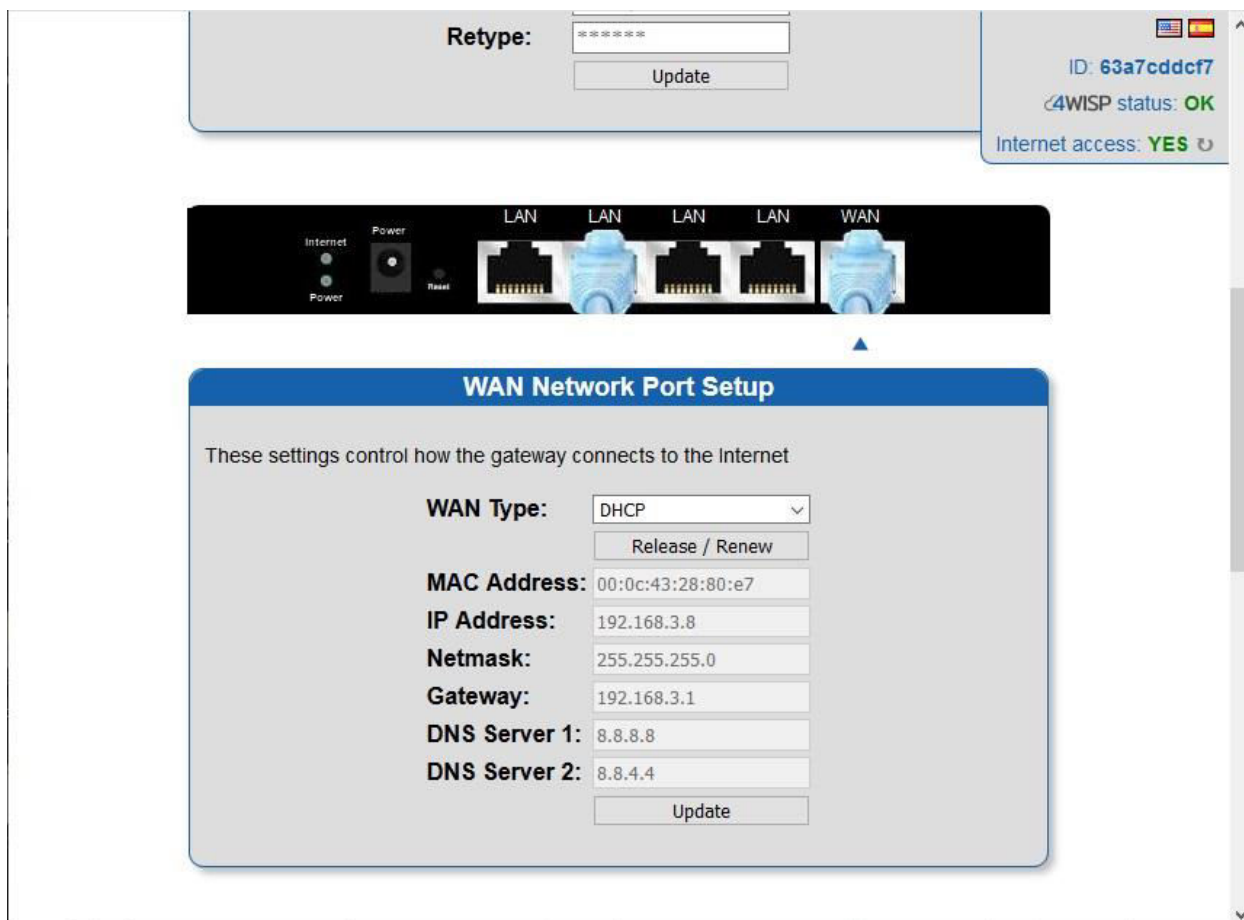
The second box requires a password to be entered to subsequently access the device. Choose a strong password, include upper and lower case letters, number and symbols. Repeat the password in the field below.

Scroll down the page to see the next box, this is a graphic representation of the easyWISP device connectors. Verify that the WAN cable is connected.



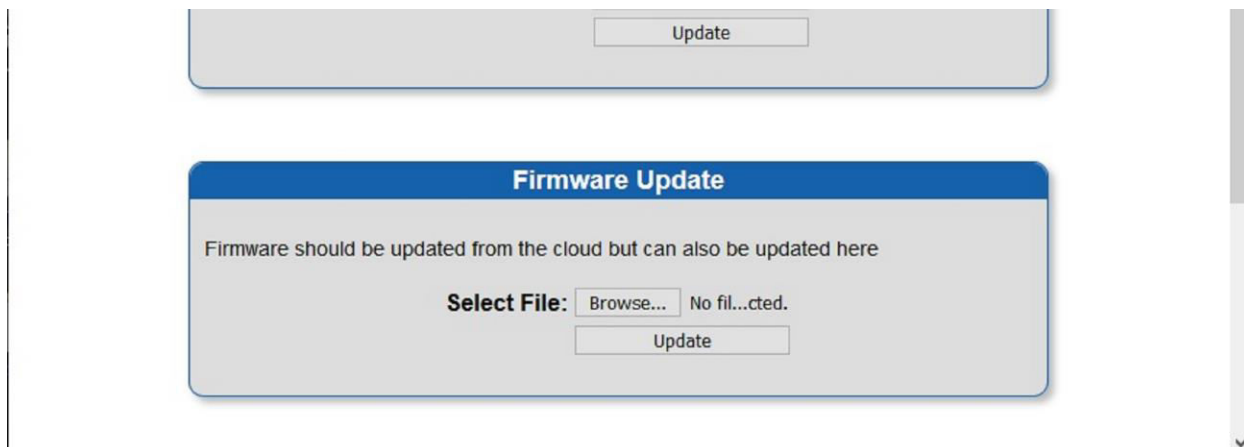
The screenshot displays the easyWISP web interface. At the top right, a status box shows the device ID: 63a7cddcf7, the 4WISP status: OK, and Internet access: YES. The main content area is divided into two sections. The first section, titled "Administrator Password Setup", contains a message: "A password is required to secure this page." Below this, there are input fields for Username (admin), Password (masked with asterisks), and Retype (masked with asterisks), followed by an "Update" button. The second section, titled "WAN Network Port Setup", contains a message: "These settings control how the gateway connects to the Internet". Below this, there are input fields for WAN Type (DHCP), MAC Address (00:0c:43:28:80:e7), IP Address (192.168.3.8), Netmask (255.255.255.0), and Gateway (192.168.3.1). A "Release / Renew" button is also present. A graphic representation of the device connectors is shown between the two sections, with labels for Internet, Power, LAN, LAN, LAN, and WAN.

Scroll down further to view the next box, the WAN network port setup. This is shown in the next screenshot. The default WAN setup is a DHCP client and so the WAN port may have already connected to the Internet if connected to an ISP router that provides a DHCP service. If the Internet access is showing not connected then configure the WAN port appropriately with a static IP for the ISP circuit provided.



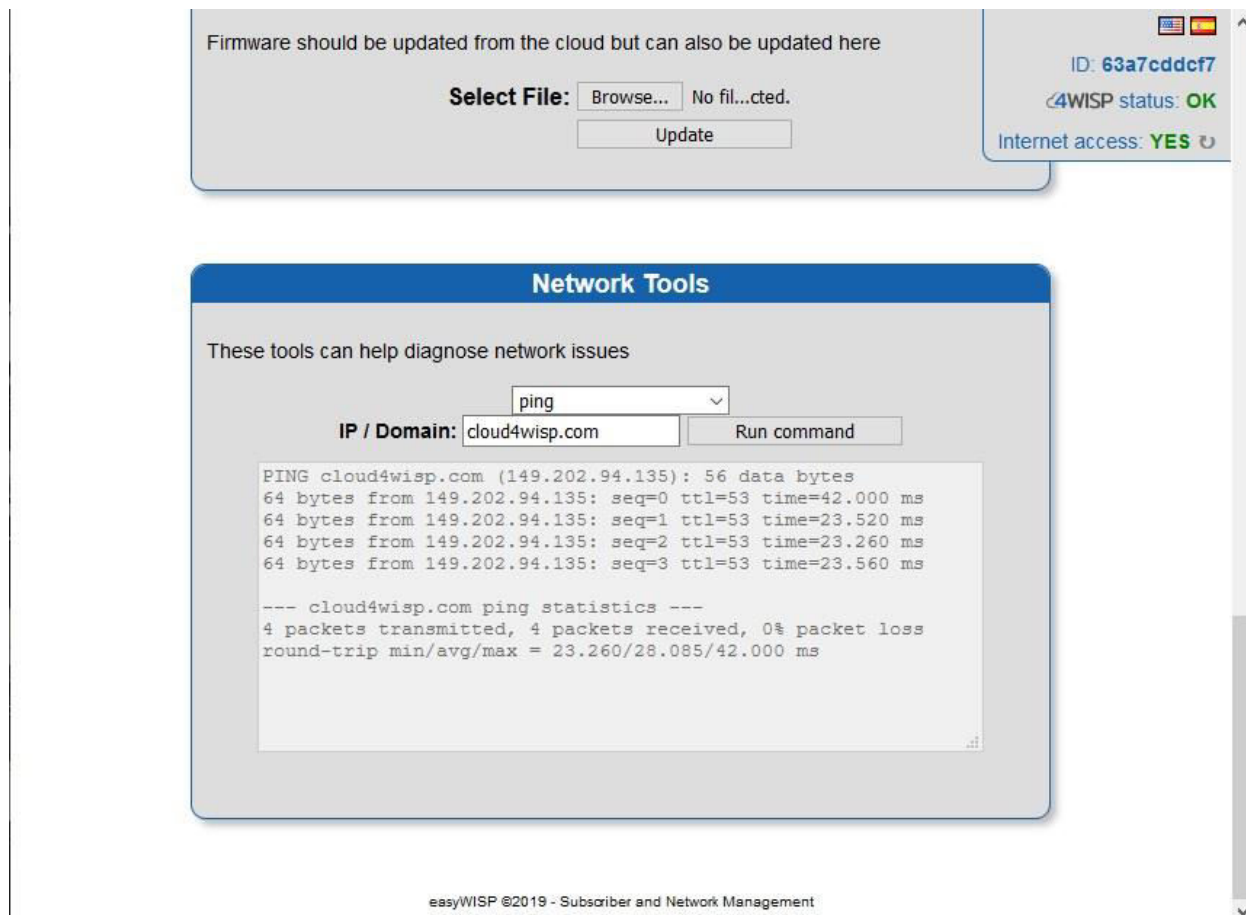
The screenshot shows the 'WAN Network Port Setup' configuration page. At the top, there is a 'Retype:' field with a placeholder '00 00 00 00 00 00' and an 'Update' button. To the right, a status bar displays 'ID: 63a7cddcf7', '4WISP status: OK', and 'Internet access: YES' with a green checkmark. Below this is a diagram of the device's ports: Internet, Power, Reset, four LAN ports, and a WAN port. The 'WAN Network Port Setup' box contains the following fields: 'WAN Type' (set to DHCP), 'Release / Renew' button, 'MAC Address' (00:0c:43:28:80:e7), 'IP Address' (192.168.3.8), 'Netmask' (255.255.255.0), 'Gateway' (192.168.3.1), 'DNS Server 1' (8.8.8.8), 'DNS Server 2' (8.8.4.4), and an 'Update' button.

When the WAN network port is correctly configured and the Internet access shows a green 'YES' then scroll the page down to see the next box, which is the firmware update box. This box is provided in case the easyWISP product cannot connect to the Cloud account and a firmware update is required. Ignore this box during this setup procedure, and update the firmware when the easyWISP controller is connected to the Cloud account.



The screenshot shows the 'Firmware Update' section. At the top, there is an 'Update' button. Below it, the 'Firmware Update' box contains the text 'Firmware should be updated from the cloud but can also be updated here'. It includes a 'Select File:' label, a 'Browse...' button, and the text 'No file selected.'. There is also an 'Update' button at the bottom of the box.

Scroll down the page to see the next box, this is the Network Tools box and is provided to diagnose network problems. This box can be used in conjunction with the easyWISP technical support, which is accessed through the support ticket system.



The screenshot displays the easyWISP web interface. At the top, there is a section for firmware updates with the text "Firmware should be updated from the cloud but can also be updated here". Below this, there is a "Select File:" label, a "Browse..." button, and a "No file...cted." message. An "Update" button is also present. To the right, a status box shows the device ID "63a7cddcf7", the "4WISP status: OK", and "Internet access: YES". Below this, the "Network Tools" section is highlighted with a blue header. It contains the text "These tools can help diagnose network issues". A dropdown menu is set to "ping". Below the dropdown, the "IP / Domain:" field contains "cloud4wisp.com", and a "Run command" button is to its right. The output of the ping command is displayed in a text area, showing the results of a ping to cloud4wisp.com (149.202.94.135). At the bottom of the interface, the text "easyWISP @2019 - Subscriber and Network Management" is visible.

Firmware should be updated from the cloud but can also be updated here

Select File: No file...cted.

ID: 63a7cddcf7
4WISP status: OK
Internet access: YES

Network Tools

These tools can help diagnose network issues

ping

IP / Domain:

```
PING cloud4wisp.com (149.202.94.135): 56 data bytes
64 bytes from 149.202.94.135: seq=0 ttl=53 time=42.000 ms
64 bytes from 149.202.94.135: seq=1 ttl=53 time=23.520 ms
64 bytes from 149.202.94.135: seq=2 ttl=53 time=23.260 ms
64 bytes from 149.202.94.135: seq=3 ttl=53 time=23.560 ms

--- cloud4wisp.com ping statistics ---
4 packets transmitted, 4 packets received, 0% packet loss
round-trip min/avg/max = 23.260/28.085/42.000 ms
```

easyWISP @2019 - Subscriber and Network Management

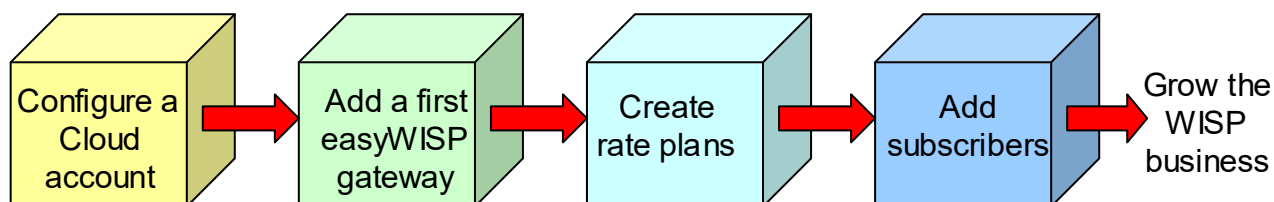
The screen shown above illustrates the use of the 'ping' command to test the circuit latency to the Cloud server.

Commands can be selected from a drop-down menu. EasyWISP technical support may request the WISP technical staff to run commands from this screen in order to diagnose a problem with the network.

After initialization of the easyWISP controller it can be assigned to the WISP's Cloud account. The device ID shown at the top of the page will be required to complete assigning the device to the Cloud account.

4.2. easyWISP Cloud configuration procedure.

The Cloud management system is designed for ease use. Four easy steps are required in order to start selling Internet services. The four steps are shown in the diagram below.



As the WISP business expands and new tower locations are obtained, easyWISP gateways will be added to the system. Subscriber plans may be added and changed with time. Subscriber plans may include special promotions for marketing the WISP services. Subscribers will be constantly added to the system on a daily basis as the WISP makes sales to new customers, or upgrades existing customers.

4.3. Create an easyWISP management account.

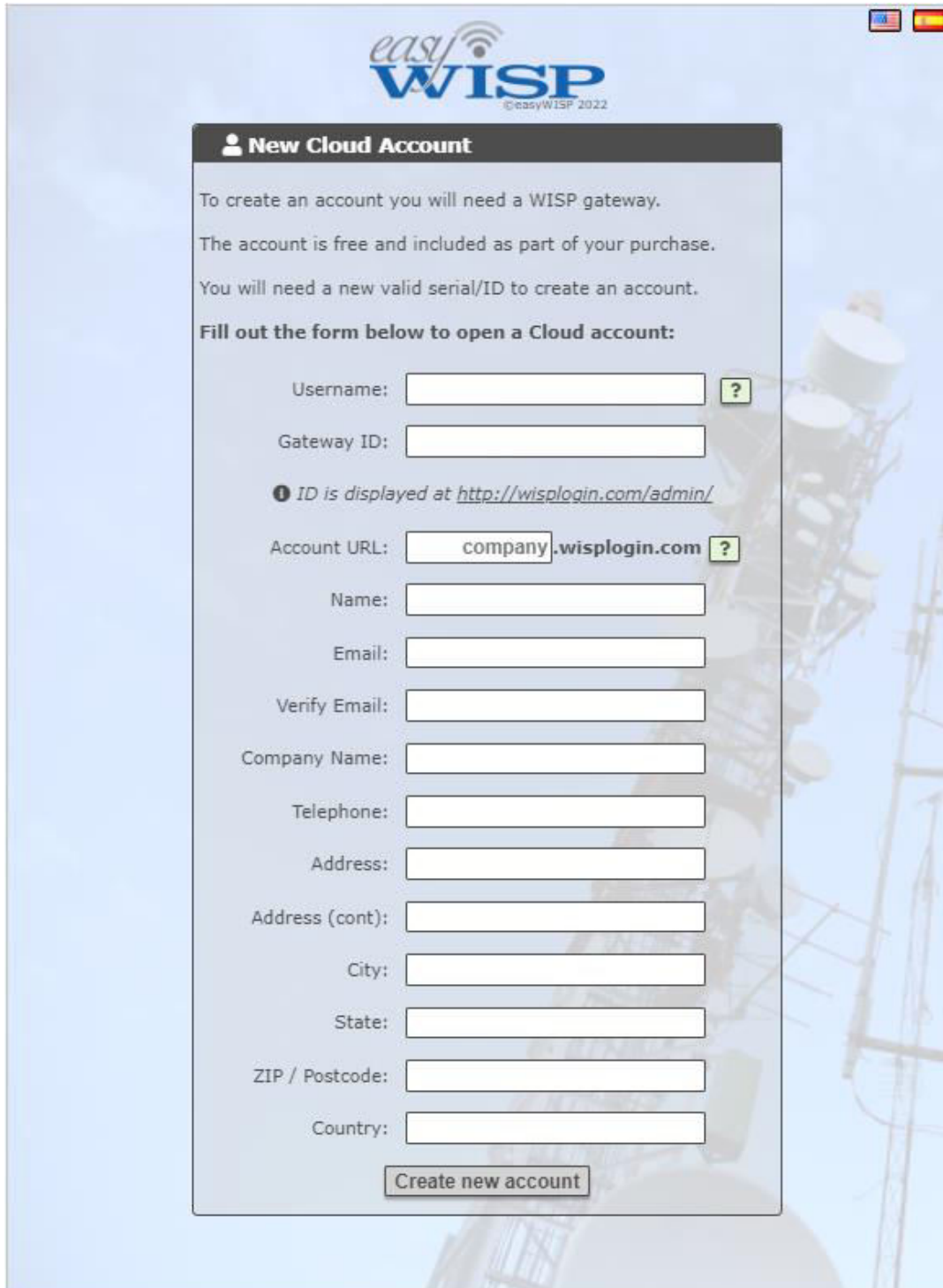
Creating a new WISP account using easyWISP is a simple process. First open a browser tab using the URL.

<https://admin.easywisp.com/>

The login screen is displayed. Select create new account.



Add a username and the first router gateway ID then enter the WISP's account information. Finally click 'create new account' and an email will be sent with the password for the account.



New Cloud Account

To create an account you will need a WISP gateway.
The account is free and included as part of your purchase.
You will need a new valid serial/ID to create an account.
Fill out the form below to open a Cloud account:

Username: ?

Gateway ID:

ID is displayed at <http://wisplogin.com/admin/>

Account URL: ?

Name:

Email:

Verify Email:

Company Name:

Telephone:

Address:

Address (cont):

City:

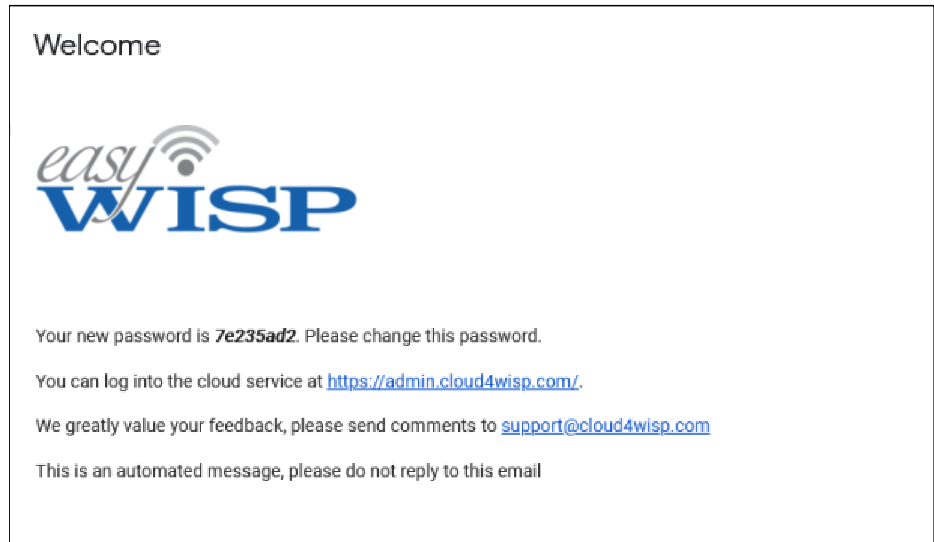
State:

ZIP / Postcode:

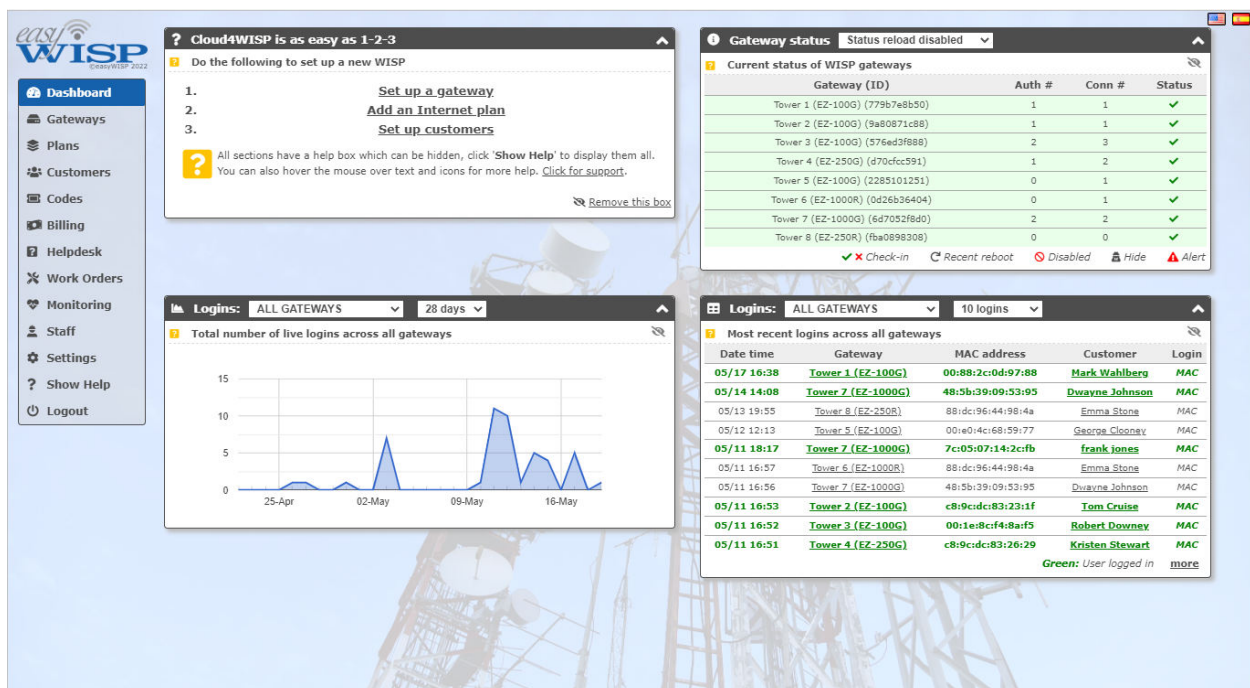
Country:

Create new account

After clicking the 'create new account' button the WISP will receive an email message with the login password.



Return to the login page to login with the username and password. On login the WISP will see the dashboard display. One router gateway will be shown, this is the router that was added when the account was created.

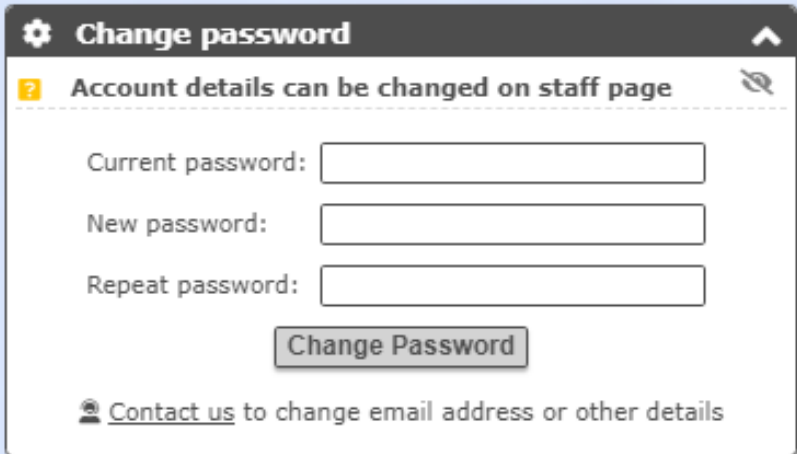


The dashboard display provides a summary of operations. The menu on the left of the screen selects the function required.

4.4. WISP management system initial setup.

The first step after creating a new account is to configure parameters that prepare the account ready for use. The menu items that should be configured first are settings, staff and monitoring. The first step with new account is to click on settings to change the password from that provided in the welcome message.

Settings menu. Change the manager password.



Change password

Account details can be changed on staff page

Current password:

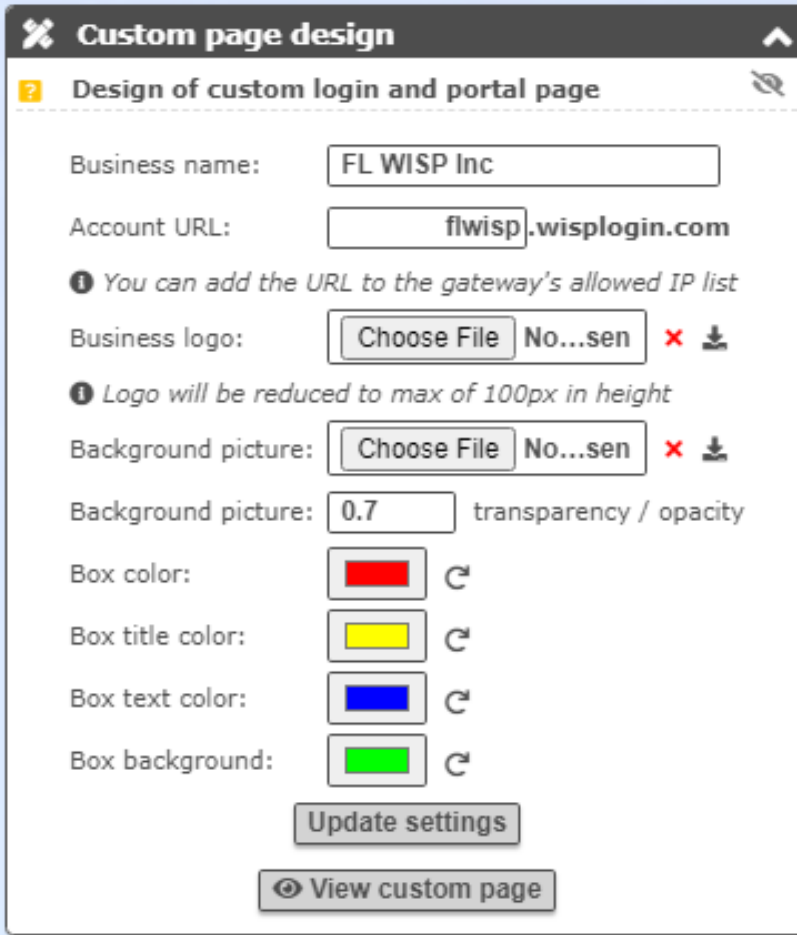
New password:

Repeat password:

Change Password

[Contact us](#) to change email address or other details

Settings menu. The captive portal design requires configuration.



Custom page design

Design of custom login and portal page

Business name:

Account URL:

You can add the URL to the gateway's allowed IP list

Business logo:

Logo will be reduced to max of 100px in height

Background picture:

Background picture: transparency / opacity

Box color:

Box title color:

Box text color:

Box background:

Update settings

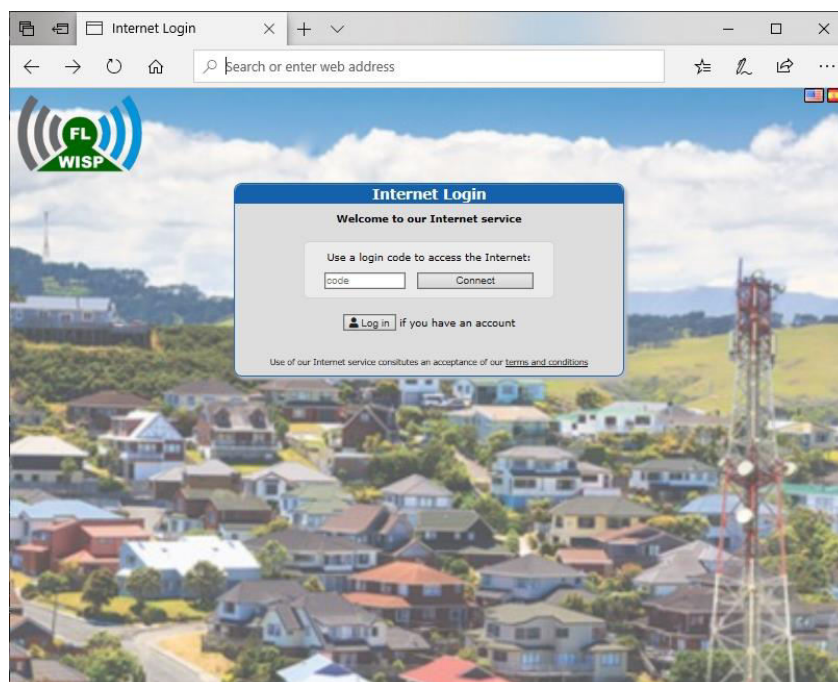
View custom page

The captive portal page is part of the Customer Relationship Management (CRM) interface and has a simple configuration process. The business name is entered for display on the page. A unique portal page is created using the WISP business name; this is the URL that WISP customers will use to access the CRM pages.

<business name>.wispllogin.com

The WISP can then upload a background picture or graphic, and the business logo. The WISP then chooses the transparency or opacity of the background and selects the colors of the login box. Finally the WISP clicks the update settings button to save the screen design. An example captive portal is shown in the figure below.

Example of a captive portal page design.

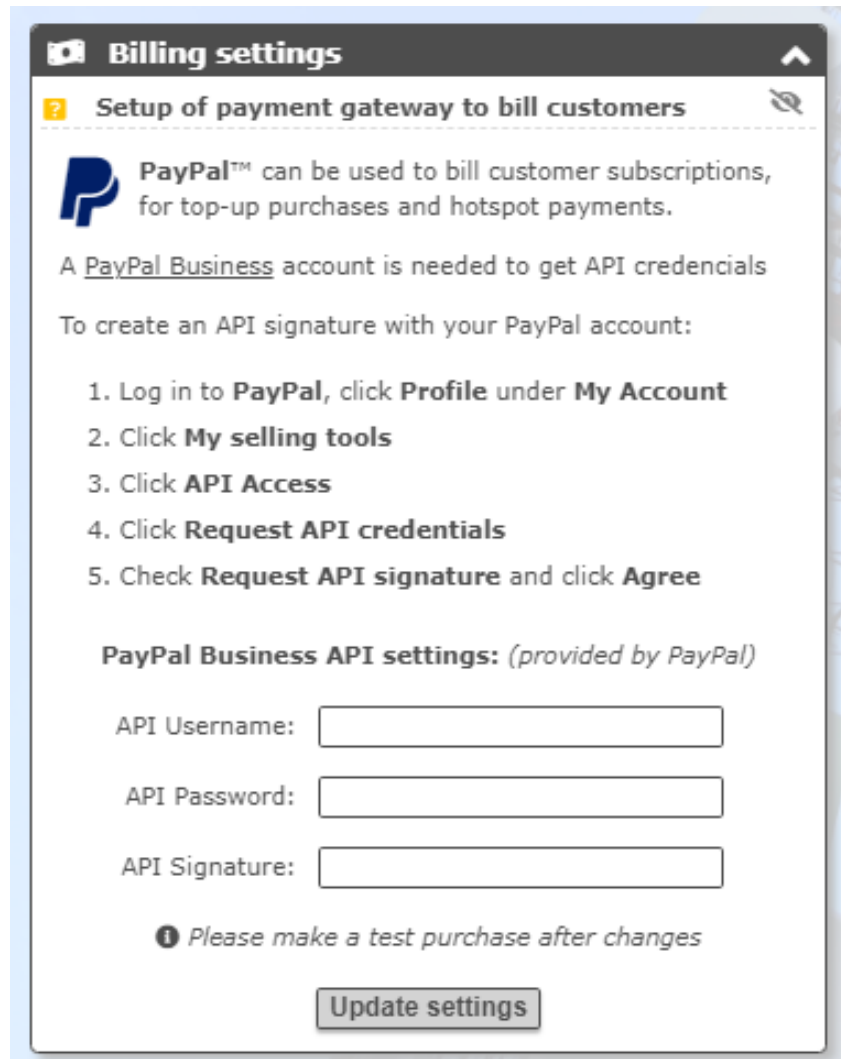


The third step in the settings process is the configuration of the PayPal® gateway. Customers are able to make credit card payments via the CRM portal, both for the payment of monthly invoices and to purchase access codes for mobile broadband on-demand billing. The WISP must have a PayPal® business account to receive payments using credit cards. A free PayPal® payment account cannot be used to receive credit card payments. The easyWISP system has a PayPal® gateway because PayPal® can be used in over 150 countries around the world. There are many other payment gateways but they are country specific. A future release of easyWISP will include a gateway for Oxxopay so that WISP's in Mexico and Colombia can receive cash payments through the Oxxopay network.

The PayPal® business account has three parameters which must be entered in the billing settings display; the username, the password and the signature which is an encryption key.

The billing settings data entry box is shown in the following figure.

Settings menu. Configure the PayPal® gateway to receive payments on-line.



Billing settings

Setup of payment gateway to bill customers

PayPal™ can be used to bill customer subscriptions, for top-up purchases and hotspot payments.

A PayPal Business account is needed to get API credentials

To create an API signature with your PayPal account:

1. Log in to **PayPal**, click **Profile** under **My Account**
2. Click **My selling tools**
3. Click **API Access**
4. Click **Request API credentials**
5. Check **Request API signature** and click **Agree**

PayPal Business API settings: *(provided by PayPal)*

API Username:

API Password:

API Signature:

i Please make a test purchase after changes

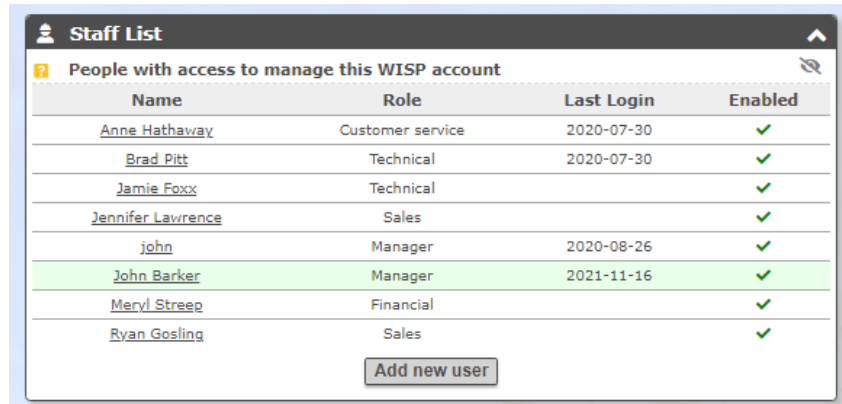
Update settings

The next step in the configuration process is to add the WISP staff to the system. Staff can be added at any time as the WISP business grows. When a member of staff is entered that person has to be given one of the following five roles. There is no limit to the number of people registered for each role.

- Manager
- Technical
- Customer service
- Financial
- Sales

Select staff in the main menu to display the list of staff. Click the button to add a new user.

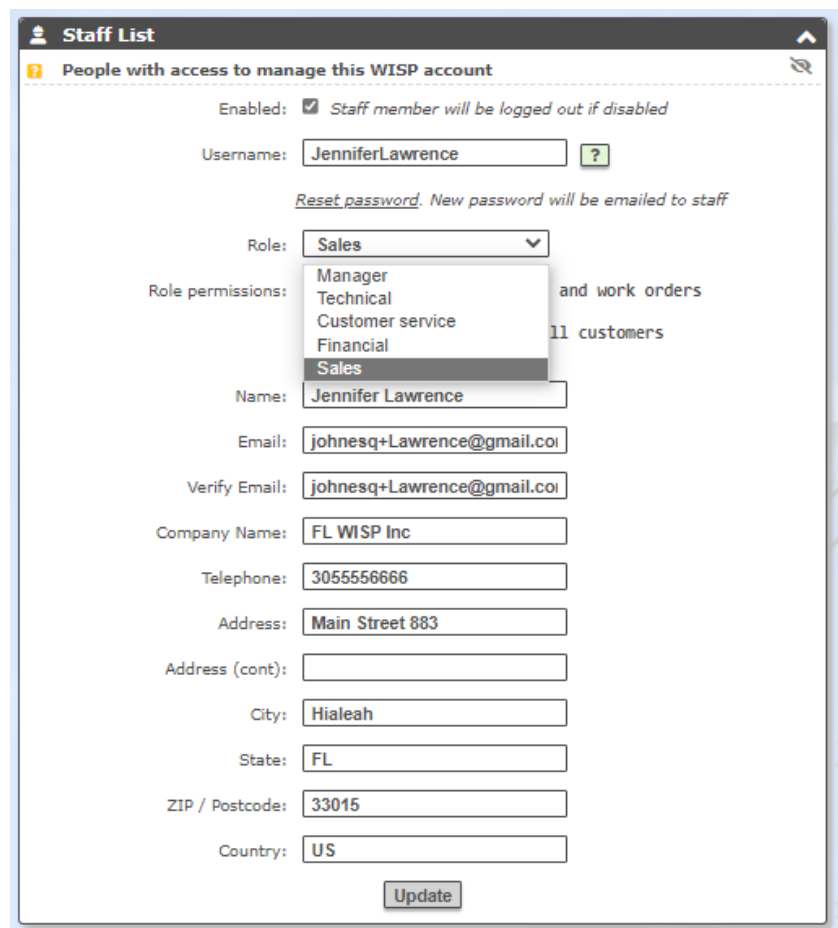
Staff menu. Display the staff list.



Name	Role	Last Login	Enabled
Anne Hathaway	Customer service	2020-07-30	✓
Brad Pitt	Technical	2020-07-30	✓
Jamie Foxx	Technical		✓
Jennifer Lawrence	Sales		✓
John	Manager	2020-08-26	✓
John Barker	Manager	2021-11-16	✓
Meryl Streep	Financial		✓
Ryan Gosling	Sales		✓

[Add new user](#)

Staff menu. Add a member of staff selecting the role for that member.



Staff List

People with access to manage this WISP account

Enabled: ☒ Staff member will be logged out if disabled

Username: ?

[Reset password](#). New password will be emailed to staff

Role: ▼

Role permissions: and work orders
 11 customers

Name:

Email:

Verify Email:

Company Name:

Telephone:

Address:

Address (cont):

City:

State:

ZIP / Postcode:

Country:

[Update](#)

The next step is to configure monitoring for the access control router that was added to the account when it was created. The purpose of monitoring is to send an email alert to the WISP staff if the access control router stops responding to the easyWISP. The reason for a failure to respond might be equipment failure, or a failure in the backhaul link to the tower. The technician will have to do further diagnostics to find the cause of the problem after the alert. When the access control router comes back online a second email message is sent out to advise that the equipment is now connected.

Click on the monitoring menu entry and the access control router gateway will be displayed on the list. Initially there will be only one entry in the list. Enter the email address to which the message will be sent and select the language for the message. Check the alert box for the device and select the downtime from the drop down menu. Downtime is the time that easyWISP waits before sending out an alert message and can be 5 minutes, 10 minutes or 15 minutes. The reason for this is there might be an intermittent connection and so the alarm will not be sent if this occurs. As access control routers are added to the account then monitoring is activated for each.

Monitoring menu.
Activate failure
monitoring for the
gateway, the
access control
router.



Monitoring settings

The monitor sends an alert when a gateway fails to check-in and another when it resumes.
The hide option removes a gateway from the dashboard, useful for prolonged outages.
The downtime defines how long to wait before alerting. Increase to reduce false alerts.

Alert email address:

Email language:

	Alert	Hide	Downtime
<u>Tower 1</u> (779b7e8b50)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5 mins
<u>Tower 2</u> (9a80871c88)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5 mins
<u>Tower 3</u> (576ed3f888)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5 mins
<u>Tower 4</u> (d70cfcc591)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5 mins

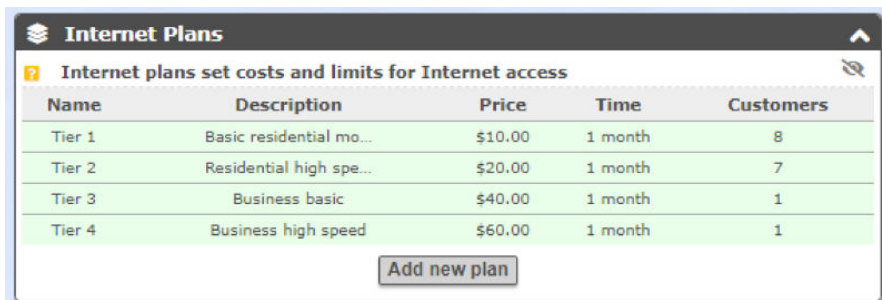
4.5. Add the rate plans.

Select the plans menu entry to configure the rate plans. Rate plans are designed for the WISP's target market and the services must meet the price performance expectations of the prospective customers. The process of calculating the rate plan charges was described in a previous section.

There is no limit to the number of rate plans that can be added and so the WISP can be very flexible with the services offered. Initially it will be useful for the WISP to configure additional rate plans to extend the price performance range of services to test the market and find which plans are the most popular. A price is set for each plan together with the billing cycle duration, usually set for 1 month. The maximum download and upload speeds are added to the plan.

The WISP might wish to set a data cap in addition to the speed limits in the case where the WISP wholesale Internet service includes charges per Gbyte of data. This is the case when using a geo-stationary satellite backhaul. Some wholesale providers also charge per Gbyte of data.

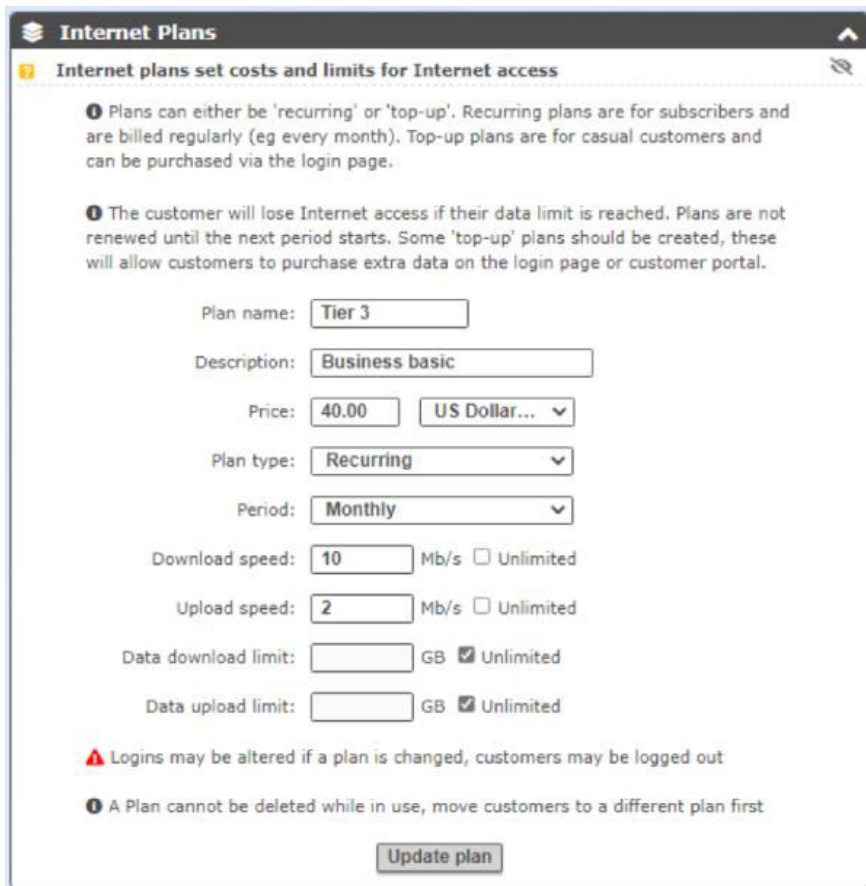
Click the plans menu entry to see the rate plans that have been configured.



Name	Description	Price	Time	Customers
Tier 1	Basic residential mo...	\$10.00	1 month	8
Tier 2	Residential high spe...	\$20.00	1 month	7
Tier 3	Business basic	\$40.00	1 month	1
Tier 4	Business high speed	\$60.00	1 month	1

[Add new plan](#)

Click the add new plan button to create a rate plan then complete the information requested. Finally click the update plan button.



Internet Plans

Internet plans set costs and limits for Internet access

Plans can either be 'recurring' or 'top-up'. Recurring plans are for subscribers and are billed regularly (eg every month). Top-up plans are for casual customers and can be purchased via the login page.

The customer will lose Internet access if their data limit is reached. Plans are not renewed until the next period starts. Some 'top-up' plans should be created, these will allow customers to purchase extra data on the login page or customer portal.

Plan name:

Description:

Price:

Plan type:

Period:

Download speed: Mb/s ☐ Unlimited

Upload speed: Mb/s ☐ Unlimited

Data download limit: GB ☒ Unlimited

Data upload limit: GB ☒ Unlimited

Logins may be altered if a plan is changed, customers may be logged out

A Plan cannot be deleted while in use, move customers to a different plan first

[Update plan](#)

The rate plan requires a name and description. Add the charge for the billing period and select the currency of the charge. Select the charge to be recurring or one time, and select the billing cycle period, which is usually monthly. Set the maximum download and upload speeds in Mbits/sec and if a data cap is required set the download and upload data caps in Gbytes.

4.6. Add subscribers.

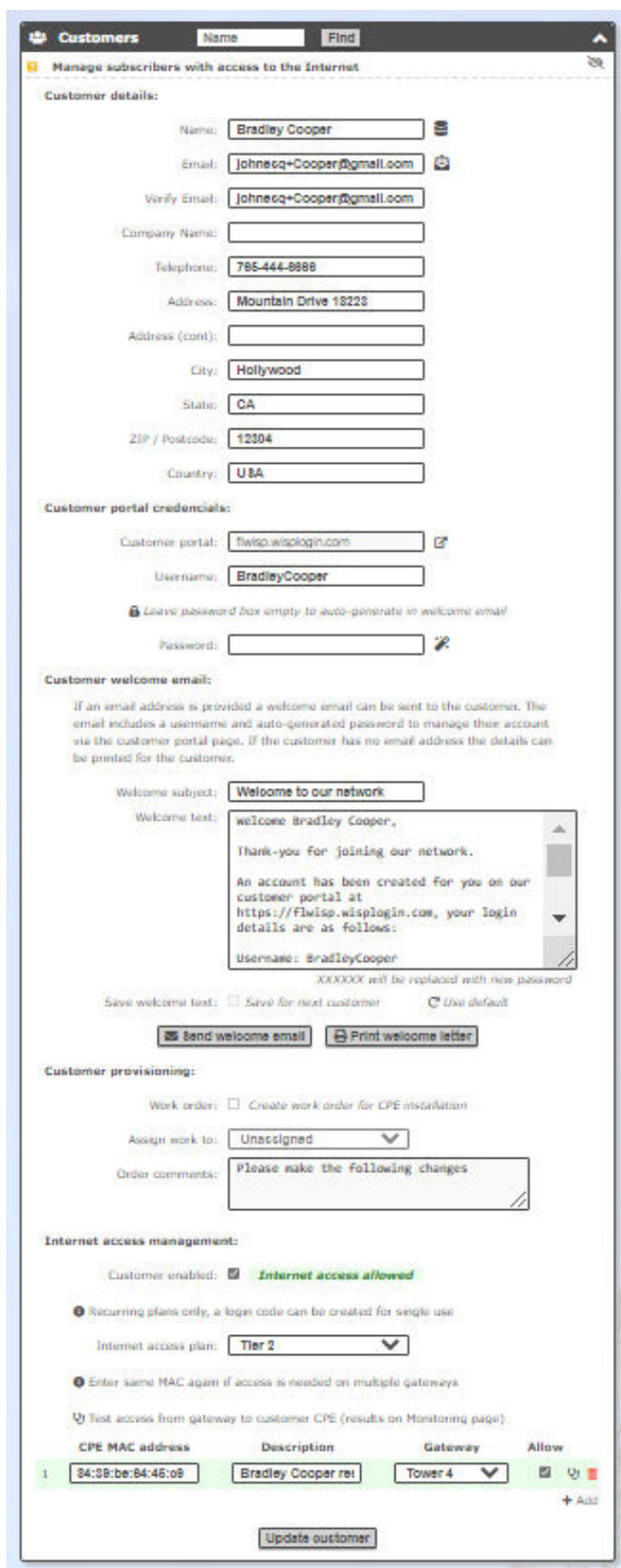
Click the customers menu entry then click add new customer to add the billing information for the first subscriber.

The form shown requires the customer billing information, name, address, telephone and email. Other information that is requested is described on the following pages.

The name of the access control router that will service the subscriber is selected in the gateway drop down menu so that the subscriber access control credentials will be sent to that router.

The MAC address of the CPE is used for subscriber authentication. An additional layer of authentication can be added with WPA2-enterprise authentication with the PtMP wireless communicating with a RADIUS server.

A completed customer record is shown in the figure.



Customers Name Find

Manage subscribers with access to the Internet

Customer details:

Name:

Email:

Verify Email:

Company Name:

Telephone:

Address:

Address (cont):

City:

State:

ZIP / Postcode:

Country:

Customer portal credentials:

Customer portal:

Username:

☐ Leave password box empty to auto-generate in welcome email

Password:

Customer welcome email:

If an email address is provided a welcome email can be sent to the customer. The email includes a username and auto-generated password to manage their account via the customer portal page. If the customer has no email address the details can be printed for the customer.

Welcome subject:

Welcome text:

welcome Bradley Cooper,

Thank-you for joining our network.

An account has been created for you on our customer portal at <https://fwisp.wisplogin.com>, your login details are as follows:

Username: BradleyCooper

XXXXXXXX will be replaced with new password

Save welcome text: ☐ Save for next customer ☒ Use default

Customer provisioning:

Work order: ☐ Create work order for CPE installation

Assign work to:

Order comments:

Please make the following changes

Internet access management:

Customer enabled: ☒ Internet access allowed

☐ Recurring plans only, a login code can be created for single use

Internet access plan:

☐ Enter same MAC again if access is needed on multiple gateways

☐ Test access from gateway to customer CPE (results on Monitoring page)

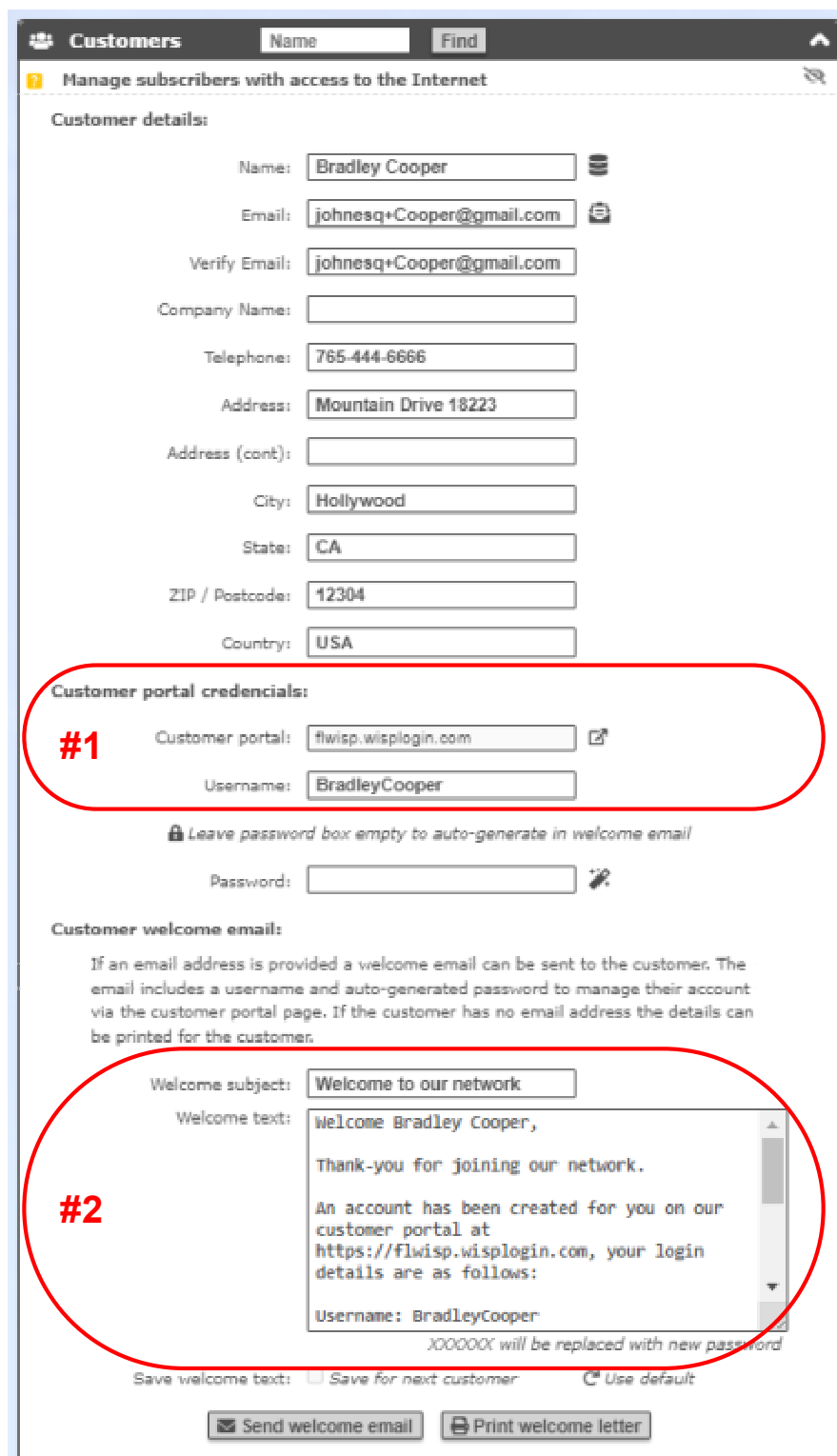
	CPE MAC address	Description	Gateway	Allow
1	<input type="text" value="84:38:be:84:45:08"/>	Bradley Cooper res	<input type="text" value="Tower 4"/>	<input checked="" type="checkbox"/> <input type="checkbox"/>

The sales person will complete the customer account form. It is likely that the sales person is sitting in front of the customer during this process and so can ask the customer for billing information to complete the form.

Important features are highlighted when creating a new customer record.

#1. The customer portal is the subscriber login to the customer relationship management (CRM) system. easyWISP will generate a password and send an email to the customer. The password can be entered manually if desired.

#2. The text of the customer messages can be edited. Click one of the buttons below to either send the message by email or print the message and give to the customer.



Customers Name Find

Manage subscribers with access to the Internet

Customer details:

Name:

Email:

Verify Email:

Company Name:

Telephone:

Address:

Address (cont):

City:

State:

ZIP / Postcode:

Country:

Customer portal credentials:

#1 Customer portal:

Username:

Leave password box empty to auto-generate in welcome email

Password:

Customer welcome email:

If an email address is provided a welcome email can be sent to the customer. The email includes a username and auto-generated password to manage their account via the customer portal page. If the customer has no email address the details can be printed for the customer.

Welcome subject:

Welcome text:

Welcome Bradley Cooper,
Thank-you for joining our network.
An account has been created for you on our customer portal at <https://flwisp.wisplogin.com>, your login details are as follows:
Username: BradleyCooper
XXXXXXXX will be replaced with new password

Save welcome text: ☐ Save for next customer ☒ Use default

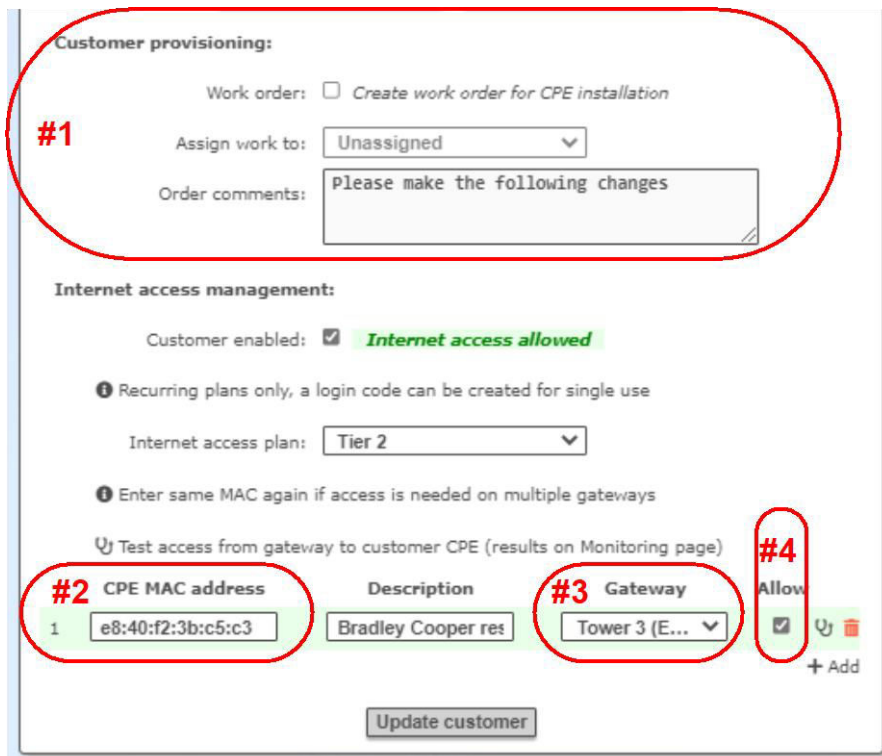
Figure 9.13.3. More important features are highlighted when creating a new customer record.

#1. Initiate an installation work order and direct to a technician.

#2. Configure MAC authentication, set the CPE MAC address.

#3. Set the access control router (tower) that the customer will connect to.

#4. Activate the customer, the billing system will allow the customer to have Internet access.



Customer provisioning:

Work order: ☐ Create work order for CPE installation

Assign work to: Unassigned

Order comments:

Internet access management:

Customer enabled: ☒ **Internet access allowed**

Recurring plans only, a login code can be created for single use

Internet access plan: Tier 2

Enter same MAC again if access is needed on multiple gateways

Test access from gateway to customer CPE (results on Monitoring page)

#2 CPE MAC address	Description	#3 Gateway	#4 Allow
1 e8:40:f2:3b:c5:c3	Bradley Cooper res	Tower 3 (E...	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

Click the customer's menu entry to see the list of customers. Billing dates shown in red are accounts past due and the payment has not been received. The accounts with a red '0' MAC address are customers that have purchased the service but have not been installed and so no CPE MAC address has been added yet.

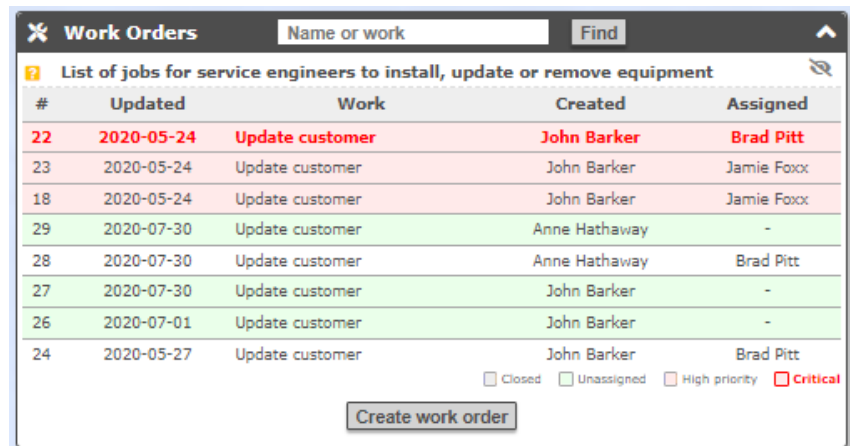
List of subscribers serviced by all towers. The rate plan that the subscriber purchased is shown next to the subscribers name.

Customers					
Name / Company		Plan	Billed	MACs	
Bradley Cooper	✓ Tier 2	2021-10-25	1		
Channing Tatum	✓ Tier 1	2021-11-18	1		
Christian Bale	✓ Tier 2	2021-11-18	1		
Daniel Craig	✓ Tier 2	2021-10-21	1		
Dwayne Johnson / DEF News ...	✓ Tier 4	2021-10-25	1		
Emma Stone / ES Representa...	✓ Tier 3	2021-10-25	1		
Frank / Enterprises LLC	✓ Tier 2	2021-09-27	1		
frank jones	✓ Tier 1	2021-10-28	0		
George Clooney	✓ Tier 1	2021-10-25	1		
Kristen Stewart	✓ Tier 2	2021-11-11	1		
Mark Wahlberg	✓ Tier 1	2021-10-21	1		
nuvonet / nuvonet	✓ Tier 1	2021-11-01	1		
Robert Downey	✓ Tier 1	2021-11-11	1		
Sandra Bullock	✓ Tier 2	2021-11-18	1		
susan smith	✓ Tier 1	2021-10-28	0		
Tom Cruise	✓ Tier 2	2021-11-10	1		
Victor / System	✓ Tier 1	2021-08-28	0		

4.7. Work orders for subscriber provisioning.

When a customer is added to the service the customer profile box for 'create work order' is checked, which initiates the provisioning process. Select the work orders menu entry to see the list of work orders.

The list of outstanding work orders showing the status and priority of each.



Work Orders Name or work Find

List of jobs for service engineers to install, update or remove equipment

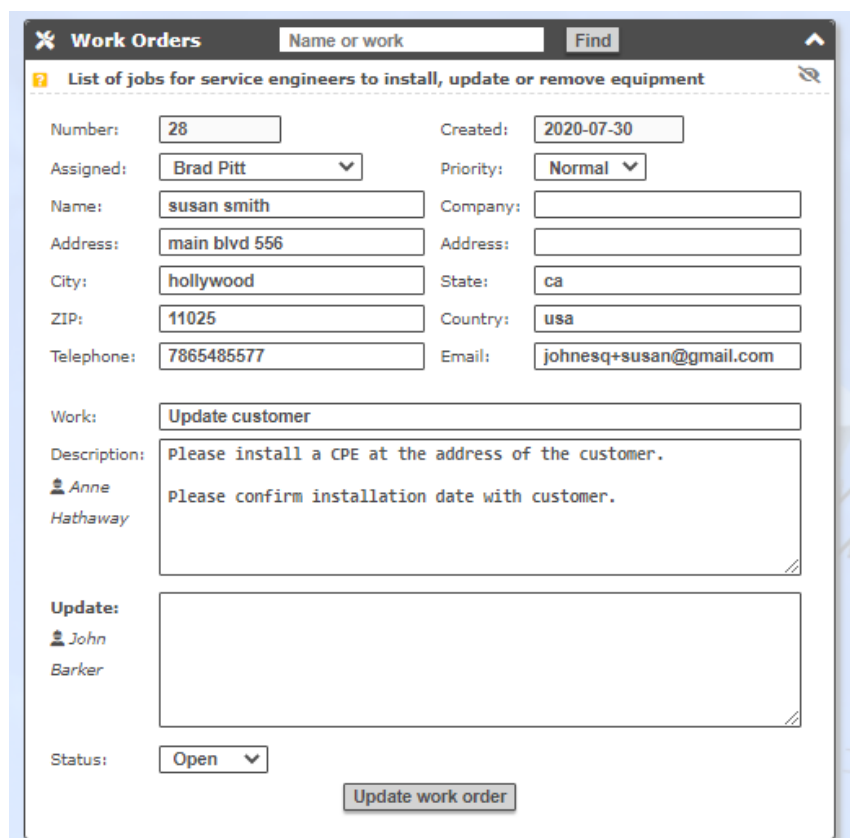
#	Updated	Work	Created	Assigned
22	2020-05-24	Update customer	John Barker	Brad Pitt
23	2020-05-24	Update customer	John Barker	Jamie Foxx
18	2020-05-24	Update customer	John Barker	Jamie Foxx
29	2020-07-30	Update customer	Anne Hathaway	-
28	2020-07-30	Update customer	Anne Hathaway	Brad Pitt
27	2020-07-30	Update customer	John Barker	-
26	2020-07-01	Update customer	John Barker	-
24	2020-05-27	Update customer	John Barker	Brad Pitt

☐ Closed
 ☐ Unassigned
 ☐ High priority
 ☒ Critical

Create work order

Click on a work order to see the information in the work order. The first task of technical staff each day is to check outstanding work orders and complete the work required. A new customer installation will require that sales or customer support staff agrees a date and time with the customer for the installation and adds this information to the work order to instruct the technician.

A work order showing the request for a customer installation.



Work Orders Name or work Find

List of jobs for service engineers to install, update or remove equipment

Number: 28 Created: 2020-07-30
 Assigned: Brad Pitt Priority: Normal
 Name: susan smith Company:
 Address: main blvd 556 Address:
 City: hollywood State: ca
 ZIP: 11025 Country: usa
 Telephone: 7865485577 Email: johnesq+susan@gmail.com

Work: Update customer

Description: Please install a CPE at the address of the customer.
 Anne Hathaway Please confirm installation date with customer.


Update: John Barker

Status: Open

Update work order

When the technician goes to the customer premises to install the CPE wireless and wireless router the technician will complete the customer profile by adding the CPE MAC address, the tower name (access control router) if not already entered, and activate the customer. The technician will then demonstrate the Internet connection to the customer and have the customer to sign off on the work order to accept the installation.

The customer 'allow' box is checked by the technician when the installation is complete.



Enter same MAC again if access is needed on multiple gateways

Test access from gateway to customer CPE (results on Monitoring page)

	CPE MAC address	Description	Gateway	Allow
1	84:39:be:64:45:c9	Bradley Cooper res	Tower 4	<input checked="" type="checkbox"/>

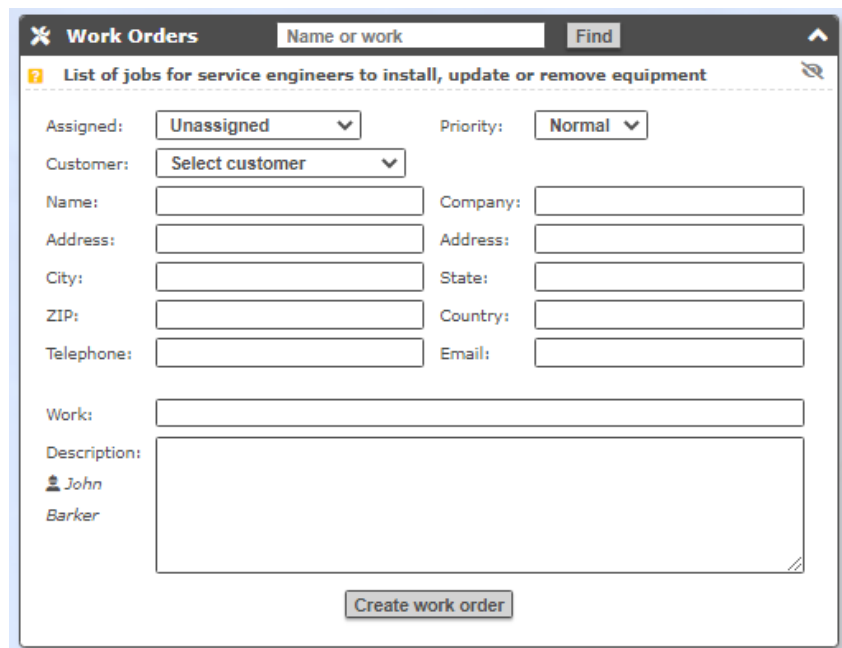
+ Add

Update customer

Most work orders are created when a customer is added to the service, however it is also necessary to create a work order when network maintenance is required or a network component has failed and requires replacing. In this case the manager may create the work order and assign to one of the technicians.

To create a work order select the work orders menu entry then click the button to 'create a work order'. The screen shown below will be displayed and the manager or other employee will complete the information required. The work order is given a title and a description. The priority is assigned to the work order, which can be either; low, normal, high or critical. A failure of a network component will have 'critical' selected while a tower inspection might have 'normal' selected.

The form to create a work order.



Work Orders Name or work Find

List of jobs for service engineers to install, update or remove equipment

Assigned: Unassigned Priority: Normal

Customer: Select customer

Name: Company:

Address: Address:

City: State:

ZIP: Country:

Telephone: Email:

Work:

Description:

John Barker

Create work order

4.8. Managing the fixed broadband subscriber billing cycle.

Fixed broadband customers pay each billing cycle for the Internet service and remain connected to the Internet unless the bill is not paid. A billing cycle is usually set to one calendar month.

Click the menu billing tab to see the first box with the list of subscribers with the billing status of each, and the second box with a list of invoices that have been issued. When the customer is paid up to date the customer entry is shown in green. If the customer bill is past due and payment has not been received then the customer entry is shown in red. One task of the financial staff member is to check this list each day and follow up with customers who have not paid their bill.

The list of subscribers displayed when the billing tab is clicked. Past due late payments are shown in red.



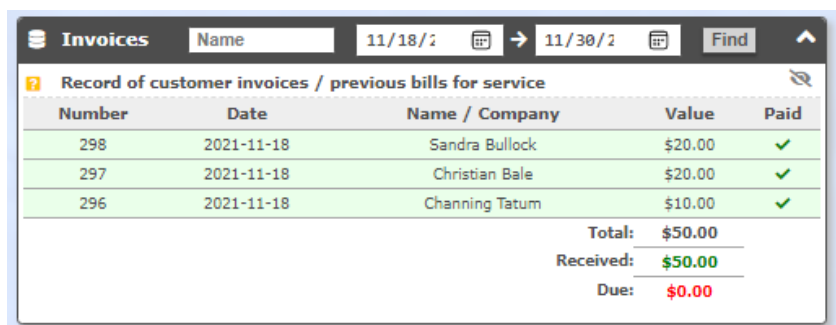
Name / Company	Enabled	Billed	Due
Bradley Cooper	✓	2021-11-17	2021-11-25
Channing Tatum	✓	2021-11-18	2021-12-18
Christian Bale	✓	2021-11-18	2021-12-18
Daniel Craig	✓	2021-11-17	2021-11-21
Dwayne Johnson / DEF News ...	✓	2021-11-17	2021-11-25
Emma Stone / ES Representa...	✓	2021-11-17	2021-11-25
Frank / Enterprises LLC	✗	2021-11-17	2021-10-27
frank jones	✓	2021-11-17	2021-11-28
George Clooney	✓	2021-11-17	2021-11-25
Kristen Stewart	✓	2021-11-17	2021-12-11
Mark Wahlberg	✓	2021-11-17	2021-11-21
nuvonet / nuvonet	✓	2021-11-17	2021-12-01
Robert Downey	✓	2021-11-17	2021-12-11
Sandra Bullock	✓	2021-11-18	2021-12-18
susan smith	✓	2021-11-17	2021-11-28
Tom Cruise	✓	2021-11-17	2021-12-10
Victor / System	✗	2021-11-17	2021-09-28

Customers can also be billed independently for Internet and issued with a login code

Bill for a login code

The second box shows the list of invoices issued. The date range can be selected to display invoices for a specific time period.

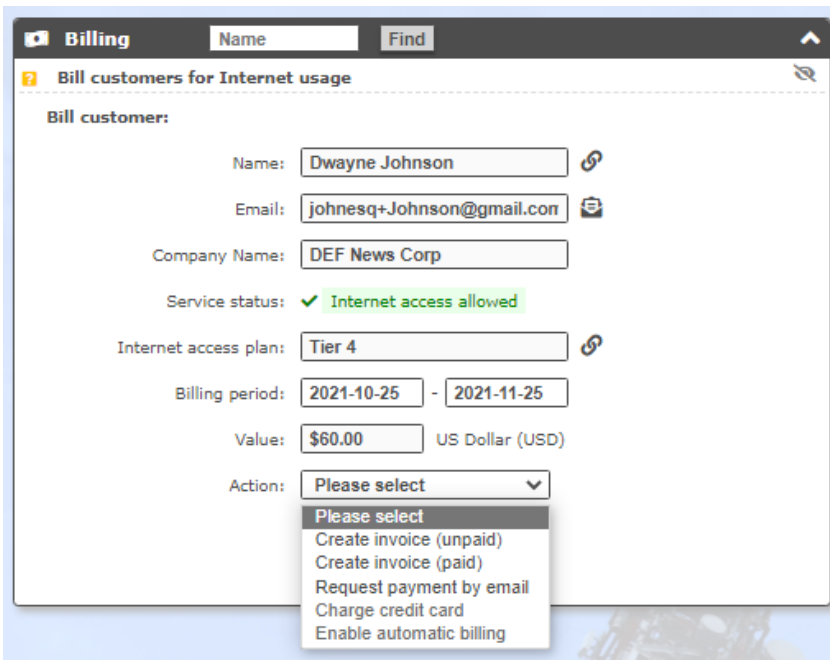
The list of paid invoices displayed when the billing tab is clicked. Any unpaid invoices are shown in red.



Number	Date	Name / Company	Value	Paid
298	2021-11-18	Sandra Bullock	\$20.00	✓
297	2021-11-18	Christian Bale	\$20.00	✓
296	2021-11-18	Channing Tatum	\$10.00	✓
Total:			\$50.00	
Received:			\$50.00	
Due:			\$0.00	

Click on a customer entry to select a billing process for that customer. Select from; create unpaid invoice, create paid invoice, request payment by email message, charge credit card, enable automatic billing.

The customer billing entry is selected for processing. Choose one of the options in the drop-down menu. For example print an unpaid invoice to send to the customer, and when the customer's payment is received convert the invoice to paid, which also sets the account as paid.



Billing Name Find

Bill customers for Internet usage

Bill customer:

Name: Dwayne Johnson

Email: johnesq+Johnson@gmail.com

Company Name: DEF News Corp

Service status: ✓ Internet access allowed

Internet access plan: Tier 4

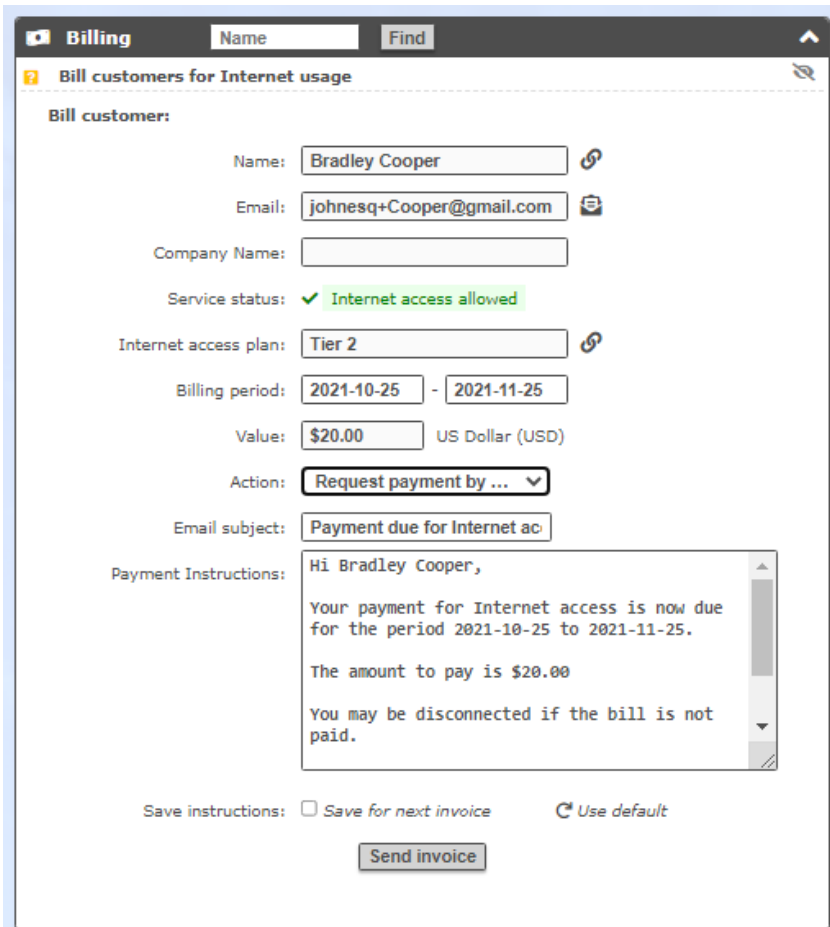
Billing period: 2021-10-25 - 2021-11-25

Value: \$60.00 US Dollar (USD)

Action: Please select

- Please select
- Create invoice (unpaid)
- Create invoice (paid)
- Request payment by email
- Charge credit card
- Enable automatic billing

Select the option to send a request for payment by email, the message can be edited and saved then used as the default message to customers.



Billing Name Find

Bill customers for Internet usage

Bill customer:

Name: Bradley Cooper

Email: johnesq+Cooper@gmail.com

Company Name:

Service status: ✓ Internet access allowed

Internet access plan: Tier 2

Billing period: 2021-10-25 - 2021-11-25

Value: \$20.00 US Dollar (USD)

Action: Request payment by ...


Email subject: Payment due for Internet ac

Payment Instructions: Hi Bradley Cooper,
Your payment for Internet access is now due for the period 2021-10-25 to 2021-11-25.
The amount to pay is \$20.00
You may be disconnected if the bill is not paid.

Save instructions: ☐ Save for next invoice ☒ Use default

Send invoice

Select the option to print an invoice. The invoice can be printed for posting or downloaded to send as an email attachment.



Fire4 Systems Inc
 6073 nw 167 st unit c12
 hialeah
 FL
 33015
 US

 7863585407
 john@fire4.com

INVOICE

Date: 2021-11-18

Number: 298

Terms: Paid

Bill to: Sandra Bullock
Sea View Road 5566
Hollywood
CA
10119
USA

Description	Value
Internet access plan: Residential high speed	\$20.00
Billing period: 2021-10-18 → 2021-11-18	
Subtotal:	\$20.00
Tax:	\$0.00
Total:	\$20.00

Comments:

Each day the financial staff must check the list of subscribers for billing due dates. The staff will send out an invoice before the due date, this period depends on the WISP, and can be 15 days. The financial staff will check each day for payments received and note a payment receipt on the customers account by clicking on the paid invoice. The customer can access the paid invoice that is generated via the CRM portal login. If a customer fails to pay an invoice by the due date then the customer loses access to the Internet because the billing system disables access, but the customer does have access to the CRM portal. When the customer account is marked as paid the Internet access is restored by the billing system.

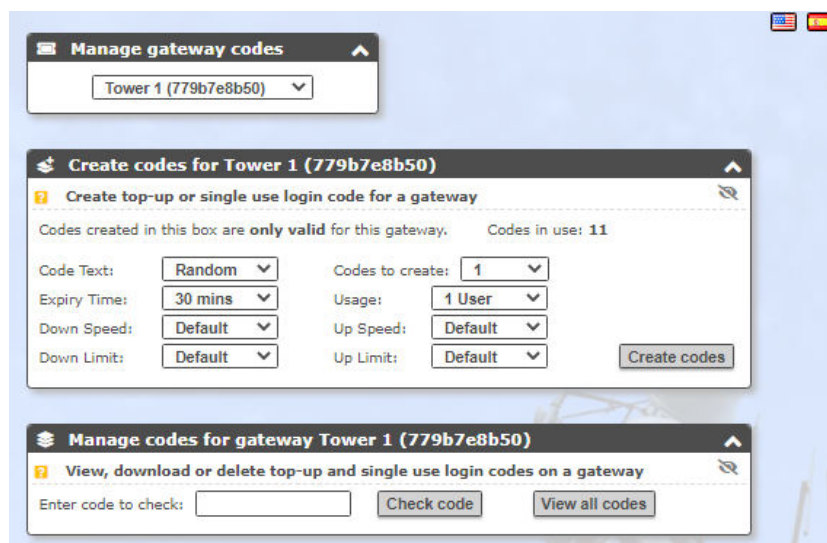
The billing system is very easy to use and requires very little staff training. The manager must check the billing display daily to follow up with staff procedures.

4.9. Managing the mobile broadband on-demand billing.

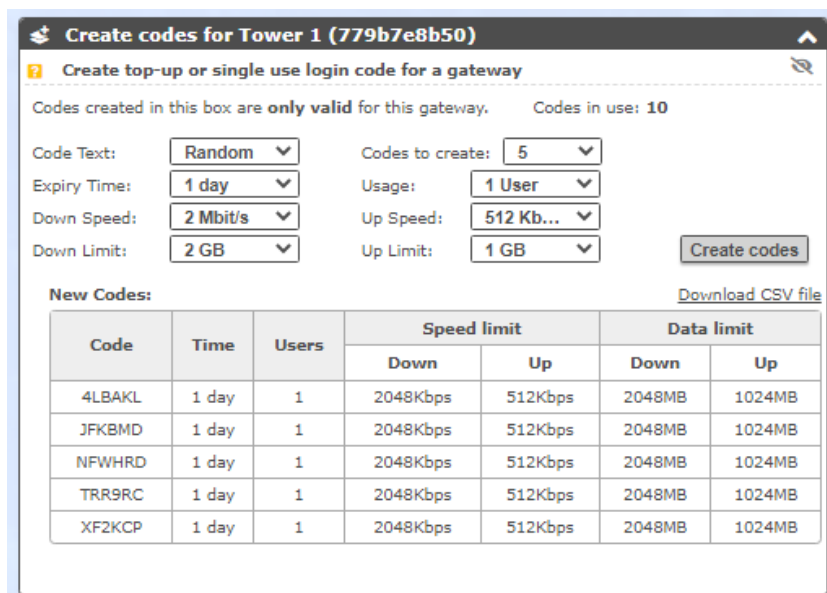
The mobile broadband on-demand billing requires access codes to be generated by the WISP then downloaded and saved in a comma separated value (CSV) format. The access codes can then be printed onto vouchers or scratch cards for sale to customers. Customers can also purchase access codes through the CRM portal and pay on-line using a credit card.

The mobile broadband service will be provided via an unencrypted wireless access point and will be a connection over a short range of a few hundred meters, as customers will be connecting with mobile devices.

Select the codes option in the menu then select the access control router gateway where the code will be used.

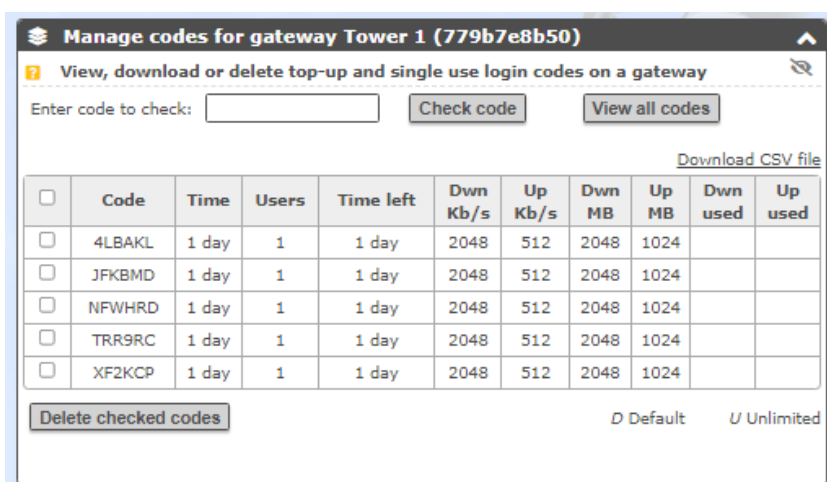


Select the parameters for the codes to be generated; the type of code (random or custom), the number of codes if random, the code name if custom, the code duration, the number of users per code, the maximum download and upload speeds, and the download and upload data limits. Then click the 'create codes' button.



Code	Time	Users	Speed limit		Data limit	
			Down	Up	Down	Up
4LBAKL	1 day	1	2048Kbps	512Kbps	2048MB	1024MB
JFKBMD	1 day	1	2048Kbps	512Kbps	2048MB	1024MB
NFWHRD	1 day	1	2048Kbps	512Kbps	2048MB	1024MB
TRR9RC	1 day	1	2048Kbps	512Kbps	2048MB	1024MB
XF2KCP	1 day	1	2048Kbps	512Kbps	2048MB	1024MB

Click the 'view all codes' button to show a list of all codes that have been generated. Download the codes for printing.

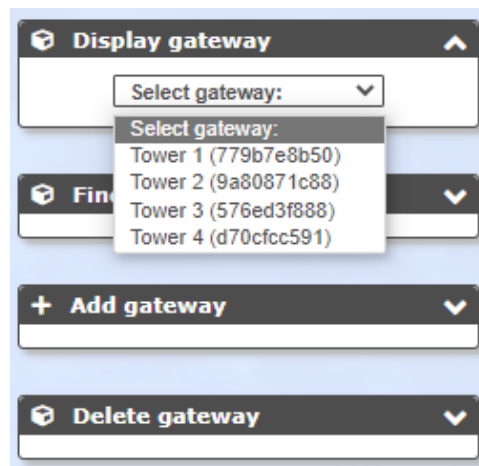


<input type="checkbox"/>	Code	Time	Users	Time left	Dwn Kb/s	Up Kb/s	Dwn MB	Up MB	Dwn used	Up used
<input type="checkbox"/>	4LBAKL	1 day	1	1 day	2048	512	2048	1024		
<input type="checkbox"/>	JFKBMD	1 day	1	1 day	2048	512	2048	1024		
<input type="checkbox"/>	NFWHRD	1 day	1	1 day	2048	512	2048	1024		
<input type="checkbox"/>	TRR9RC	1 day	1	1 day	2048	512	2048	1024		
<input type="checkbox"/>	XF2KCP	1 day	1	1 day	2048	512	2048	1024		

Delete checked codes D Default U Unlimited

4.10. Gateway configuration and traffic information.

Each access control router gateway can be monitored and configured. Click the 'gateway' menu entry then select the gateway to be displayed from the drop down list. This screen is also used to find a gateway, add a gateway and delete a gateway. When a gateway has been selected the configuration parameters for that gateway are displayed.



Display gateway

Select gateway: ▼

Select gateway:

- Tower 1 (779b7e8b50)
- Tower 2 (9a80871c88)
- Tower 3 (576ed3f888)
- Tower 4 (d70cfcc591)

+ Add gateway ▼

Delete gateway ▼

The access control router gateway parameters are displayed as a series of boxes that can be opened as required. The access control router gateway status box is shown opened to display the basic parameters of the gateway. Note that the access control router gateway firmware is updated automatically by the easyWISP system. Each box is described in the following pages.



Display gateway

Tower 1 (779b7e8b50) ↻

Gateway status

Public IP address:	98.203.45.175	Firmware:	1.3.9mt
MAC address:	70:b3:d5:e6:94:7e	Enabled:	Yes
Hardware:	EasyWISP EZ-100G	Uptime:	2d 0h 28m 16s 🔴

Gateway settings ▼

Customer access ▼

Users: 24 hours ▼

Performance: 24 hours ▼

WAN usage: 24 hours ▼

Authenticated users (logged in) ▼

Connected users (using the gateway) ▼

MAC addresses ▼

IP addresses and web sites ▼

The easyWISP gateway configuration includes a list of parameters that can be configured via the Cloud for each easyWISP access controller. The parameters are listed below:

- Verify the gateway configuration parameters.
- Remotely reboot the gateway.
- Set a name for the gateway.
- Change administrator password.
- Configure the WAN network interface as a DHCP client or with a static IP address.
- Configure the LAN port settings.
- Block access to private IP ranges.
- Port forward configuration; add up to 250 device port forward rules.
- Allowed IP list, allows access to an IP or domain name.
- Blocked IP list, blocks access to an IP or domain name.
- Allowed MAC list, allows a device MAC address to bypass authentication.
- Blocked MAC list, blocks a device MAC address when attempting authentication.

The gateway settings box permits the network configuration parameters of the access control router to be changed. Each gateway is given an easily recognizable name (e.g. Tower 1) and the password of the gateway can be changed.

The WAN port settings will have been configured when the easyWISP or Mikrotik access control router was installed and can be modified here if required. The WAN settings will have been set either for a static public IP or as a DHCP client installed behind a network router with a private address range. If a mistake is made when modifying the WAN settings then contact with the device will be lost and the technician will have to go to the tower to reset the WAN settings.

The LAN port settings always provide a DHCP service for CPE devices configured as routers. The CPE devices can be configured with static IP's however each IP must be within the LAN subnet range but outside the DHCP range. The DHCP range will require changing if CPE devices are configured with static IP's.

The gateway settings can be viewed via the Cloud. The access control router gateway settings box shown on the next page permits changes to the gateway parameters.

Gateway settings

Custom login page and network settings for gateway

Name:

Hostname:

Login page: [Add a custom page](#)

Admin Password: Repeat:

WAN port settings: ⚡ Change will reboot gateway and log out users

⚠ Invalid WAN settings may require a site visit to restore cloud access!

Type:

IP address:

Netmask:

Gateway:

DNS:

LAN port settings: ⚡ Change will reboot gateway and log out users

IP address:

Netmask:

Gateway:

DNS:

DHCP start:

DHCP end:

Lease time: (seconds)

Firewall settings: 🔄 Change will restart firewall and log out users

Block private IP ranges: ☐ 192.168.0.0/16 + 10.0.0.0/8 + 172.16.0.0/12

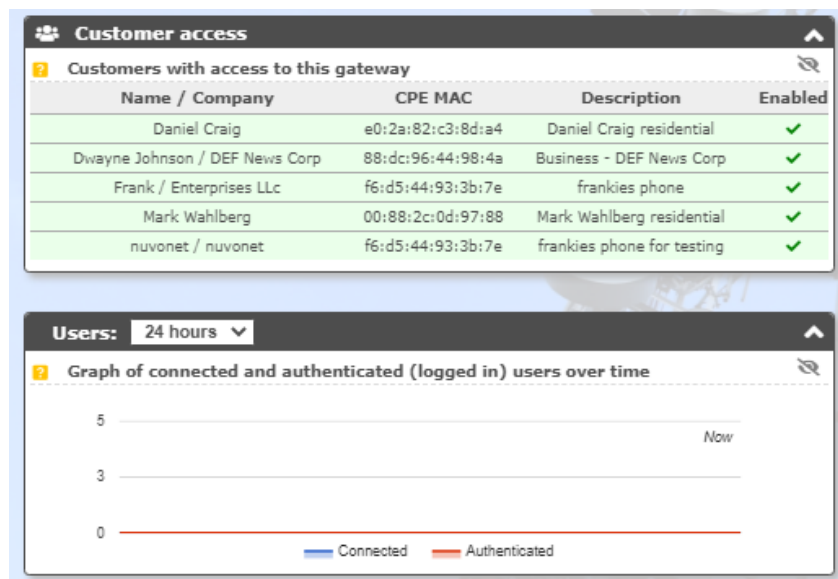
Port forward settings: WAN port access to local network

	WAN port	LAN IP	LAN port	Forward name / comments	
1	<input type="text"/>	→ <input type="text"/>	<input type="text"/>	<input type="text"/>	

The gateway settings box has two additional configurations. The first configuration will block access to private IP ranges in the WAN circuit and is useful if the WAN port is connected to a router and is sharing a private IP range with other devices. The second configuration is to add a port-forward rule to permit wireless access points and CPE devices to be accessed remotely where the WISP requires access to the device UI for configuration purposes. Up to 100 port-forward rules can be added.

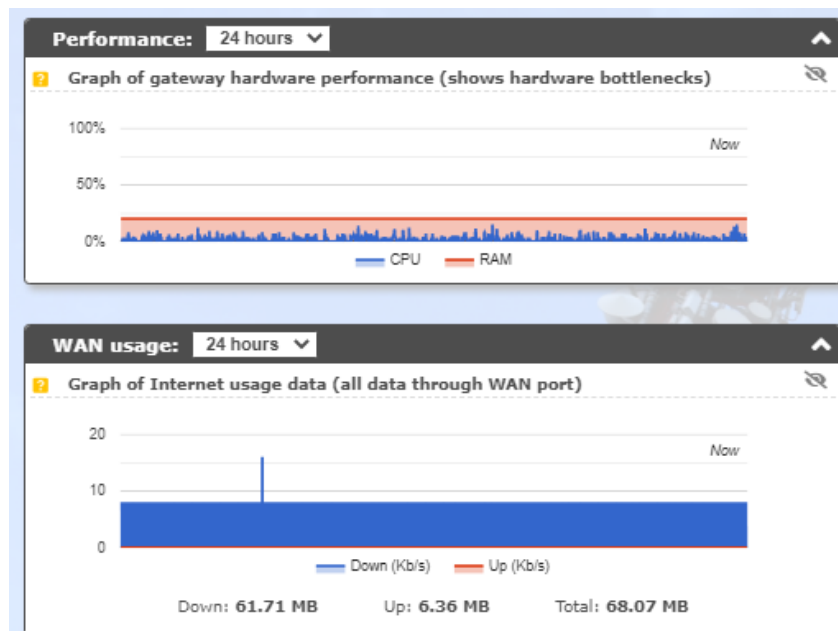
The information boxes shown below illustrate the subscribers and authentications with time.

The list of subscribers associated with the tower access control router gateway and a graph showing the number of authenticated subscribers with time. The time axis can be selected between 1 hour to 1 week.



The graphs shown below illustrate the performance of the gateway and backhaul connection, and can be used to identify bottlenecks in the network and indicate where circuit upgrades are required.

Graphs showing performance of the gateway processor in % of maximum capacity with time, and a graph of WAN port bandwidth use with time. The time axis can be changed from 1 hour to 1 week.



The boxes show below list the subscribers that are connected to the network and the subscribers that have been authenticated. Connected means that the CPE is visible to the access control router, while authenticated customers are communicating over the network and their identity has been authenticated.

Lists showing authenticated and connected subscribers.

Authenticated users (logged in)

2

All logged in devices with access to the Internet (excluding access points)

MAC address

OS/browser

Time left

Data in / out

Code / User

No users authenticated

Connected users (using the gateway)

2

All devices connected to the gateway (with or without Internet access)

MAC address

IP address

Hostname

Block IP

Block MAC

Allow MAC

No users connected

The tables shown in the figure below are the MAC blocked and allowed tables that are configured for the access control router, and the IP or domain allowed and blocked addresses for the access control router.

The upper box is the list of allowed and blocked MAC addresses, and the lower box shows the allowed and blocked IP or domain name addresses.

MAC addresses

MAC addresses allowed to bypass login (eg WIFI access points)

Allowed MAC list (one per line):

```
00:11:22:33:44:55
aa:bb:cc:dd:ee:ff
```

Blocked MAC list (one per line):

```
00:11:22:33:44:55
aa:bb:cc:dd:ee:ff
```

Update

IP addresses and web sites

IP addresses, domains and web sites always blocked or always allowed

Allowed IP list (one per line):

```
12.34.56.78
www.web-site.com
```

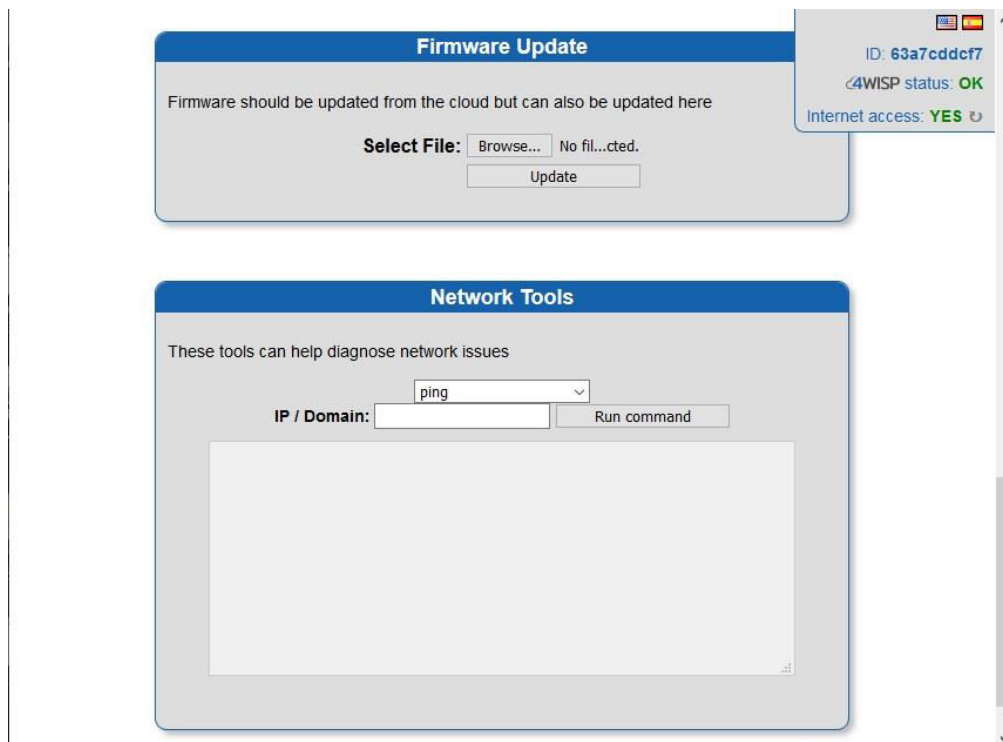
Blocked IP list (one per line):

```
12.34.56.78
www.web-site.com
```

Change will restart firewall and log out users

Update

The easyWISP gateway also has diagnostic functions that can be accessed locally to debug installation problems. EasyWISP controller firmware is updated automatically via the cloud, however the firmware can be uploaded manually when connected directly to the gateway. Several network tools are available that can be used to test circuit functionality.

The screenshot shows a web interface with two main sections: "Firmware Update" and "Network Tools". The "Firmware Update" section has a blue header and contains the text "Firmware should be updated from the cloud but can also be updated here". Below this is a "Select File:" label, a "Browse..." button, the text "No file selected.", and an "Update" button. The "Network Tools" section also has a blue header and contains the text "These tools can help diagnose network issues". It features a dropdown menu with "ping" selected, an "IP / Domain:" label, an input field, and a "Run command" button. A large empty text area is below the input field. On the right side of the interface, there is a status panel with a language selector (US and ES flags), the ID "63a7cddcf7", the status "<4WISP status: OK", and "Internet access: YES" with a globe icon. The interface is displayed within a browser window with a scrollbar on the right.

Firmware Update

Firmware should be updated from the cloud but can also be updated here

Select File: No file selected.

Network Tools

These tools can help diagnose network issues

ping
IP / Domain:

Internet access: YES

4.11. Monitoring of network failures.

The configuration of the access control router gateway monitoring was described during initial setup. The messages that are sent to the WISP administrator in the case of failure are shown below.

Activate alerting in the case of access control router gateway failure, which may be due to a failed device or a tower WAN circuit failure.



Monitoring settings

The monitor sends an alert when a gateway fails to check-in and another when it resumes.
 The hide option removes a gateway from the dashboard, useful for prolonged outages.
 The downtime defines how long to wait before alerting. Increase to reduce false alerts.

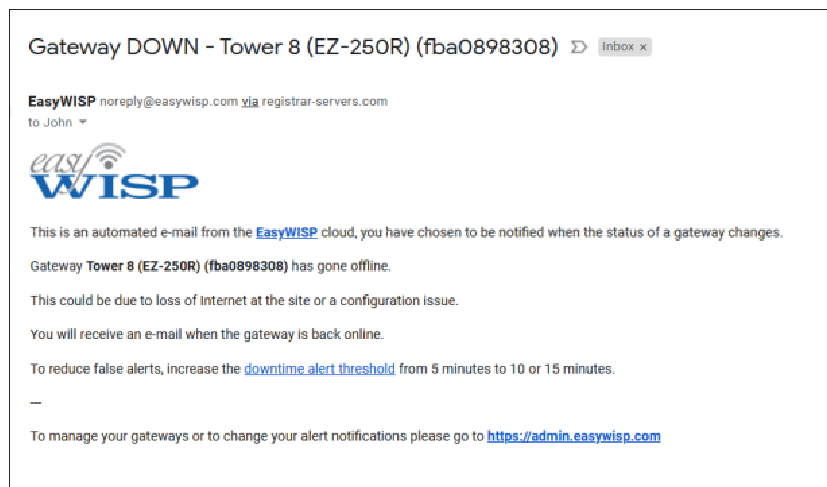
Alert email address:

Email language:

	Alert	Hide	Downtime
Tower 1 (779b7e8b50)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5 mins
Tower 2 (9a80871c88)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5 mins
Tower 3 (576ed3f888)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5 mins
Tower 4 (d70fcc591)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5 mins


[Change Settings](#)

Message sent to the WISP administrator when the easyWISP system loses contact with an access control router gateway.



Gateway DOWN - Tower 8 (EZ-250R) (fba0898308) Inbox x

EasyWISP noreply@easywisp.com via registrar-servers.com
 to John



This is an automated e-mail from the EasyWISP cloud, you have chosen to be notified when the status of a gateway changes.

Gateway Tower 8 (EZ-250R) (fba0898308) has gone offline.

This could be due to loss of Internet at the site or a configuration issue.

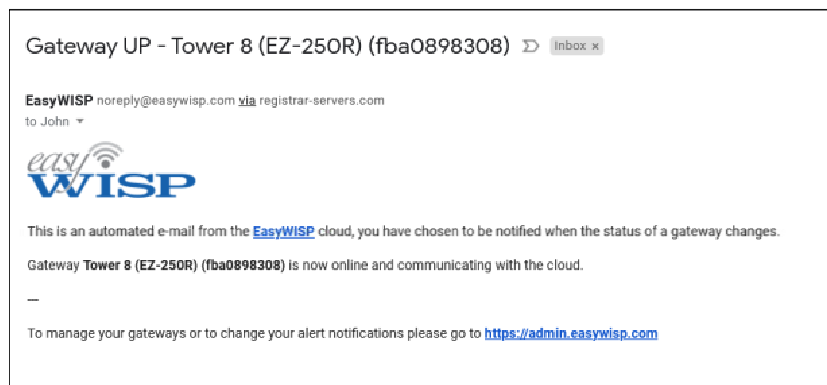
You will receive an e-mail when the gateway is back online.

To reduce false alerts, increase the [downtime alert threshold](#) from 5 minutes to 10 or 15 minutes.

—


To manage your gateways or to change your alert notifications please go to <https://admin.easywisp.com>

Message sent to the WISP administrator when the easyWISP system restores contact with an access control router gateway.



Gateway UP - Tower 8 (EZ-250R) (fba0898308) Inbox x

EasyWISP noreply@easywisp.com via registrar-servers.com
 to John



This is an automated e-mail from the EasyWISP cloud, you have chosen to be notified when the status of a gateway changes.

Gateway Tower 8 (EZ-250R) (fba0898308) is now online and communicating with the cloud.

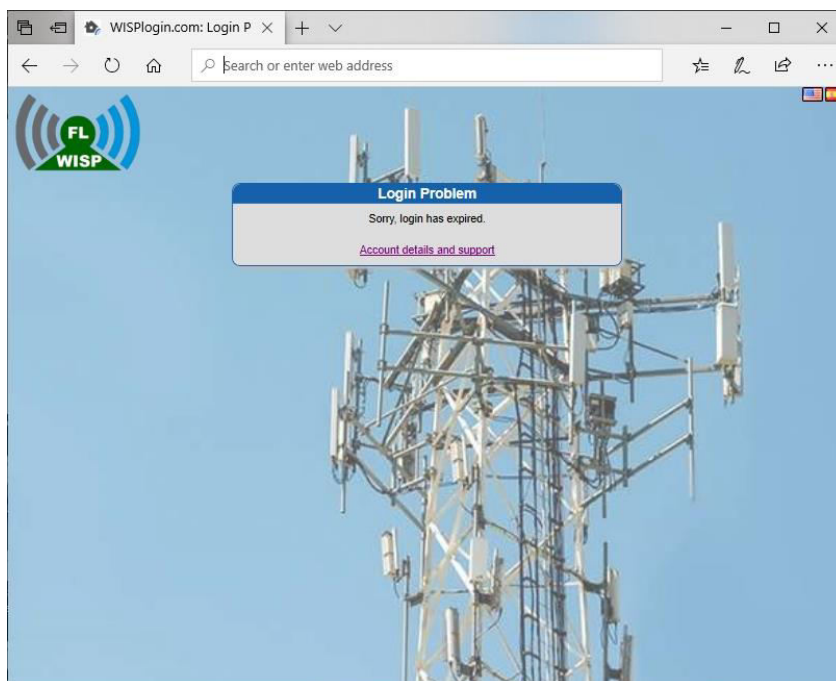
—

To manage your gateways or to change your alert notifications please go to <https://admin.easywisp.com>

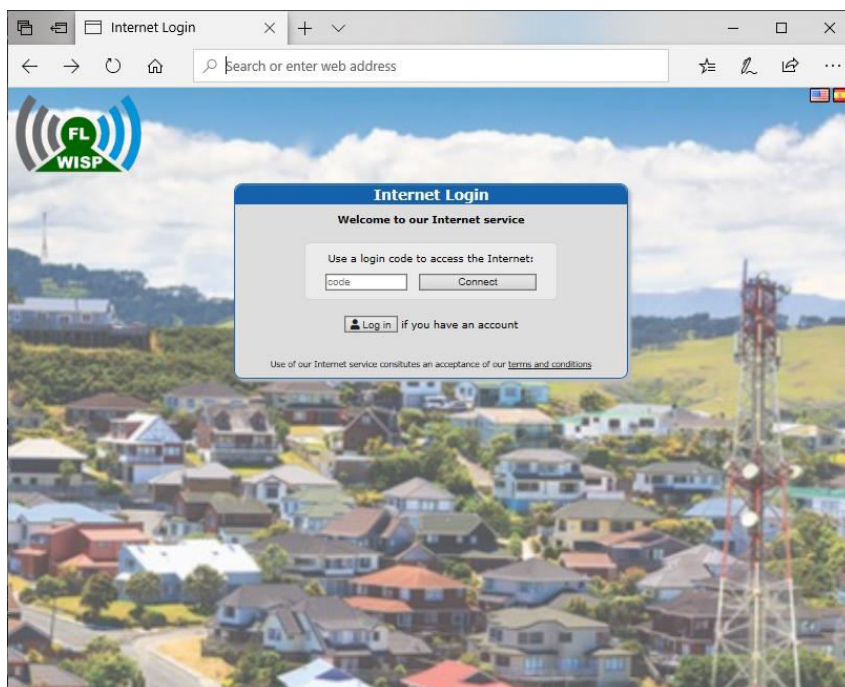
4.12. The subscribers view of the Internet service (the CRM portal).

The customer relationship management (CRM) portal serves a number of purposes. First the customer is redirected to an information screen if the customer's account is not paid, or else there is a technical problem and the access control router has no connection to the Internet. The WISP might have set a data cap with the subscribers account so if the data cap is exceeded the information screen is displayed.

The screen that the subscriber will see when the account is past due. The billing system has disabled the subscriber and the subscriber is re-directed to this page.

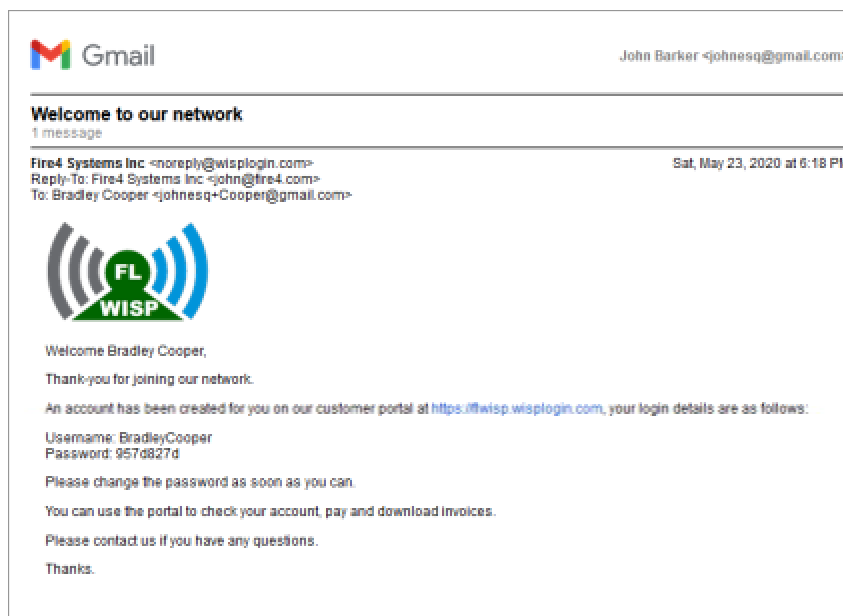


If a data cap is configured for the subscriber and the data cap is exceeded then this is the screen that the subscriber will see.



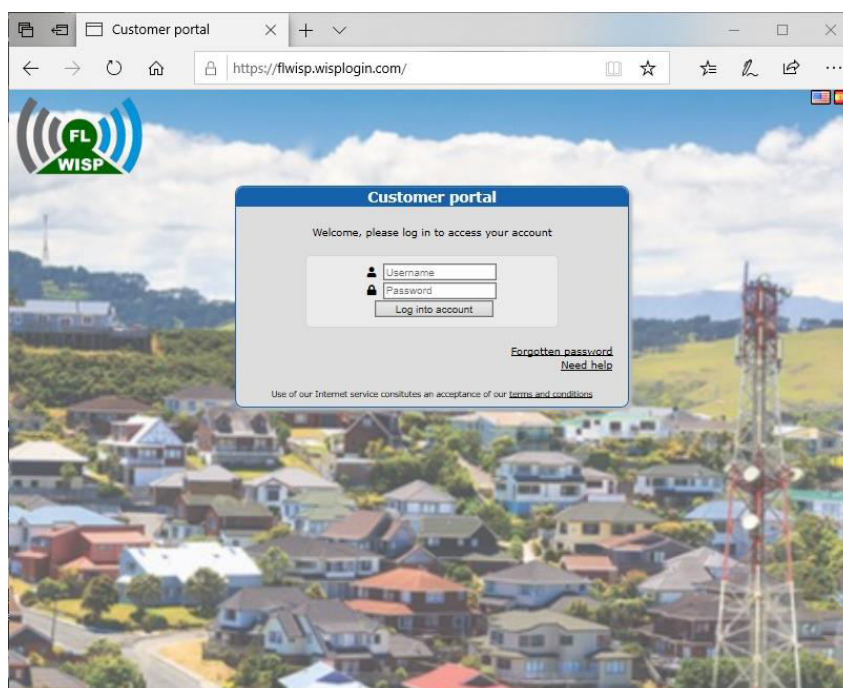
When the subscriber account is created the subscriber receives a message with the CRM portal login user name and password, this is either sent to the customer via email or printed out and given to the customer. An example of the email message is shown in the next figure.

An example of the message that the subscriber receives when the account is created, advising the username and password to access the CRM portal together with the portal URL.



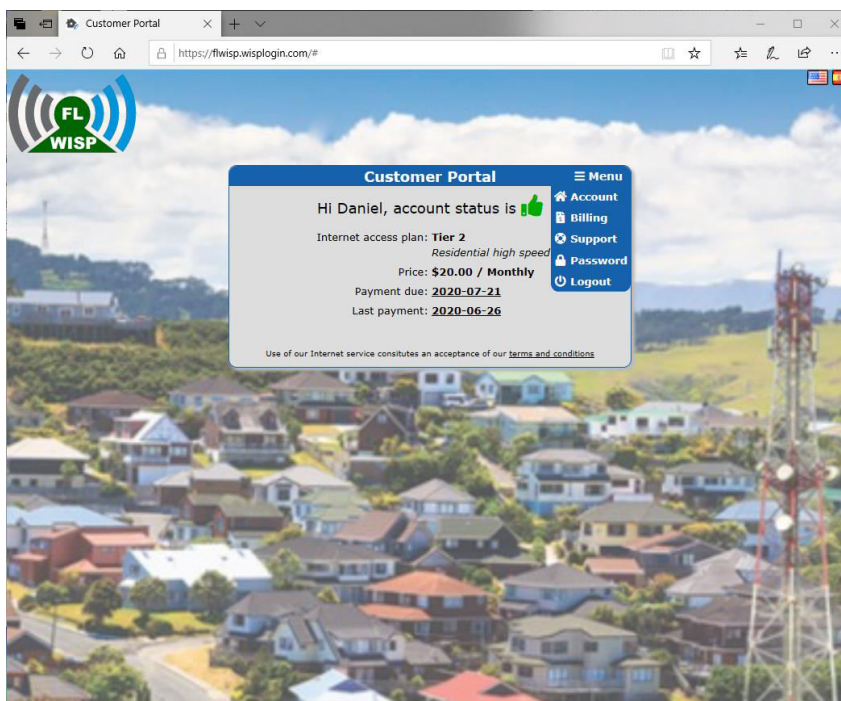
Typing the URL into the browser tab opens the subscriber CRM captive portal login page.

The CRM portal login screen using the login credentials provided in the message.



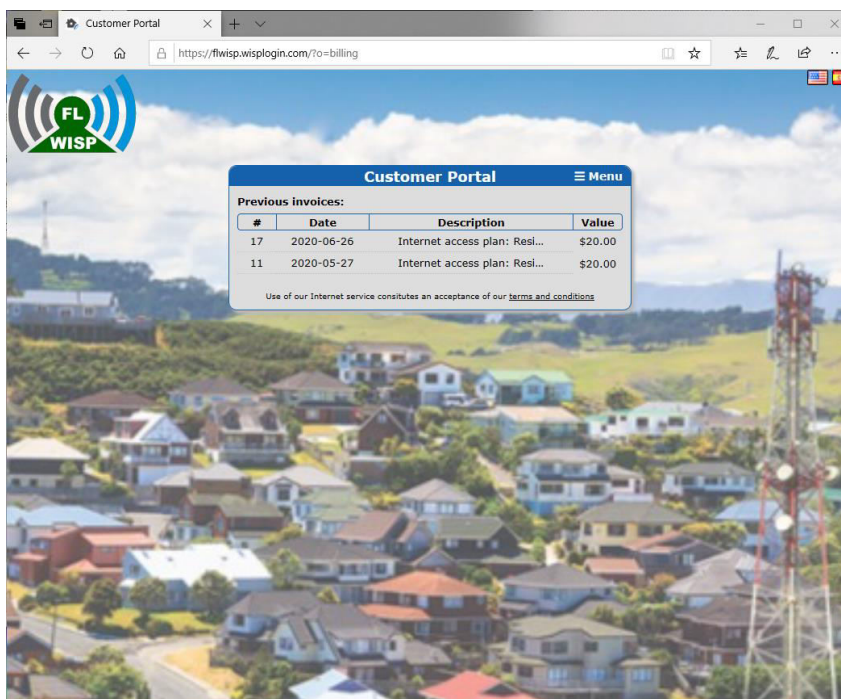
When the subscriber logs in to the CRM portal there is a menu with several options; view account information, see billing information, which includes downloading invoices, open a customer support request, change the password and logout.

The CRM screen after login showing the subscriber's account status.



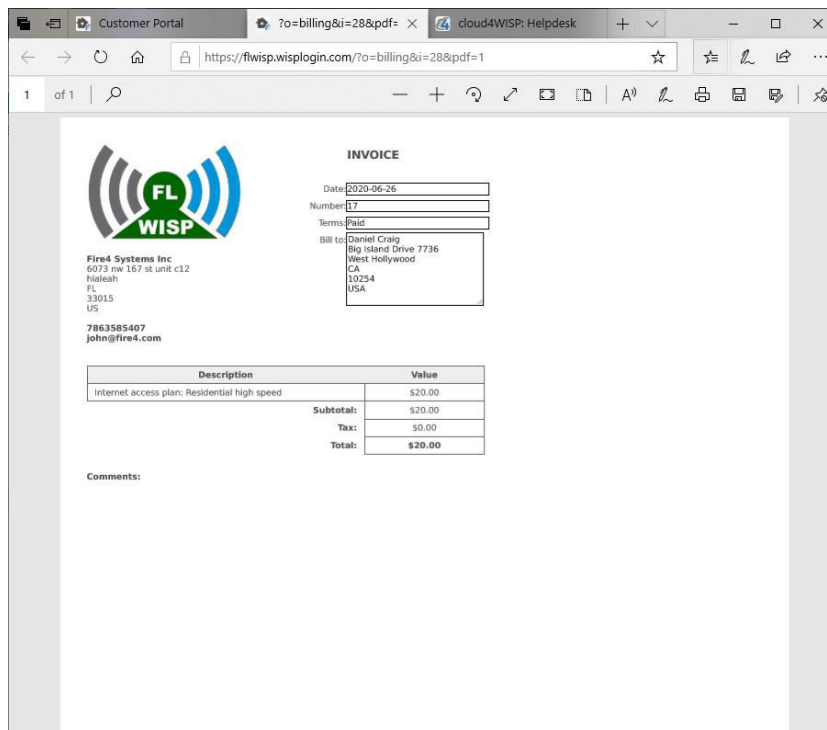
Selecting the billing menu option lists the invoices issued for the account.

Click on any invoice to open and view the invoice.



Click on any invoice listed in the billing menu to open it in a new browser window. The invoice can be printed or saved on the subscriber's computer.

Display an invoice selected from the list of invoices.



INVOICE

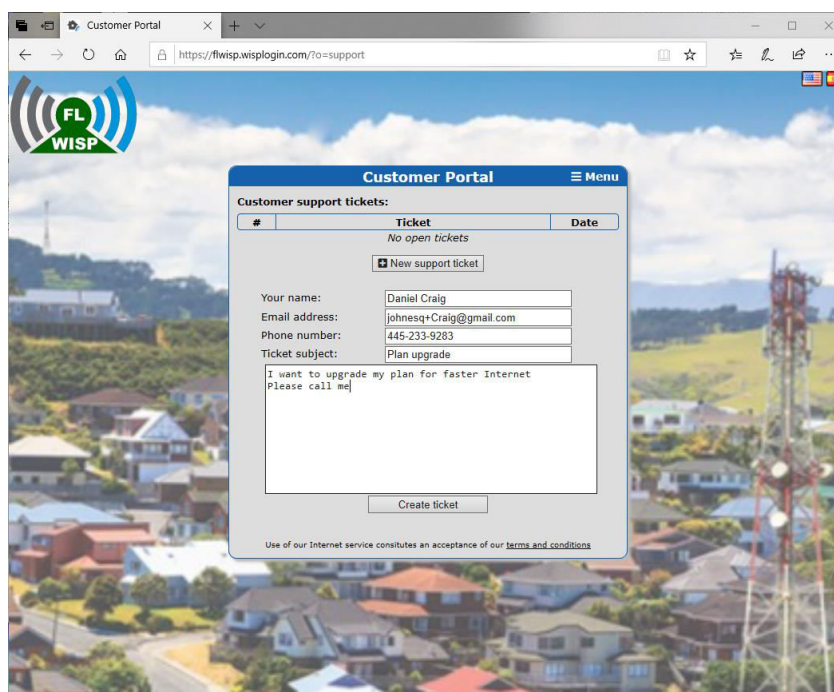
Date: 2020-06-26
 Number: 67
 Terms: Paid
 Bill to: Daniel Craig
 Big Island Drive 7736
 West Hollywood
 CA
 90254
 USA

Description	Value
Internet access plan: Residential high speed	\$20.00
Subtotal:	\$20.00
Tax:	\$0.00
Total:	\$20.00

Comments:

The subscriber can click on the support menu entry to open a customer support request, which is sent to the helpdesk.

Entry of information for a customer support request.



Customer support tickets:

#	Ticket	Date
No open tickets		

[New support ticket](#)

Your name: Daniel Craig
 Email address: johnesq+craig@gmail.com
 Phone number: 445-233-9283
 Ticket subject: Plan upgrade

I want to upgrade my plan for faster Internet
 Please call me

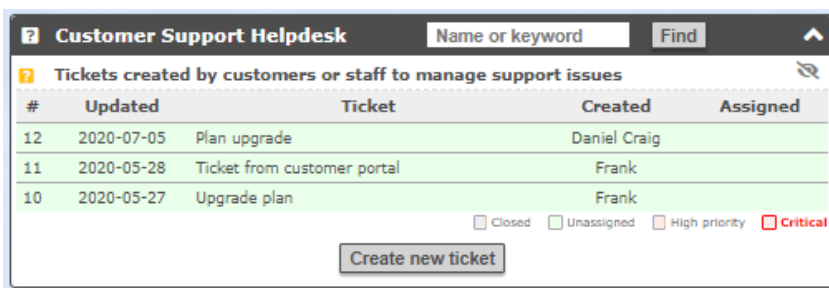
[Create ticket](#)

Use of our Internet service constitutes an acceptance of our [terms and conditions](#)

4.13. Helpdesk.

Click on the helpdesk menu entry to view the customer support staff screen. The helpdesk shows a box with open support tickets that are sent by subscribers using the CRM portal. Click on any ticket entry to open a box that will display the ticket.

The list of open tickets is shown, each can have a priority set according to the urgency of the issue.



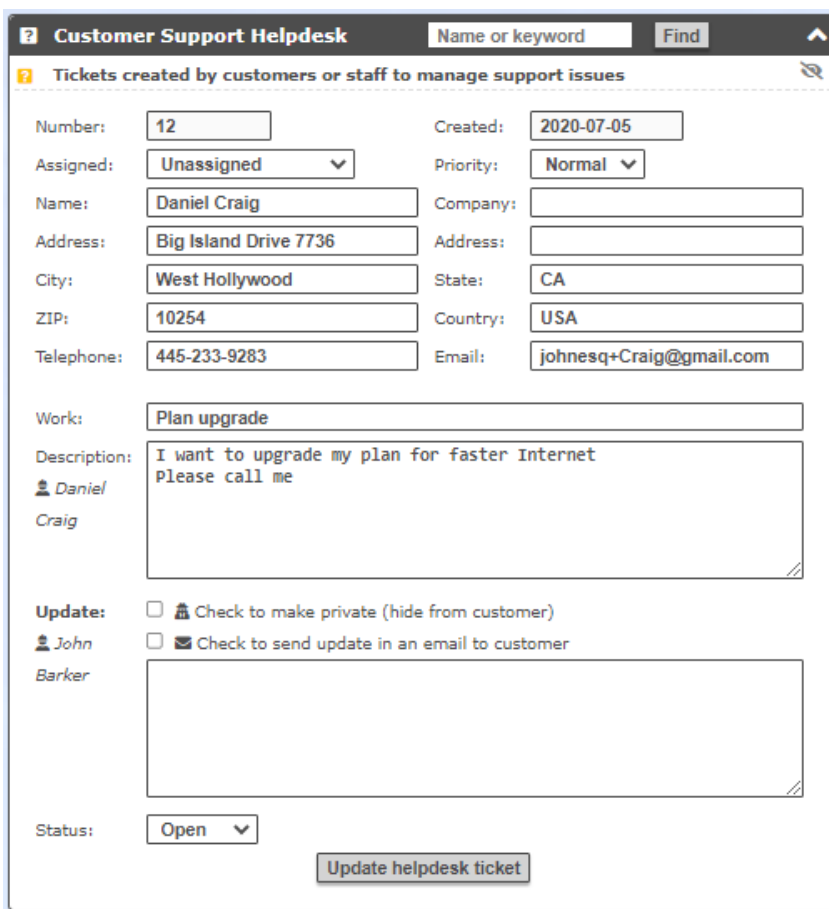
#	Updated	Ticket	Created	Assigned
12	2020-07-05	Plan upgrade	Daniel Craig	
11	2020-05-28	Ticket from customer portal	Frank	
10	2020-05-27	Upgrade plan	Frank	

☐ Closed
 ☐ Unassigned
 ☐ High priority
 ☐ Critical

Create new ticket

When the ticket is opened by the customer support staff then customer support may be able to answer the question, or the question may need assigning to another member of staff; the financial staff for billing questions, the sales staff for upgrades and new services, and the technical staff to answer technical issues. The reply to the customer can be sent via an email or via a call. Check the box to send an email.

The support ticket with the request from the subscriber.



Number: 12 Created: 2020-07-05
 Assigned: Unassigned Priority: Normal
 Name: Daniel Craig Company:
 Address: Big Island Drive 7736 Address:
 City: West Hollywood State: CA
 ZIP: 10254 Country: USA
 Telephone: 445-233-9283 Email: johnesq+Craig@gmail.com

Work: Plan upgrade

Description: I want to upgrade my plan for faster Internet
Please call me

Update: ☐ Check to make private (hide from customer)
☐ Check to send update in an email to customer

Status: Open

Update helpdesk ticket

The customer support staff also receives telephone calls from customers. A common type of call is a complaint that the customer has no Internet access. The customer support person can check the circuit through to the customer CPE wireless using a feature on the gateway configuration screen. If the response shows that the circuit to the customers CPE is good then the problem is the network at the customer's premises. If a problem is detected communicating with the CPE then the customer support staff must open a work order for the technical staff to locate and correct the network problem. If the problem is found to be at the customer's premises then it is usual to request the customer to pay a service charge in order to have a technician go to the customer's premises to correct the problem. If the customer agrees to the charge then a work order can be opened for technical staff to proceed to the customer's premises to repair the fault.

Gateway configuration screen showing circuit test to CPE.

Customer provisioning:

Work order: ☐ Create work order for CPE installation

Assign work to:

Order comments:

Internet access management:


Customer enabled: ☒ **Internet access allowed**

Recurring plans only, a login code can be created for single use

Internet access plan:

Enter same MAC again if access is needed on multiple gateways

Test access from gateway to customer CPE (results on Monitoring page)

	CPE MAC address	Description	Gateway	Allow
1	<input type="text" value="e8:40:f2:3b:c5:c3"/>	<input type="text" value="Bradley Cooper res"/>	<input type="text" value="Tower 3 (E..."/>	<input checked="" type="checkbox"/> 

TEST CPE (circled in red)

Check customer CPE display showing the result of the customers CPE circuit test.

Check customer CPE/device

Test CPE devices, tests can take a few minutes, reload page to check

Gateway (ID)	MAC Address (Customer)	Reply to 3 ARP pings
Tower 4 (d70cfcc591)	84:39:be:64:45:c9 (Bradley Cooper)	Waiting for reply... ✗
Tower 1 (779b7e8b50)	e0:2a:82:c3:8d:a4 (Daniel Craig)	Waiting for reply... ✗
Tower 4 (d70cfcc591)	84:39:be:64:45:c9 (Bradley Cooper)	0ms 14ms 3ms ✗
Tower 4 (d70cfcc591)	08:9e:01:b3:72:61 (Channing Tatum)	No No No ✗

☐ On line
 ☐ Replies missing
 ☐ Comms error / Not found

CPE checks can be carried out from the CPE setup section of the customer's page

5. EasyWISP cloud management additional configuration

5. EasyWISP cloud management additional configuration.

When the Cloud account has been created then the WISP can login with the chosen username and password provided. After the first login change the password, using a strong password. Keep the username and password in a safe location where it can be retrieved if necessary. Do not give the password and username to others. Employees can be added to the account later.

5.1. Dashboard.

When the login has been completed successfully then the Dashboard will be displayed. See the next figure.

The first box shows the workflow steps to remind the administrator.

1. Set up a gateway.
2. Add plans.
3. Add customers.

The first easyWISP gateway was added when the account was created. Subsequent easyWISP gateways can be added at any time. Customers/subscribers cannot be added without a billing plan to associate with the customer, therefore step 2 is the addition of a billing plan. It is likely that the WISP will require several billing plans, examples are:

- Basic Plan: 10Mb/s download speed, \$19/month.
- Performance Plan: 25Mb/s download speed, \$39/month.
- Business Plan: 50Mb/s download speed, \$65/month.

When subscribers are added they are associated with one of the billing plans


The Cloud Dashboard page, with four easyWISP gateways in use is shown on the following page.

The first box within the page is for instructional purposes and can be removed by the WISP.

The second box within the page shows the gateways that are associated with the account. The usual configuration is to install a gateway at each tower, however several towers may be backhauled to one gateway.

The third box within the page is a graph that summarizes the number of logins across the WISP's network, the period of the graph can be selected at 7, 14 or 28 days.

The fourth box within the page lists recent subscriber logins to the WISP's network. The number of subscribers displayed can be selected as 10, 100 or 1000.



[Dashboard](#)
[Gateways](#)
[Plans](#)
[Customers](#)
[Codes](#)
[Billing](#)
[Helpdesk](#)
[Work Orders](#)
[Monitoring](#)
[Staff](#)
[Settings](#)
[Show Help](#)
[Logout](#)

? Cloud4WISP is as easy as 1-2-3

Do the following to set up a new WISP

1. [Set up a gateway](#)
2. [Add an Internet plan](#)
3. [Set up customers](#)

? All sections have a help box which can be hidden, click 'Show Help' to display them all. You can also hover the mouse over text and icons for more help. [Click for support](#).

[Remove this box](#)

Gateway status Status reload disabled


Current status of WISP gateways

Gateway (ID)	Auth #	Conn #	Status
Tower 1 (EZ-100G) (779b7e8b50)	1	1	✓
Tower 2 (EZ-100G) (9a80871c88)	1	1	✓
Tower 3 (EZ-100G) (576ed3f888)	2	3	✓
Tower 4 (EZ-250G) (d70cfc591)	1	2	✓
Tower 5 (EZ-100G) (2285101251)	0	1	✓
Tower 6 (EZ-1000R) (0d26b36404)	0	1	✓
Tower 7 (EZ-1000G) (6d7052f8d0)	2	2	✓
Tower 8 (EZ-250R) (fba0898308)	0	0	✓

✓ Check-in
↻ Recent reboot
⛔ Disabled
🔒 Hide
🚨 Alert

Logins: ALL GATEWAYS 28 days

Total number of live logins across all gateways



Logins: ALL GATEWAYS 10 logins

Most recent logins across all gateways

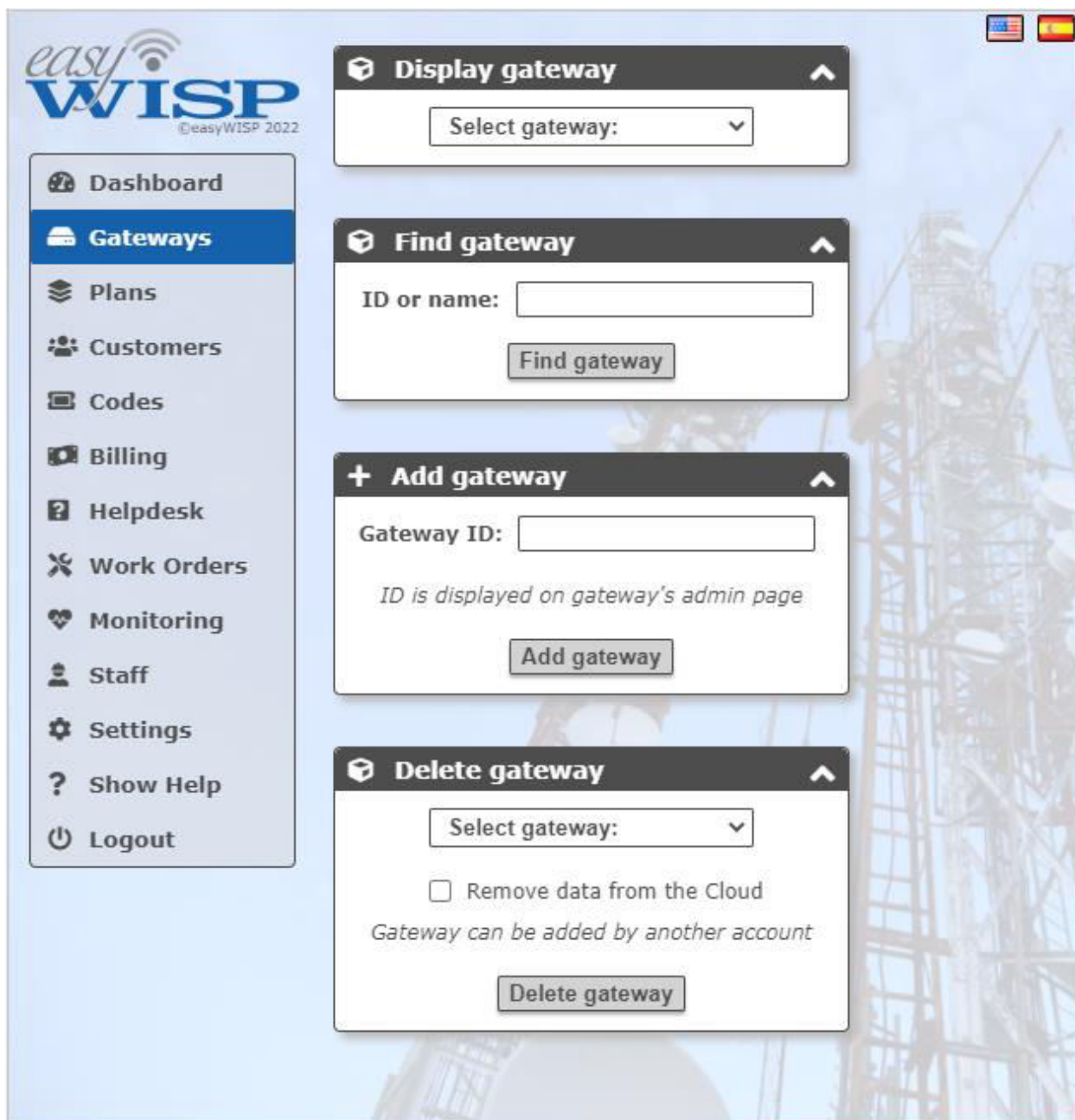
Date time	Gateway	MAC address	Customer	Login
05/17 16:38	Tower 1 (EZ-100G)	00:88:2c:0d:97:88	Mark Wahlberg	MAC
05/14 14:08	Tower 7 (EZ-1000G)	48:5b:39:09:53:95	Dwayne Johnson	MAC
05/13 19:55	Tower 8 (EZ-250R)	88:dc:96:44:98:4a	Emma Stone	MAC
05/12 12:13	Tower 5 (EZ-100G)	00:e0:4c:68:59:77	George Clooney	MAC
05/11 18:17	Tower 7 (EZ-1000G)	7c:05:07:14:2c:fb	frank jones	MAC
05/11 16:57	Tower 6 (EZ-1000R)	88:dc:96:44:98:4a	Emma Stone	MAC
05/11 16:56	Tower 7 (EZ-1000G)	48:5b:39:09:53:95	Dwayne Johnson	MAC
05/11 16:53	Tower 2 (EZ-100G)	c8:9c:dc:83:23:1f	Tom Cruise	MAC
05/11 16:52	Tower 3 (EZ-100G)	00:1e:8c:f4:8a:f5	Robert Downey	MAC
05/11 16:51	Tower 4 (EZ-250G)	c8:9c:dc:83:26:29	Kristen Stewart	MAC

Green: User logged in [more](#)

5.2. Adding easyWISP gateways.

To add an easyWISP gateway click on the gateway menu entry then enter the gateway ID in the first box and click the 'add gateway' button

Three other boxes are provided. Display gateway permits the gateway to be selected from a drop-down list and selected in order to configure the gateway. Find a gateway permits the ID or name of the gateway to be entered in order to locate the gateway configuration page. Finally delete a gateway permits a gateway to be selected from a drop-down menu and deleted from the gateway database. This might occur is a gateway is transferred from one WISP account to another; a gateway cannot be registered in two accounts simultaneously.

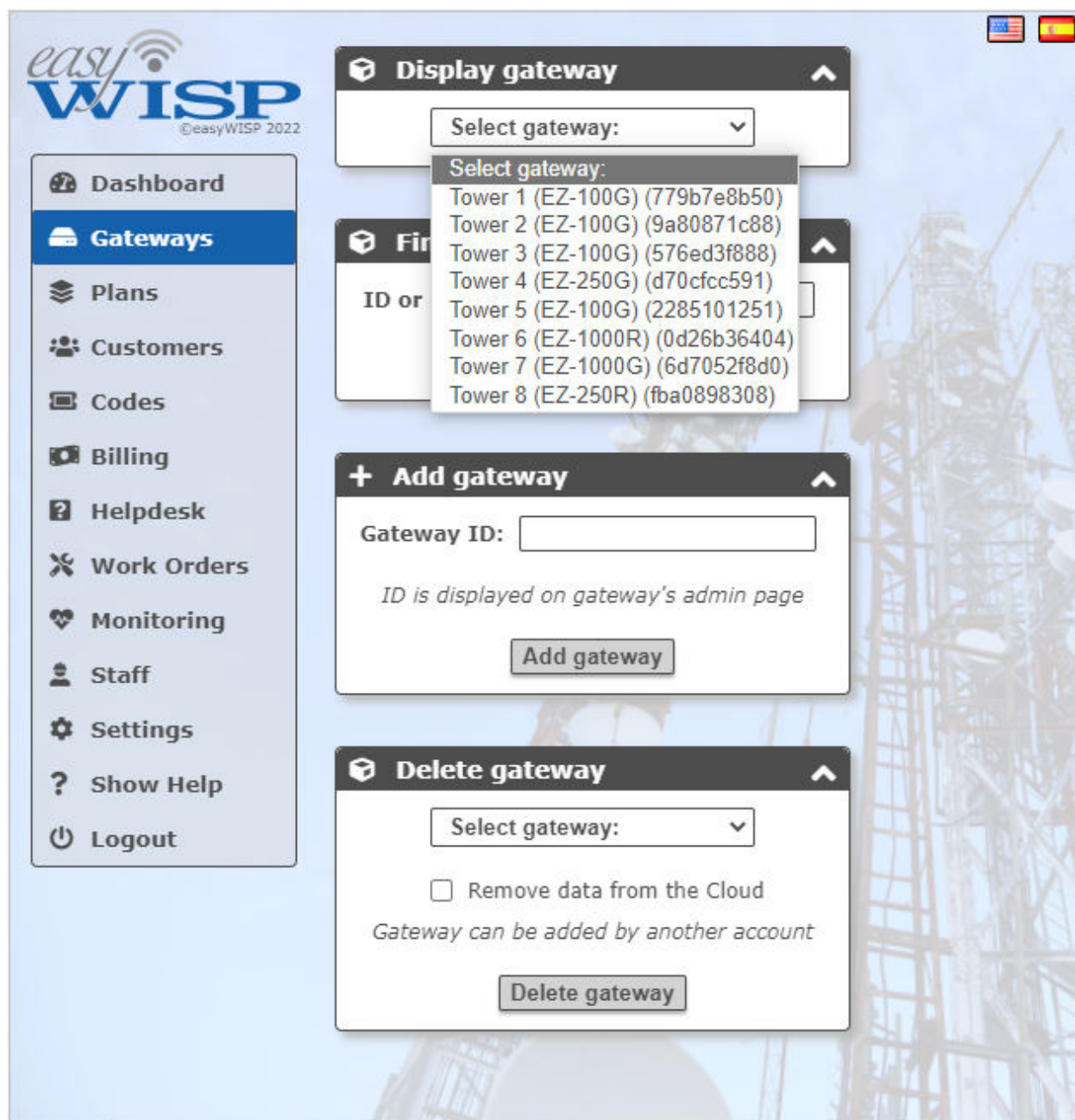


The screenshot displays the easyWISP web interface. On the left is a sidebar menu with the following items: Dashboard, Gateways (highlighted), Plans, Customers, Codes, Billing, Helpdesk, Work Orders, Monitoring, Staff, Settings, Show Help, and Logout. The main content area contains four panels:

- Display gateway:** A panel with a dropdown menu labeled "Select gateway:".
- Find gateway:** A panel with a text input field labeled "ID or name:" and a "Find gateway" button.
- Add gateway:** A panel with a text input field labeled "Gateway ID:", a note "ID is displayed on gateway's admin page", and an "Add gateway" button.
- Delete gateway:** A panel with a dropdown menu labeled "Select gateway:", a checkbox labeled "Remove data from the Cloud", a note "Gateway can be added by another account", and a "Delete gateway" button.

5.3. Configuring an easyWISP gateway.

First select the gateway from the display drop-down menu as shown in the screen below. Click on the selected gateway to open the gateway configuration screen

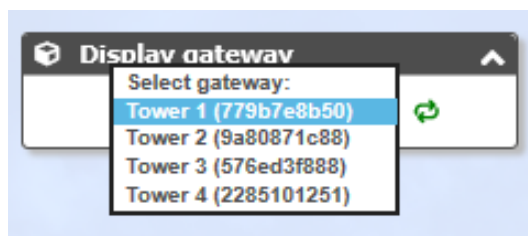


When the gateway has been selected the configuration parameters will be displayed. This screen has a lot of information and is shown scrolled down over the following three pages.



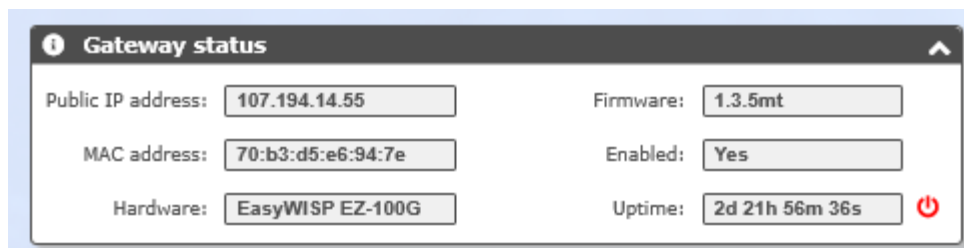
The easyWISP gateway configuration parameters are described in sequence:

Box 1: permits the selection of any gateway managed by the Cloud



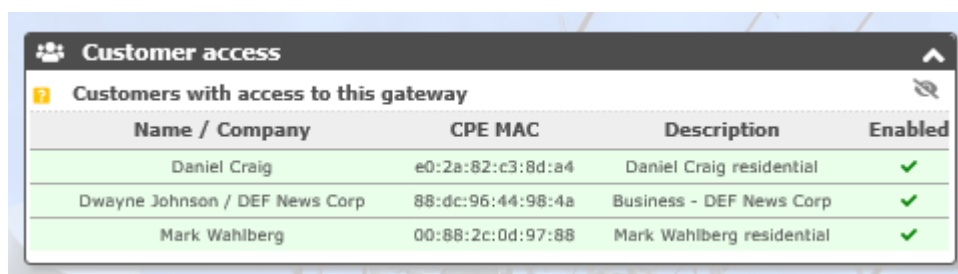
Box 2: shows the basic hardware parameters easyWISP gateway, the public IP, the MAC address, the hardware version, the firmware version and if enabled. The on-line status of the easyWISP gateway is shown, in the example the 'not checked in' message indicates that the gateway is off-line and action must be taken to put the gateway back on-line.

IMPORTANT NOTE: take care when modifying WAN IP addresses via the cloud. A mistake made may require a visit to the tower to restore the WAN IP address via the easyWISP setup page.



Gateway status	
Public IP address:	107.194.14.55
MAC address:	70:b3:d5:e6:94:7e
Hardware:	EasyWISP EZ-100G
Firmware:	1.3.5mt
Enabled:	Yes
Uptime:	2d 21h 56m 36s


Box 3: lists the customer CPE devices that are services by the easyWISP controller.




Customer access			
Customers with access to this gateway			
Name / Company	CPE MAC	Description	Enabled
Daniel Craig	e0:2a:82:c3:8d:a4	Daniel Craig residential	✓
Dwayne Johnson / DEF News Corp	88:dc:96:44:98:4a	Business - DEF News Corp	✓
Mark Wahlberg	00:88:2c:0d:97:88	Mark Wahlberg residential	✓

Box 4: shows the easyWISP gateway settings, which can be modified using this page. The first section permits the device name to be changed, the login page to be changed for a custom login page, and the admin password to be changed. The next section is the WAN port settings, the default for the WAN port is DHCP client; however the WAN port can be configured for a static IP. The next section is the LAN port settings. The easyWISP EZ100G has four LAN ports, however they are configured as a switch. The IP parameters can be configured for the LAN ports. The next section is the firewall setting; the firewall will block access to private address ranges. This means that if the WISP has other equipment at the tower connected to a router in addition to easyWISP, it will block any subscriber attempt to access the network behind the easyWISP.


The final section is the port forward settings. Port forward rules can be added to permit the WISP to access CPE and PtMP devices on the LAN side of easyWISP permitting remote access to browser user interface (UI) to modify the device configuration or to test the device. The WISP might want to remotely configure the PtMP radio and CPE radios. The rules for configuring a device for monitoring or remote access are as follows: the IP address of the monitored device must be unique for each device, and must be within the LAN subnet range, but outside the LAN DHCP range. Click the update button after the changes are made.

 **Gateway settings**


 **Custom login page and network settings for gateway**


Name:

Hostname:

Login page:  Add a custom page

Admin Password: Repeat:

WAN port settings:  Change will reboot gateway and log out users

 Invalid WAN settings may require a site visit to restore cloud access!


Type:

IP address:

Netmask:

Gateway:

DNS:

LAN port settings:  Change will reboot gateway and log out users

IP address:

Netmask:


Gateway:

DNS:

DHCP start:


DHCP end:

Lease time: (seconds)

Firewall settings:  Change will restart firewall and log out users

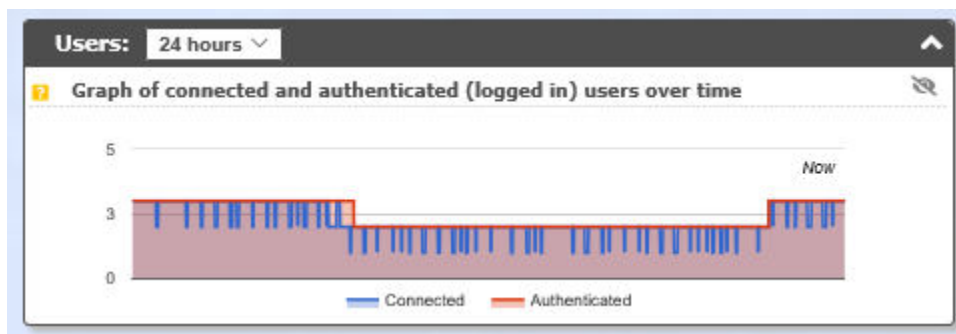
Block private IP ranges: ☐ 192.168.0.0/16 + 10.0.0.0/8 + 172.16.0.0/12

Port forward settings: WAN port access to local network

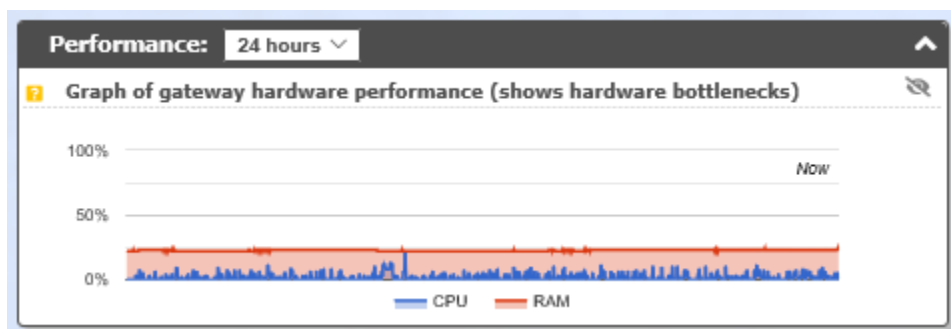
	WAN port		LAN IP		LAN port	Forward name / comments	
1	<input type="text"/>	→	<input type="text"/>		<input type="text"/>	<input type="text"/>	

Update

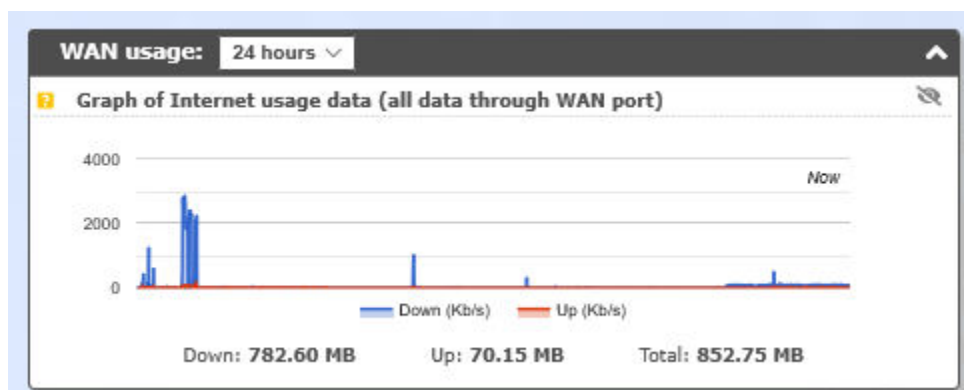
Box 5: displays a graph showing the number of users connected to the gateway. The timescale can be selected from 1 hour to 1 week.



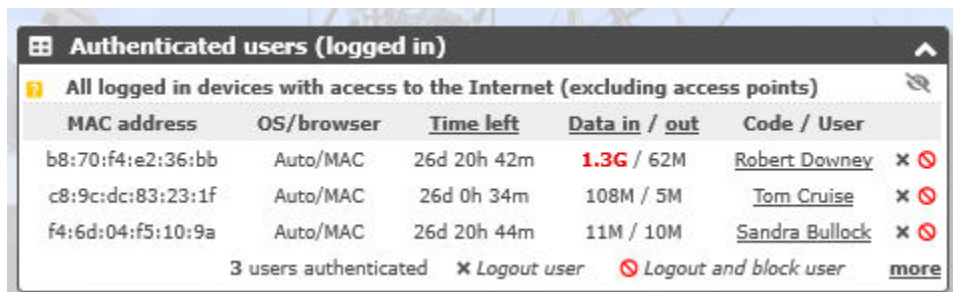
Box 6: displays the performance of the easyWISP gateway controller. This graph will indicate to the WISP if the easyWISP controller requires upgrading to a unit with higher performance. The timescale can be selected from 1 hour to 1 week.



Box 7: displays WAN usage which is the utilization of the WAN bandwidth. If the WAN circuit bandwidth utilization is constantly at maximum then the WISP should upgrade the circuit for higher capacity. The timescale can be selected from 1 hour to 1 week.



Box 8: lists authenticated subscribers currently logged in to the WISP's Internet service. This list should include all subscribers, unless one subscriber has a defective wireless connection.



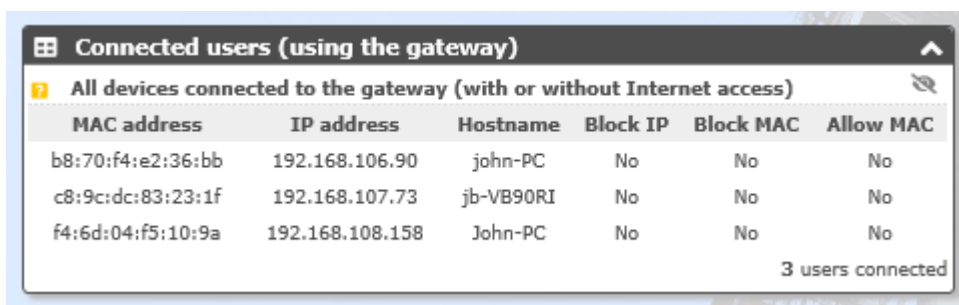
Authenticated users (logged in)

All logged in devices with access to the Internet (excluding access points)

MAC address	OS/browser	Time left	Data in / out	Code / User	
b8:70:f4:e2:36:bb	Auto/MAC	26d 20h 42m	1.3G / 62M	Robert Downey	✕ ⛔
c8:9c:dc:83:23:1f	Auto/MAC	26d 0h 34m	108M / 5M	Tom Cruise	✕ ⛔
f4:6d:04:f5:10:9a	Auto/MAC	26d 20h 44m	11M / 10M	Sandra Bullock	✕ ⛔

3 users authenticated ✕ Logout user ⛔ Logout and block user [more](#)

Box 9: lists connected subscribers who are currently accessing the Internet. This number may not include all the subscribers who are connected to the easyWISP gateway. The WISP can use the information in this graph to estimate the contention-ratio (see elsewhere in this document for an explanation of this parameter) of the tower service.



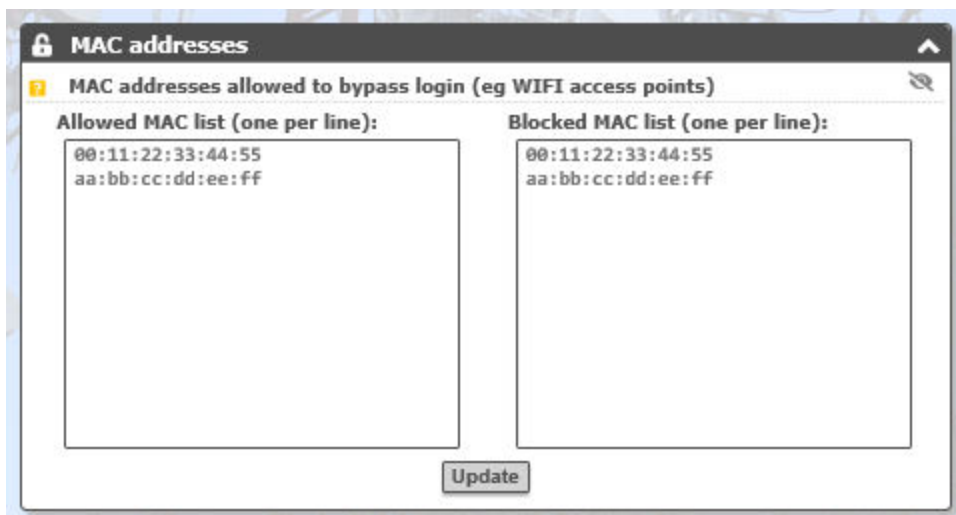
Connected users (using the gateway)

All devices connected to the gateway (with or without Internet access)

MAC address	IP address	Hostname	Block IP	Block MAC	Allow MAC
b8:70:f4:e2:36:bb	192.168.106.90	john-PC	No	No	No
c8:9c:dc:83:23:1f	192.168.107.73	jb-VB90RI	No	No	No
f4:6d:04:f5:10:9a	192.168.108.158	John-PC	No	No	No

3 users connected

Box 10: shows the allowed and blocked MAC lists. Entering MAC addresses into the allowed or blocked list and clicking the 'update' button will add MAC addresses.



MAC addresses

MAC addresses allowed to bypass login (eg WIFI access points)

Allowed MAC list (one per line):

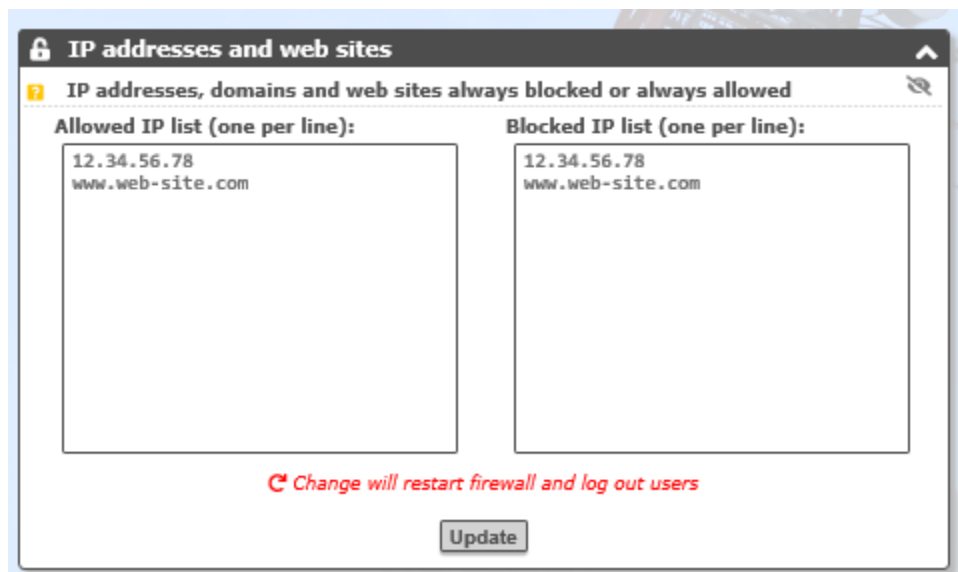
00:11:22:33:44:55
aa:bb:cc:dd:ee:ff

Blocked MAC list (one per line):

00:11:22:33:44:55
aa:bb:cc:dd:ee:ff

[Update](#)

Box 11: shows the allowed IP and blocked IP lists. Entering IP addresses into the allowed or blocked list and clicking the 'update' button will add IP addresses.



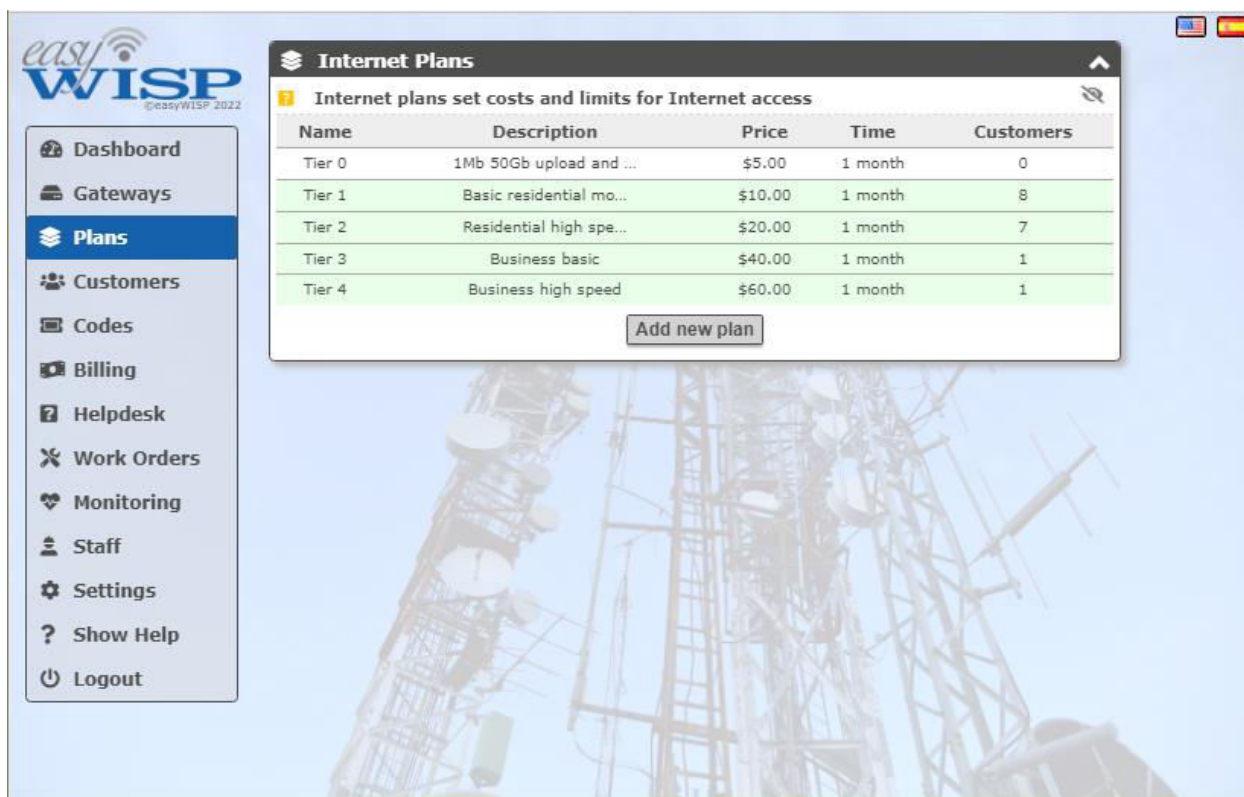
There is no limit to the number of easyWISP gateways that can be added to a Cloud account.

5.4. Plans.

A rate plan is a specific service provided for a group of subscribers. The rate plans developed by the WISP are sometimes referred to as tiers. Each rate plan determines the download and upload speeds, the download and upload byte counts, and the charge for that service in the local currency. Rate plan characteristics are developed by the WISP for the local market and will be determined by the operating costs, the local demand for the service and the economic levels of the potential subscribers. Rate plan examples are:

- Basic Plan (Tier 1): 10Mb/s download speed, \$19/month.
- Performance Plan (Tier 2): 25Mb/s download speed, \$39/month.
- Business Plan (Tier 3): 50Mb/s download speed, \$65/month.

Any type of rate plan can be configured and there is no limit to the number of rate plans. Click on the plan entry in the main menu to list the rate plans already configured; no plans will be shown the first time that the Cloud account is configured) See the next screen.



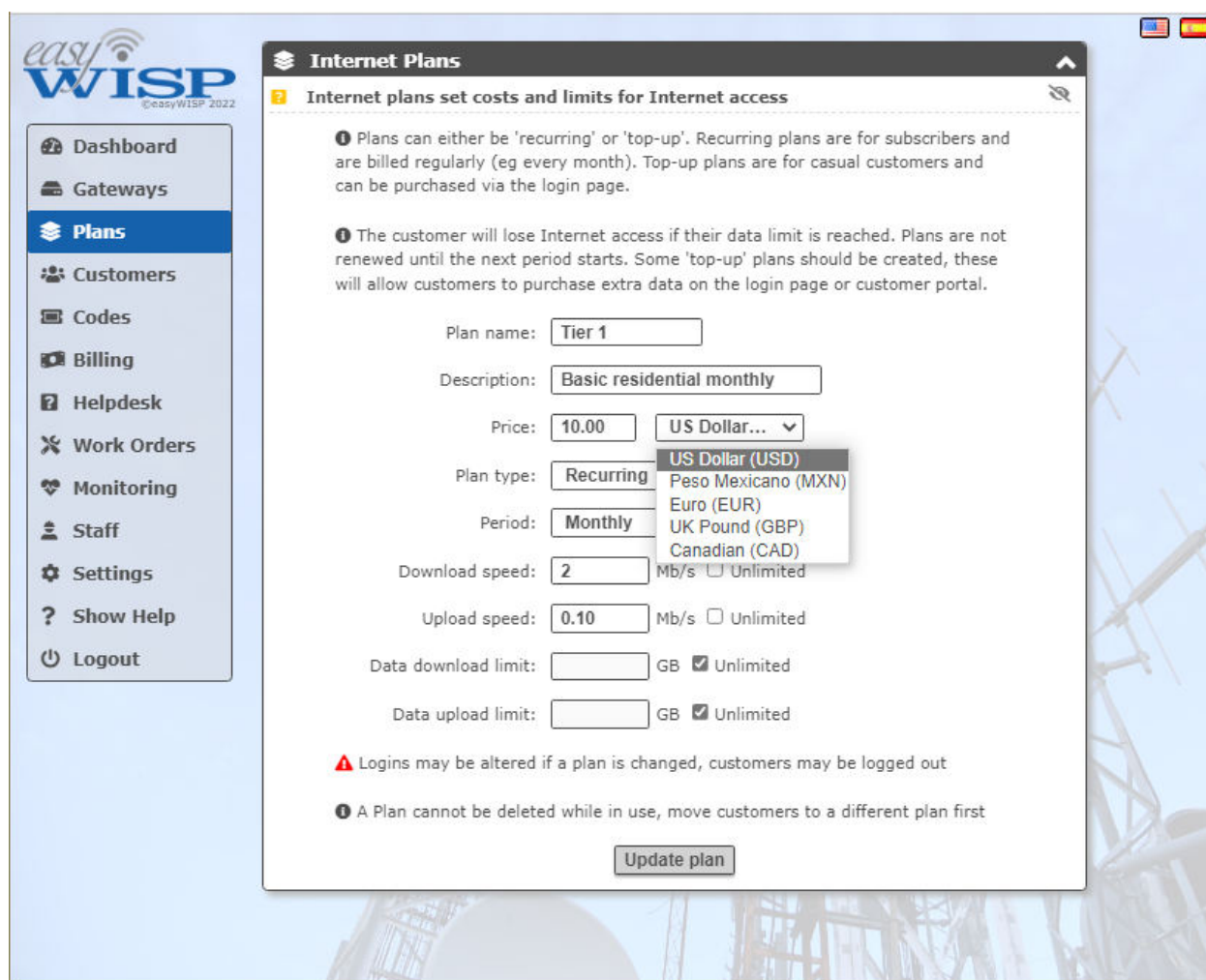
Click on the button 'add new plan' to create a new billing rate plan. The new rate plan screen is shown in the next figure.

The parameters required to create a rate plan are as follows:

- Rate plan name (usually the name given to commercialize the service).
- Description of the rate plan (e.g. for small and medium businesses, for residential subscribers).
- Charge for the rate plan (e.g. a monthly charge if the billing cycle is monthly)
- Currency for the charge (five currencies are currently available, see the drop down list in the next figure).
- Rate plan type, usually recurring is selected.
- Period is the duration of the billing cycle (e.g. one calendar month, 12 charges per year).
- Download speed (in Kb/s however speeds are provided to subscribers in Mb/s, e.g. 1000Kb/s), or check the box if no speed limit.

- Upload speed (in Kb/s however speeds are provided to subscribers in Mb/s, e.g. 1000Kb/s), or check the box if no speed limit.
- Data download limit (the maximum number of bytes that can be downloaded during each billing cycle).
- Data upload limit (the maximum number of bytes that can be uploaded during each billing cycle).

The next figure shows the currency alternatives in the drop-down menu.



Internet Plans

Internet plans set costs and limits for Internet access

Plans can either be 'recurring' or 'top-up'. Recurring plans are for subscribers and are billed regularly (eg every month). Top-up plans are for casual customers and can be purchased via the login page.

The customer will lose Internet access if their data limit is reached. Plans are not renewed until the next period starts. Some 'top-up' plans should be created, these will allow customers to purchase extra data on the login page or customer portal.

Plan name:

Description:

Price:

Plan type:

Period:

Download speed: Mb/s ☐ Unlimited

Upload speed: Mb/s ☐ Unlimited

Data download limit: GB ☒ Unlimited

Data upload limit: GB ☒ Unlimited

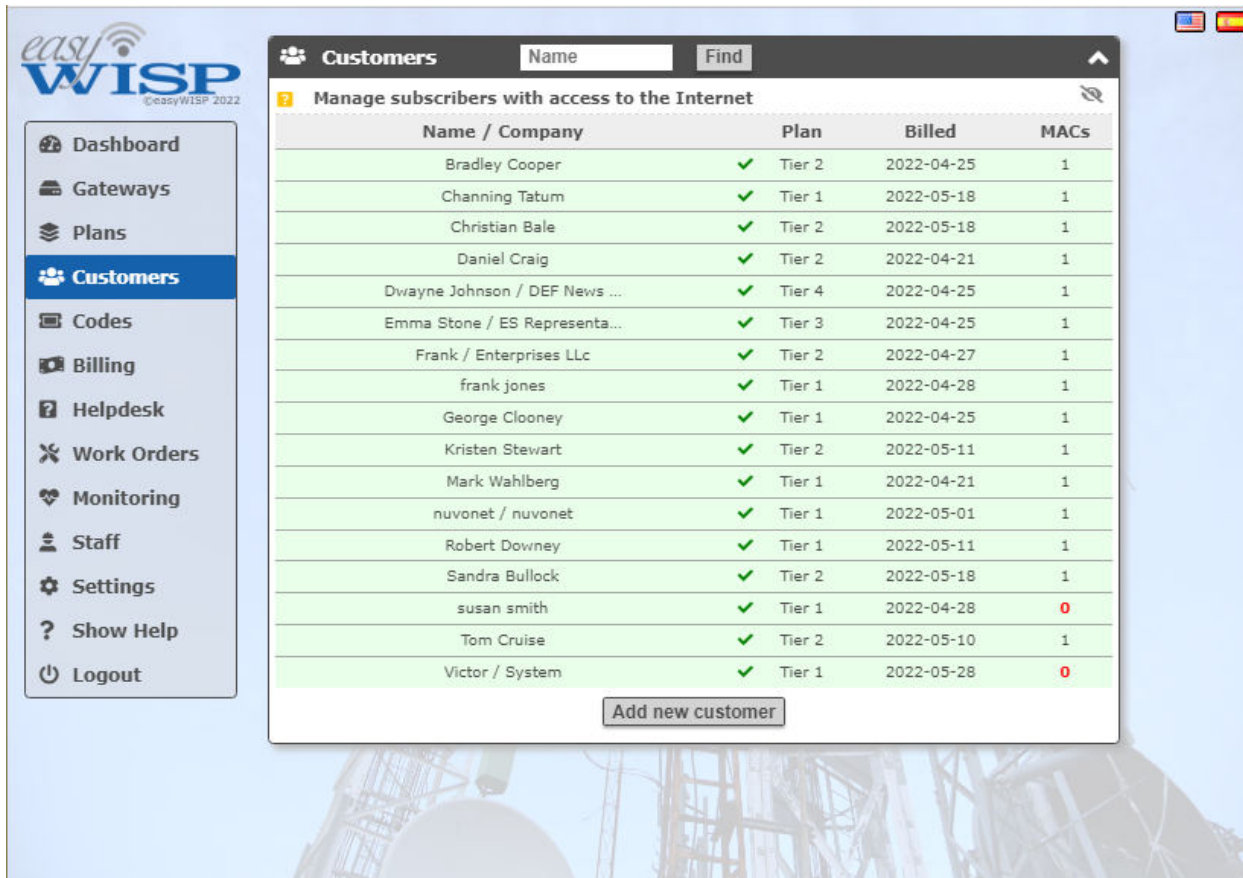
Logins may be altered if a plan is changed, customers may be logged out

A Plan cannot be deleted while in use, move customers to a different plan first

In some locations or countries the ISP may charge the WISP for the data connection per Mbyte or Gbyte downloaded. If this is the case the WISP should put a download and upload data cap on users to prevent costs spiraling out of control. The WISP can charge different prices for each data cap. The subscriber who reaches the data cap before the end of the billing cycle can purchase additional data, which is sold as an access code that is entered in a login page. The login page is shown at the end of the billing section.

5.5. Customers (subscribers).

Click on the customer entry on the main menu tab to see a list of subscribers associated with the Cloud account. This is shown on the following screen with subscribers who have been added to the account.




Name / Company	Plan	Billed	MACs
Bradley Cooper	✓ Tier 2	2022-04-25	1
Channing Tatum	✓ Tier 1	2022-05-18	1
Christian Bale	✓ Tier 2	2022-05-18	1
Daniel Craig	✓ Tier 2	2022-04-21	1
Dwayne Johnson / DEF News ...	✓ Tier 4	2022-04-25	1
Emma Stone / ES Representa...	✓ Tier 3	2022-04-25	1
Frank / Enterprises LLC	✓ Tier 2	2022-04-27	1
frank jones	✓ Tier 1	2022-04-28	1
George Clooney	✓ Tier 1	2022-04-25	1
Kristen Stewart	✓ Tier 2	2022-05-11	1
Mark Wahlberg	✓ Tier 1	2022-04-21	1
nuvonet / nuvonet	✓ Tier 1	2022-05-01	1
Robert Downey	✓ Tier 1	2022-05-11	1
Sandra Bullock	✓ Tier 2	2022-05-18	1
susan smith	✓ Tier 1	2022-04-28	0
Tom Cruise	✓ Tier 2	2022-05-10	1
Victor / System	✓ Tier 1	2022-05-28	0

Add new customer

Click on the 'add new customer' button to add a subscriber. The next screen will be displayed.

Customer details include name, email, company name (if a business customer), telephone, and complete address. It is important to obtain the customers email address as the Cloud system will send a welcome message to the customer.



- Dashboard
- Gateways
- Plans
- Customers**
- Codes
- Billing
- Helpdesk
- Work Orders
- Monitoring
- Staff
- Settings
- Show Help
- Logout

Customers

Name

Find

Manage subscribers with access to the Internet

Customer details:

Name:
Email:
Verify Email:
Company Name:
Telephone:
Address:
Address (cont):
City:
State:
ZIP / Postcode:
Country:

Customer portal credentials:

Customer portal:
Username:

☒ Leave password box empty to auto-generate in welcome email

Password:

Customer welcome email:

If an email address is provided a welcome email can be sent to the customer. The email includes a username and auto-generated password to manage their account via the customer portal page. If the customer has no email address the details can be printed for the customer.

Welcome subject:

Welcome text:

welcome Bradley Cooper,

Thank-you for joining our network.

An account has been created for you on our customer portal at
<https://fwisp.wisplogin.com>, your login details are as follows:

Username: BradleyCooper
XXXXXXXX will be replaced with new password

Save welcome text:
☐ Save for next customer
☒ Use default

Customer provisioning:

Work order: ☐ Create work order for CPE installation

Assign work to:

Order comments:

Please make the following changes

Internet access management:

Customer enabled: ☒ Internet access allowed

Recurring plans only, a login code can be created for single use

Internet access plan:

Enter same MAC again if access is needed on multiple gateways

Test access from gateway to customer CPE (results on Monitoring page)

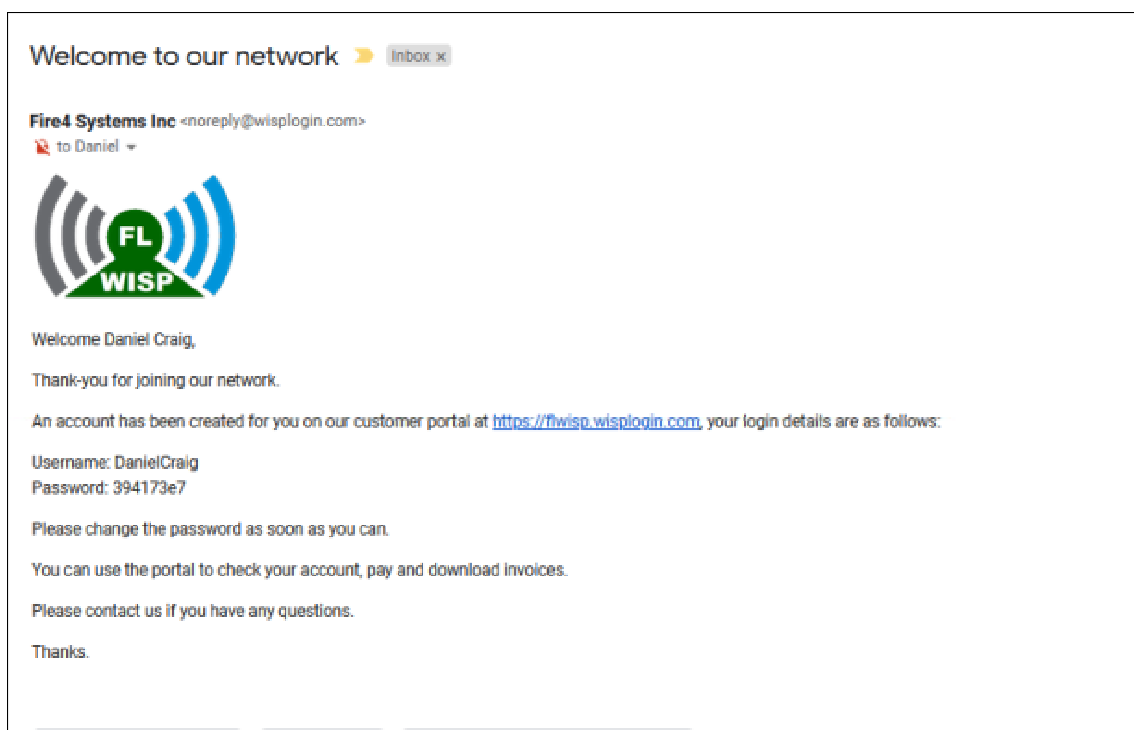
	CPE MAC address	Description	Gateway	Allow
1	<input type="text" value="a8:40:f2:3b:05:03"/>	<input type="text" value="Bradley Cooper res"/>	<input type="text" value="Tower 3..."/>	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

The customer support person will add the new subscriber information to the Cloud account. Alternatively the WISP may prefer the sales person to add the new subscriber information. The following fields should be completed when adding a subscriber to the WISP's account

- Subscriber name.
- Subscriber email. When the subscriber is added Cloud will send a greeting email to this address.
- Company name if a business account, otherwise leave blank.
- Subscribers telephone for contact. This will be required when the field service technician receives the installation work order and schedules an installation date and time with the subscriber.
- Address. This is the address where the CPE radio will be installed.
- Customer portal username. This is created by the WISP and is a service for the subscriber to login to see account information, send support requests and make on-line payments.
- The portal password field is left blank; Cloud will send a password for the portal with the greeting message. The WISP has no access to the subscriber's portal password.
- Welcome subject and welcome text; the WISP can personalize the welcome message that will be sent to the subscriber.
- Check the box to save the welcome text that the WISP has prepared and will be used for subsequent subscribers.
- Customer provisioning, check the box to create a work order.
- Assign work to; the drop-down menu lists the staff who can be selected to send the work order to, this will be a field service technician or the technical manager.
- Other comments is a box to provide additional information to add to the work order, for example, the subscriber might advise that there is a vicious dog locked in the house yard to want the technician who will do the CPE installation.
- The Internet access management checkbox enables Internet access for the subscriber. The WISP might want to wait until the subscriber has given the first month payment before activating the subscriber.
- The Internet access plan can be selected from the drop down menu, this is the data speed and price plan or tier that was chosen by the subscriber.
- The CPE MAC address is entered when available; this MAC address will be authenticated by the easyWISP access controller. The field service engineer can add the CPE MAC address during installation if desired.

- The description field is optional but should provide additional information that a field service technician might need in the event that the link fails and requires service.
- The easyWISP gateway that will service the subscriber is selected from the drop down list
- The allow box is checked to allow the easyWISP gateway to accept access from the CPE radio.
- Finally the update button is clicked to enter this subscriber into the subscriber database. Note that the subscriber information can be modified at any time that the subscriber information changes.

An example of a welcome email message is shown below;



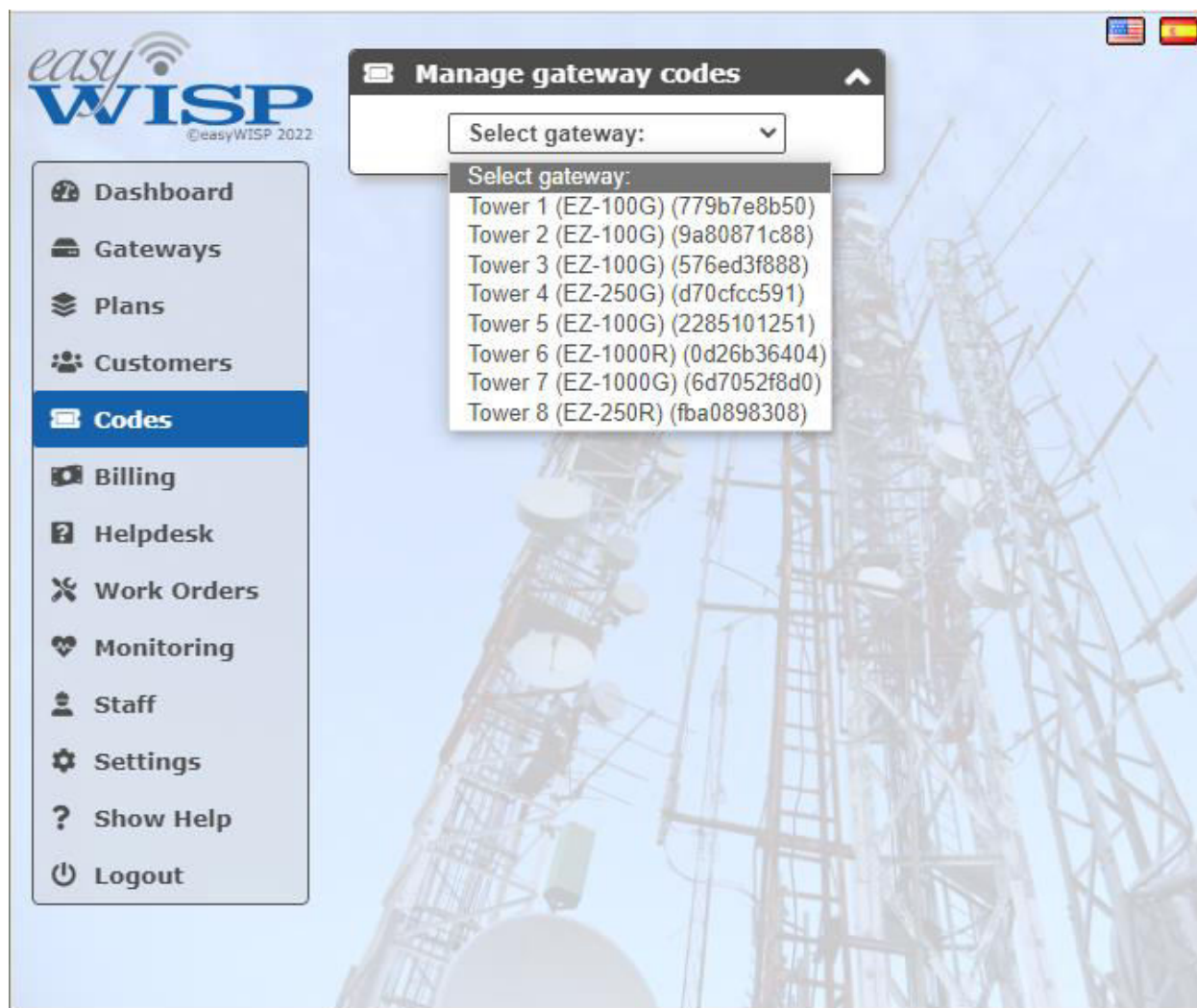
Each subscriber has access to the CRM (customer relationship management) portal. This is a WISP branded website where the subscriber can access information about the account, and make payments on-line. The customer can also send support request messages to the WISP. The customer portal is configured by the WISP when the Cloud account is created:

<http://<wispname>.wisplogin.com>

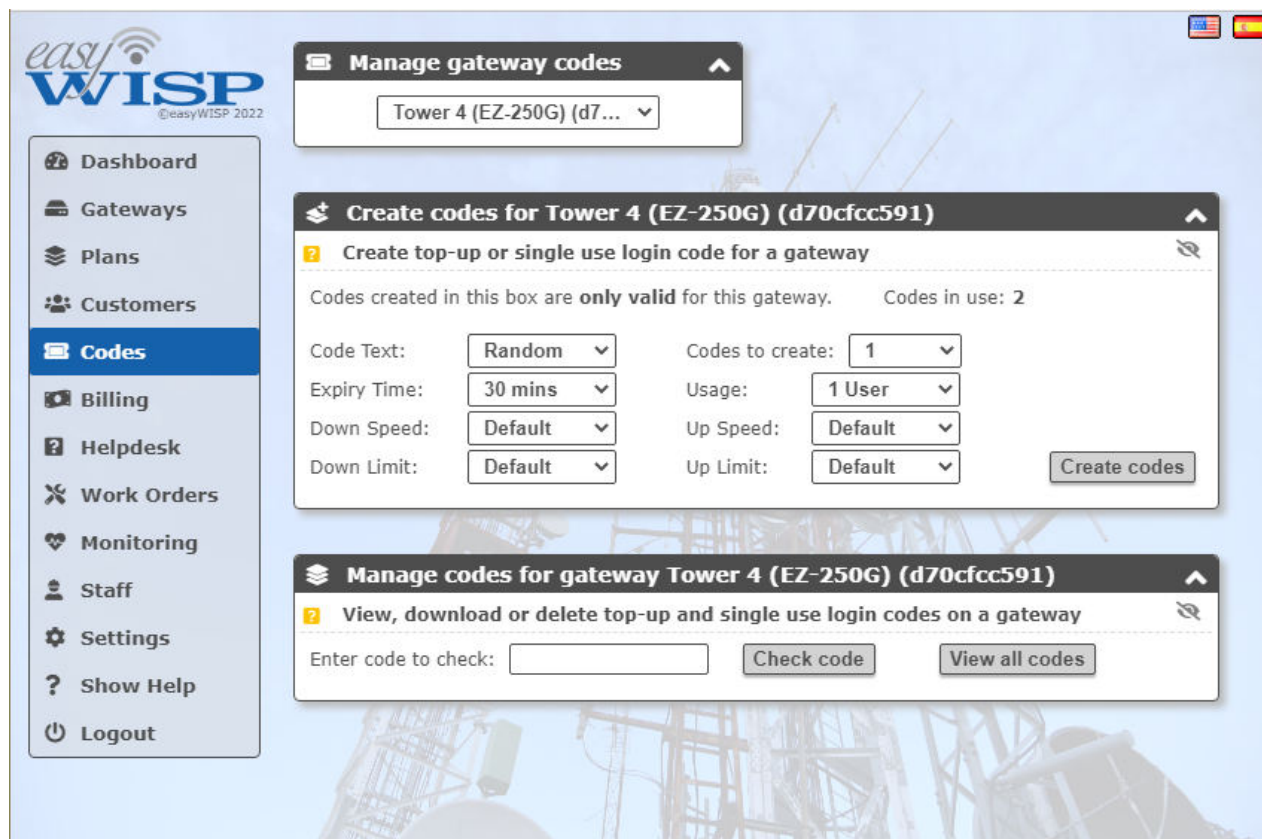
Each subscriber is given a username that is created by the WISP for access to the CRM portal. A password is sent to the subscriber in the welcome message. The WISP does not know the subscribers password.

5.6. Codes and Hotspot access.

In addition to the subscriber management the easyWISP Cloud system supports Hotspot login. This Internet connection method is for anonymous customers and no provisioning and activation is required. This method of access is popular for Internet by voucher applications. The wireless Hotspot service must have a dedicated wireless access point configured without encryption. The wireless access point that provides the service for subscribers is configured with encryption. A Hotspot subscriber is recognized because the MAC address of the user is not found in the list of subscriber MAC addresses, this list of MAC addresses is in the Cloud subscriber database. In this case the user will be redirected to a captive portal and see a custom login page with the options to enter an access code or purchase an access code online. Access codes are generated by the easyWISP Cloud and can only be used to access the easyWISP gateway specified. When 'codes' is selected in the menu a box permits the gateway to be selected where the codes will be used, as shown in the screen below.



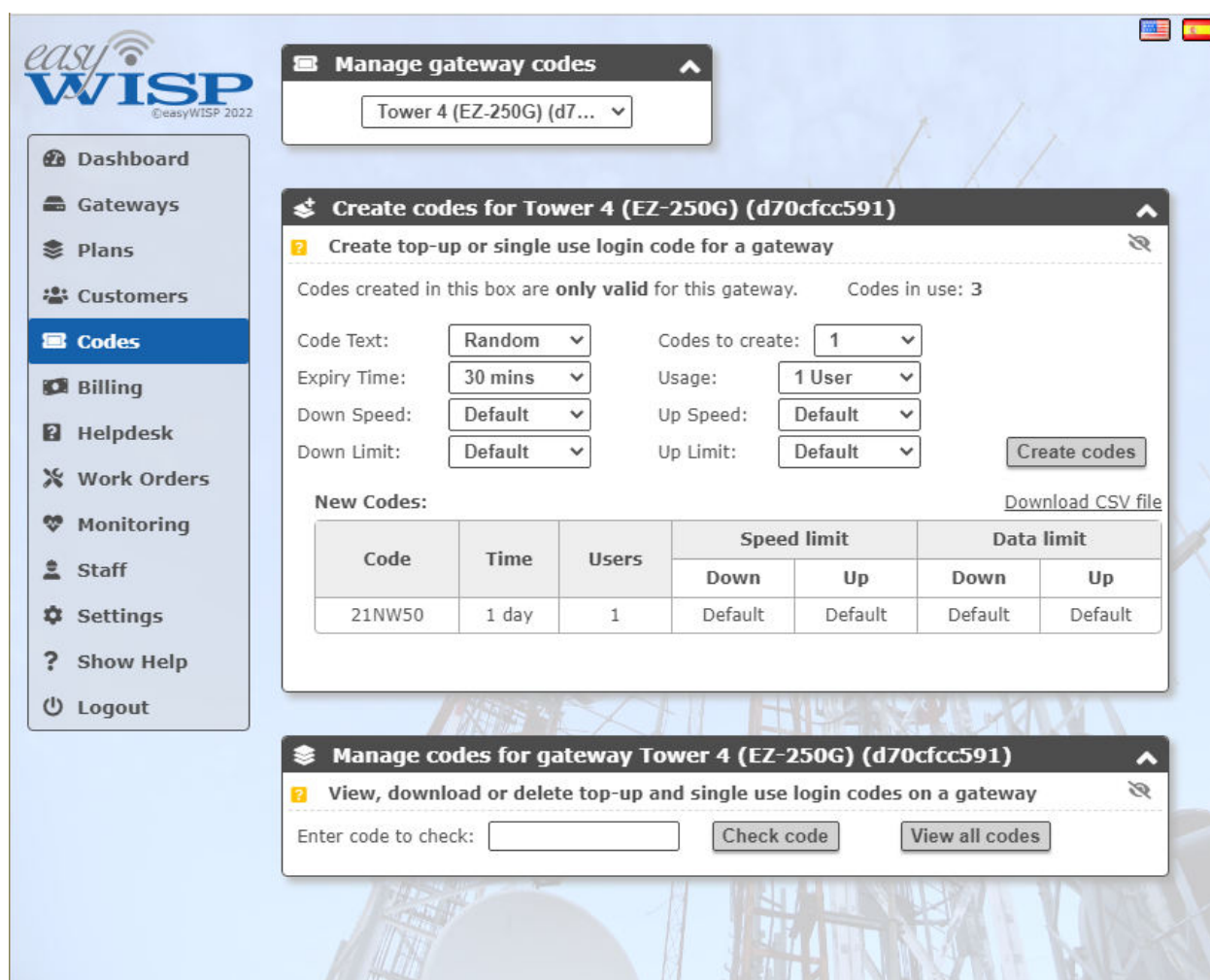
The codes menu permits access codes to be generated for a subscriber to use to login to the network. Codes are generated for a specific gateway. Code login is also accessible by subscribers and hotspot users via the login page. When the gateway is selected two boxes open, the first is used to generate one or more codes, the second box is used to check codes that were generated previously.



When generating an access code there are several parameters that must be selected.

- Code text: random or typed. Selecting random will generate a series of alpha-numeric characters that the customer with type into the login screen to connect to the network. Alternatively a string of up to 10 alpha-numeric characters can be entered to generate one specific access code.
- Number of cods to create: If 'random' has been selected then a number of random codes from 1 to 10,000 can be selected and subsequently generated.
- Expiry time: A drop-down menu permits the duration of the code to be selected from 30 minutes to 180 days and also any value can be entered if desired. The code starts counting down from the data and time of first use, and the count-down cannot be suspended.
- Usage: The number of users who can use the access code simultaneously. A drop-down menu permits the selection of from 1 to 6 users, or unlimited users.

- Down speed: This is the maximum download speed that is permitted for the code(s) generated. The download speed can be selected from the drop-down menu, or a download speed is entered.
- Up speed: This is the maximum upload speed that is permitted for the code(s) generated. The upload speed can be selected from the drop-down menu, or an upload speed is entered.
- Down limit: This is the maximum download byte count that is permitted for the code(s) generated. The download byte count can be selected from the drop-down menu, or a download byte count is entered.
- Up limit: This is the maximum upload byte count that is permitted for the code(s) generated. The upload byte count can be selected from the drop-down menu, or an upload byte count is entered.
- Create codes button: clicking this button will generate the list of codes requested, as shown in the screen.



Manage gateway codes

Tower 4 (EZ-250G) (d70cfcc591)

Create codes for Tower 4 (EZ-250G) (d70cfcc591)

Create top-up or single use login code for a gateway

Codes created in this box are **only valid** for this gateway. Codes in use: 3

Code Text: Codes to create:

Expiry Time: Usage:

Down Speed: Up Speed:

Down Limit: Up Limit:

New Codes: [Download CSV file](#)

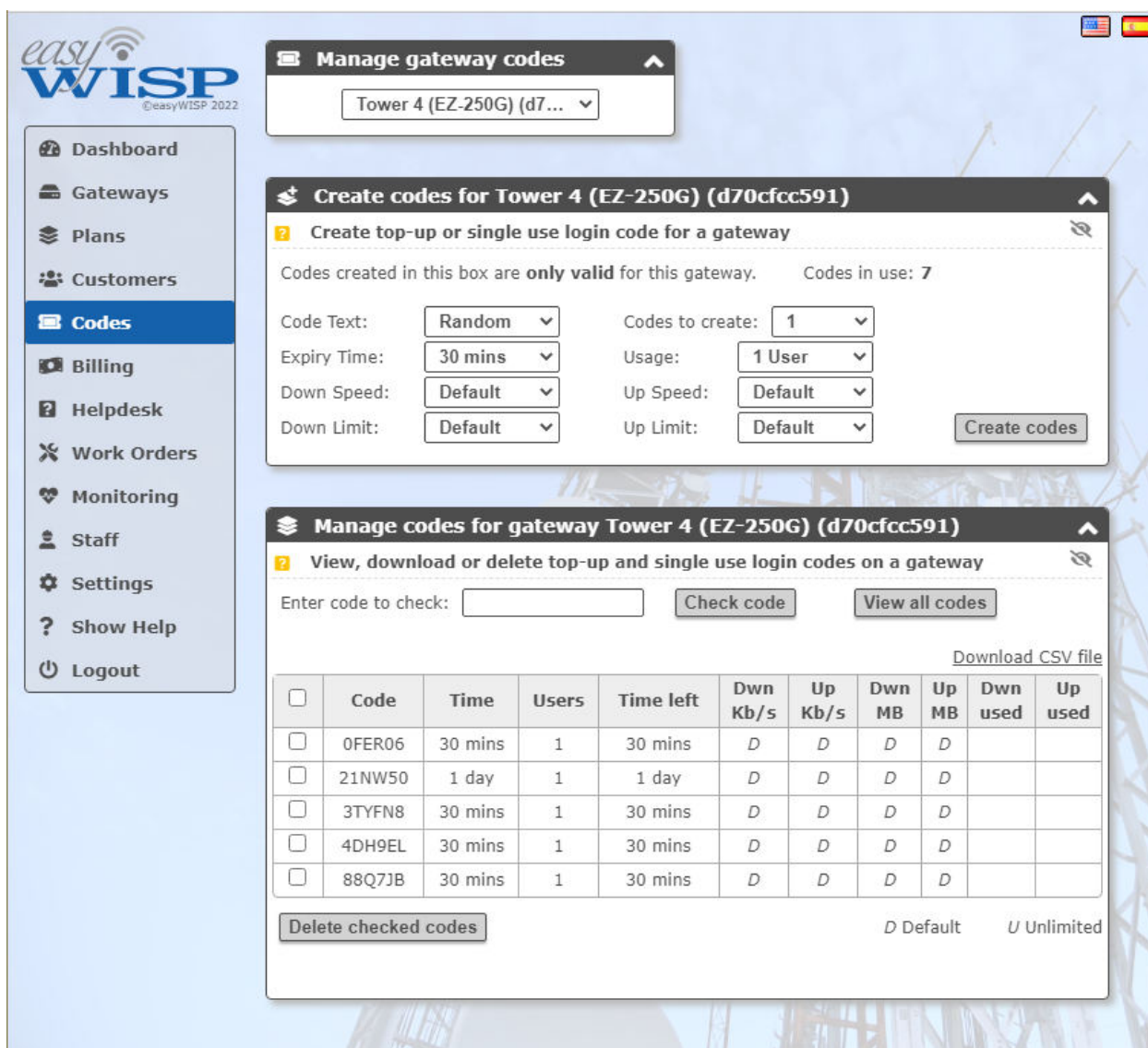
Code	Time	Users	Speed limit		Data limit	
			Down	Up	Down	Up
21NW50	1 day	1	Default	Default	Default	Default

Manage codes for gateway Tower 4 (EZ-250G) (d70cfcc591)

View, download or delete top-up and single use login codes on a gateway

Enter code to check:

Access codes that were generated previously can be viewed in the manage codes box. A search can be made for a specific code by typing it in to the enter code box and clicking the check code button, the code will be listed if found. The view all codes button can be clicked which will list all codes generated for the gateway. The characteristics of the code are displayed plus the time remaining for the code and the upload byte count and download byte count used. This is shown in the screen below.



The screenshot shows the EasyWISP web interface. On the left is a sidebar menu with options: Dashboard, Gateways, Plans, Customers, **Codes** (selected), Billing, Helpdesk, Work Orders, Monitoring, Staff, Settings, Show Help, and Logout. The main content area has a header 'Manage gateway codes' with a dropdown menu showing 'Tower 4 (EZ-250G) (d7...'. Below this is a section titled 'Create codes for Tower 4 (EZ-250G) (d70cfcc591)' with a sub-header 'Create top-up or single use login code for a gateway'. It states 'Codes created in this box are **only valid** for this gateway. Codes in use: 7'. There are two columns of dropdown menus for configuration: Code Text (Random), Expiry Time (30 mins), Down Speed (Default), Down Limit (Default), Codes to create (1), Usage (1 User), Up Speed (Default), and Up Limit (Default). A 'Create codes' button is at the bottom right. Below this is another section titled 'Manage codes for gateway Tower 4 (EZ-250G) (d70cfcc591)' with a sub-header 'View, download or delete top-up and single use login codes on a gateway'. It includes an 'Enter code to check:' input field, a 'Check code' button, and a 'View all codes' button. A 'Download CSV file' link is also present. A table displays the list of codes with columns: Code, Time, Users, Time left, Dwn Kb/s, Up Kb/s, Dwn MB, Up MB, Dwn used, and Up used. The table contains five rows of codes. At the bottom of the table is a 'Delete checked codes' button and a legend: 'D Default' and 'U Unlimited'.

<input type="checkbox"/>	Code	Time	Users	Time left	Dwn Kb/s	Up Kb/s	Dwn MB	Up MB	Dwn used	Up used
<input type="checkbox"/>	0FER06	30 mins	1	30 mins	D	D	D	D		
<input type="checkbox"/>	21NW50	1 day	1	1 day	D	D	D	D		
<input type="checkbox"/>	3TYFN8	30 mins	1	30 mins	D	D	D	D		
<input type="checkbox"/>	4DH9EL	30 mins	1	30 mins	D	D	D	D		
<input type="checkbox"/>	88Q7JB	30 mins	1	30 mins	D	D	D	D		

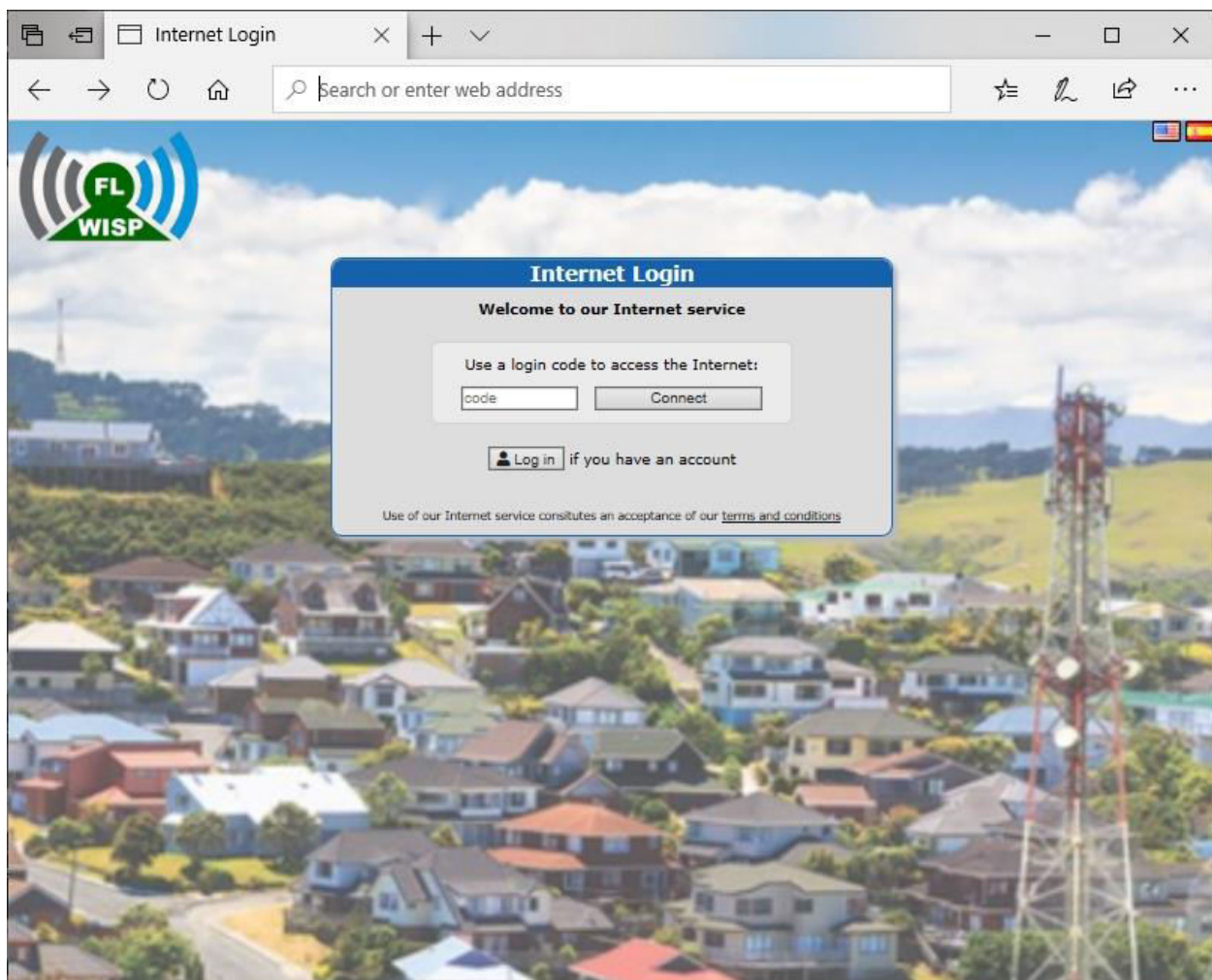
D Default U Unlimited

Codes are entered into a login screen for two reasons.

The first case occurs when a subscriber has used the upload or download byte count allocated to the account, or else the billing period has expired and the subscriber has not paid for the subsequent billing period.

The second case occurs for hotspot login. In this case the PtMP antenna is not encrypted and the user is connecting a mobile device directly to the PtMP antenna. When the MAC address is not recognized the login screen is displayed.

The login screen is shown in the figure below.

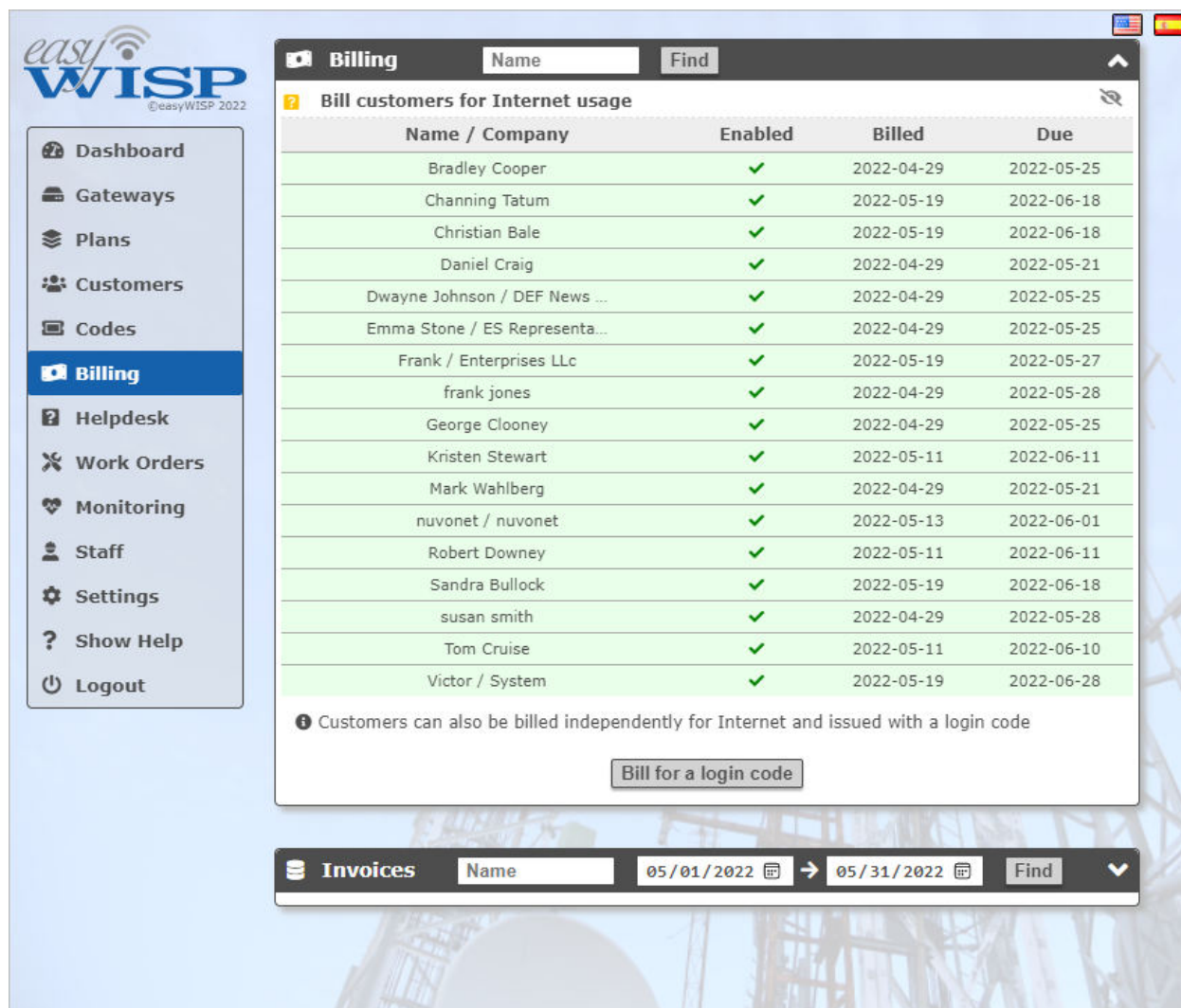


5.7. Billing.

The billing menu is used to track the billing status of subscribers, to issue invoices for subscribers, and to register a payment for a subscriber. If the subscribers account becomes past due then the subscriber loses access to the Internet and will see a login page.

The billing system has been designed for both pre-pay and post-pay billing; the WISP will make the decision to choose the pre-pay or post pay business model.

Clicking the billing tab in the menu will open the billing screen. Subscribers are listed in the billing box and are shown in green when subscribers are paid to date and red when past due.



The screenshot shows the EasyWISP Billing interface. On the left is a sidebar menu with options: Dashboard, Gateways, Plans, Customers, Codes, **Billing** (selected), Helpdesk, Work Orders, Monitoring, Staff, Settings, Show Help, and Logout. The main content area is titled "Billing" and contains a "Name" search field and a "Find" button. Below this is a table titled "Bill customers for Internet usage".

Name / Company	Enabled	Billed	Due
Bradley Cooper	✓	2022-04-29	2022-05-25
Channing Tatum	✓	2022-05-19	2022-06-18
Christian Bale	✓	2022-05-19	2022-06-18
Daniel Craig	✓	2022-04-29	2022-05-21
Dwayne Johnson / DEF News ...	✓	2022-04-29	2022-05-25
Emma Stone / ES Representa...	✓	2022-04-29	2022-05-25
Frank / Enterprises LLc	✓	2022-05-19	2022-05-27
frank jones	✓	2022-04-29	2022-05-28
George Clooney	✓	2022-04-29	2022-05-25
Kristen Stewart	✓	2022-05-11	2022-06-11
Mark Wahlberg	✓	2022-04-29	2022-05-21
nuvonet / nuvonet	✓	2022-05-13	2022-06-01
Robert Downey	✓	2022-05-11	2022-06-11
Sandra Bullock	✓	2022-05-19	2022-06-18
susan smith	✓	2022-04-29	2022-05-28
Tom Cruise	✓	2022-05-11	2022-06-10
Victor / System	✓	2022-05-19	2022-06-28

Below the table, there is an information icon and the text: "Customers can also be billed independently for Internet and issued with a login code". A button labeled "Bill for a login code" is located below this text.

At the bottom of the interface, there is an "Invoices" section with a "Name" search field, a date range selector showing "05/01/2022" to "05/31/2022", and a "Find" button.

An invoice can be generated for a subscriber by clicking on the subscriber's name, which will open the screen shown below.

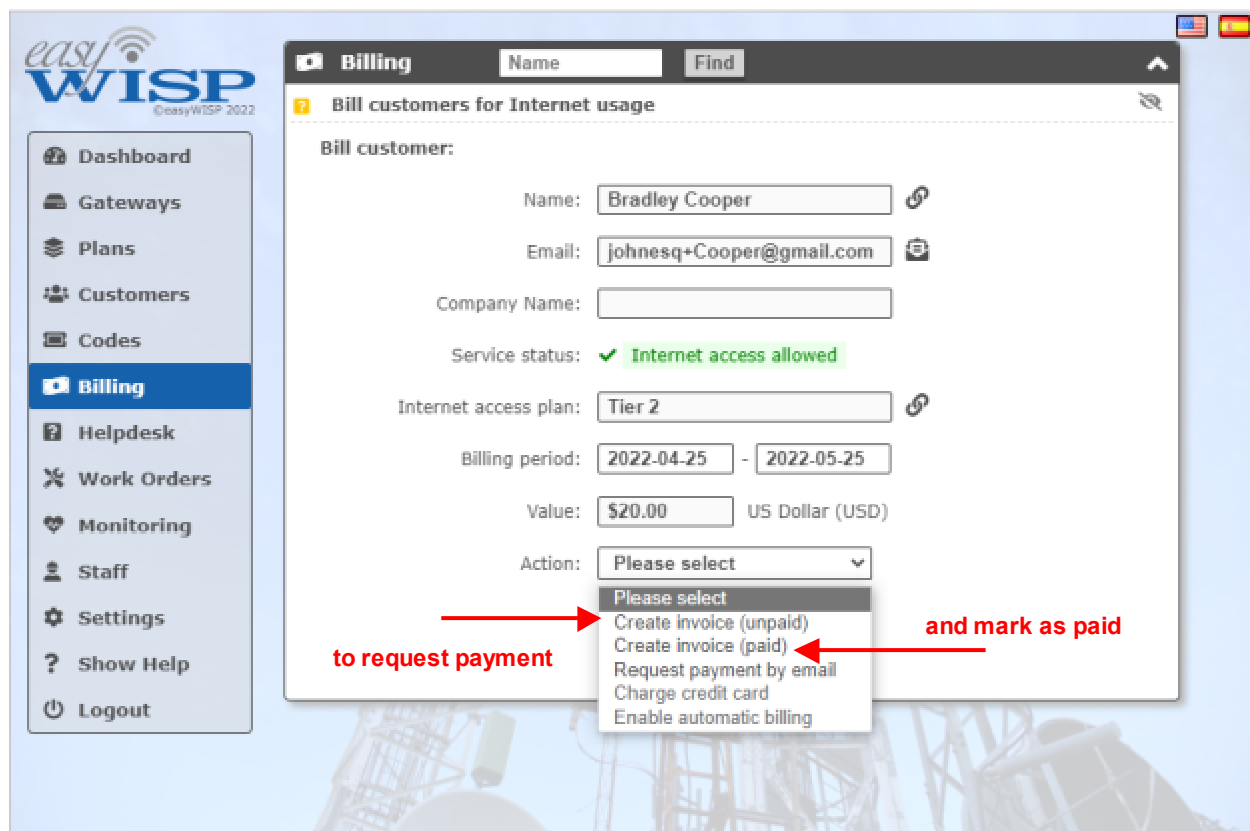
Clicking the Action button will open a drop down menu. There are five options in the drop down menu.

- Create an Invoice (unpaid).
- Create an invoice (paid).
- Request payment by email.
- Charge credit card.
- Enable automatic billing.

Prepaid customers are billed before the start of the billing cycle. Postpaid customers are billed after the end of the billing cycle.

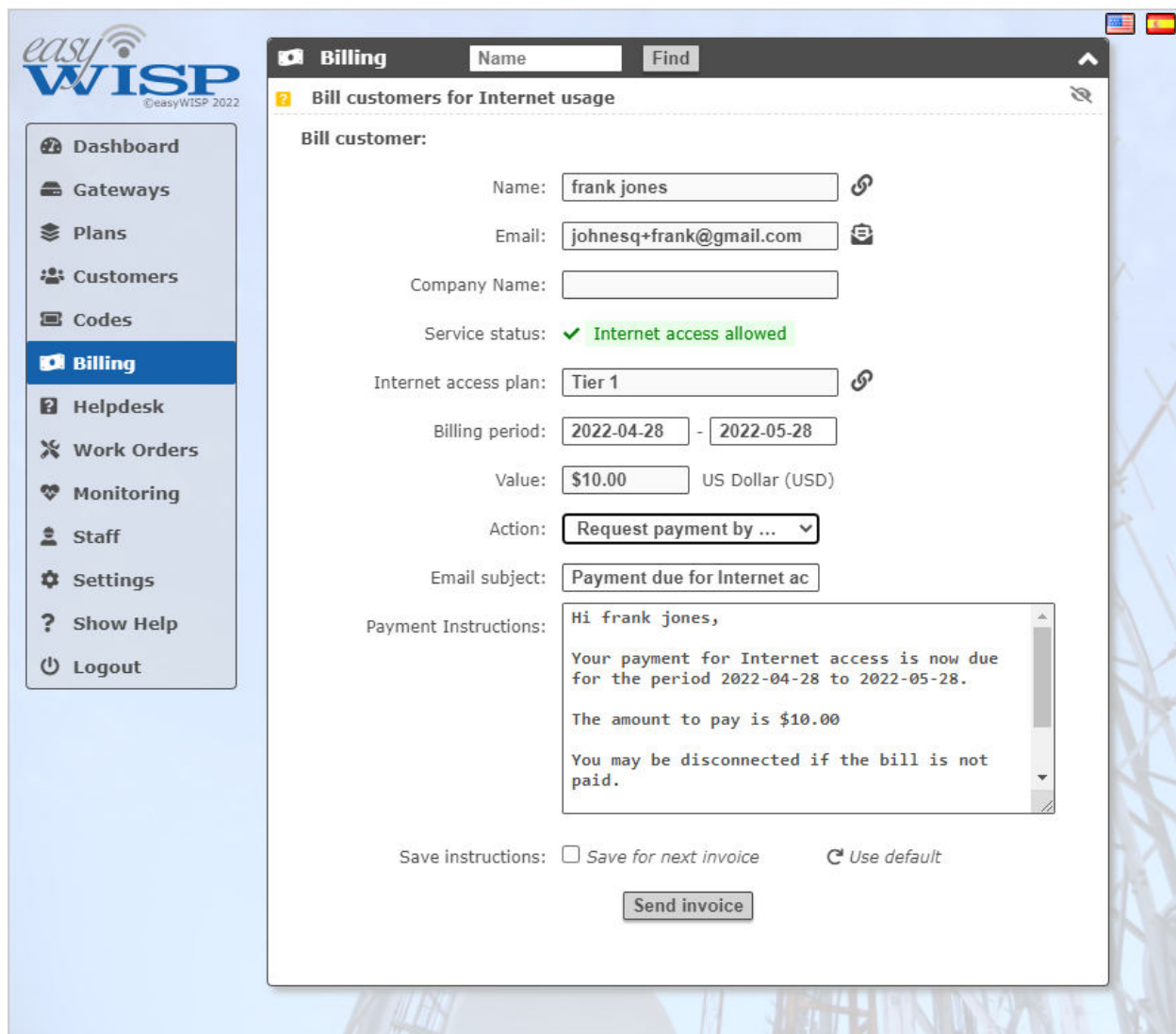
The customer is billed by one of two methods, request payment via email or else create an unpaid invoice and post to the customer.

The screen to select these options is shown below.



A request for payment can be sent by email for payment by cash, check or other means. Upon receipt of payment the WISP then generates a paid invoice, which then updates the billing system that the customer has paid for the billing cycle.

Generation of the request for payment email is shown below.



The screenshot displays the EasyWISP Billing interface. On the left is a sidebar menu with options: Dashboard, Gateways, Plans, Customers, Codes, Billing (selected), Helpdesk, Work Orders, Monitoring, Staff, Settings, Show Help, and Logout. The main content area is titled 'Billing' and 'Bill customers for Internet usage'. It contains a form for creating a bill for a customer named 'frank jones' with email 'johnesq+frank@gmail.com'. The service status is 'Internet access allowed', and the billing period is from 2022-04-28 to 2022-05-28 for a value of \$10.00. The action is set to 'Request payment by ...'. The email subject is 'Payment due for Internet ac'. The payment instructions are: 'Hi frank jones, Your payment for Internet access is now due for the period 2022-04-28 to 2022-05-28. The amount to pay is \$10.00. You may be disconnected if the bill is not paid.' At the bottom, there are checkboxes for 'Save instructions' (unchecked) and 'Save for next invoice' (unchecked), and a 'Send invoice' button.

Billing Name Find

2 Bill customers for Internet usage

Bill customer:

Name: frank jones

Email: johnesq+frank@gmail.com

Company Name:

Service status: ✓ Internet access allowed

Internet access plan: Tier 1

Billing period: 2022-04-28 - 2022-05-28

Value: \$10.00 US Dollar (USD)

Action: Request payment by ...

Email subject: Payment due for Internet ac

Payment Instructions:

Hi frank jones,

Your payment for Internet access is now due for the period 2022-04-28 to 2022-05-28.

The amount to pay is \$10.00

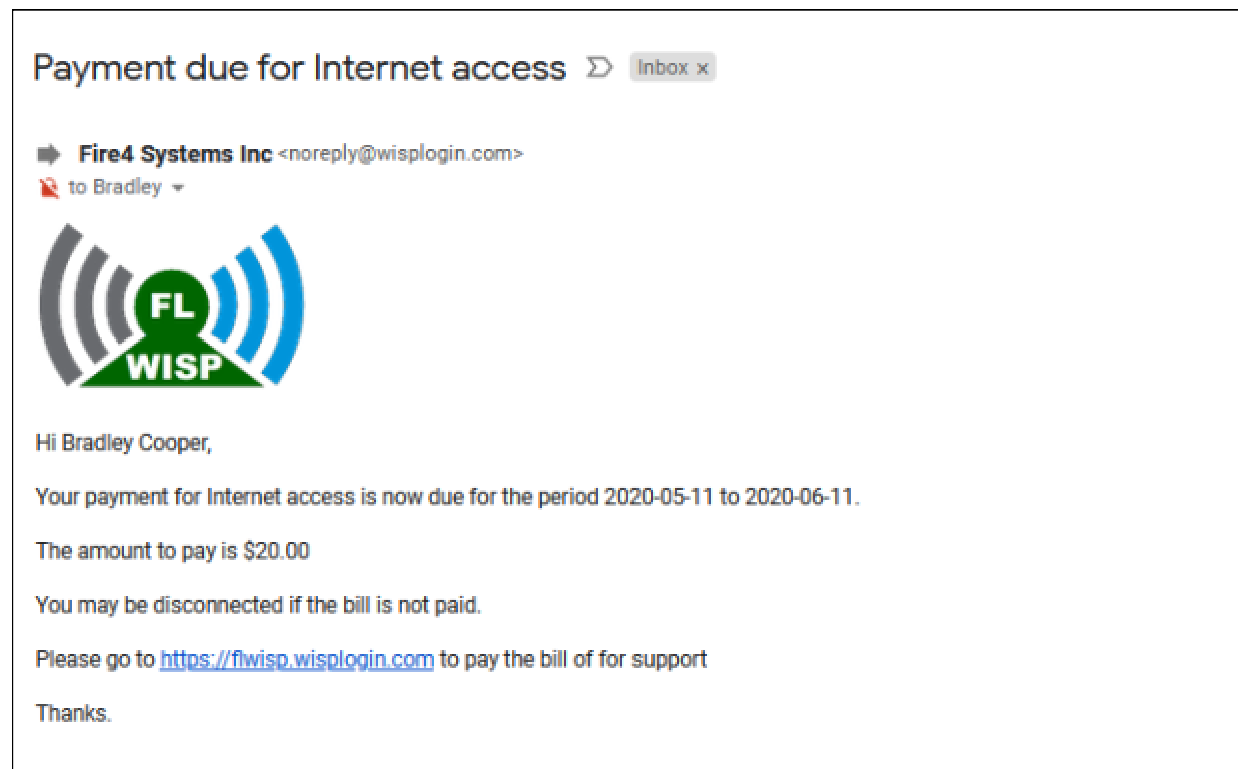
You may be disconnected if the bill is not paid.

Save instructions: ☐ Save for next invoice ☒ Use default

Send invoice

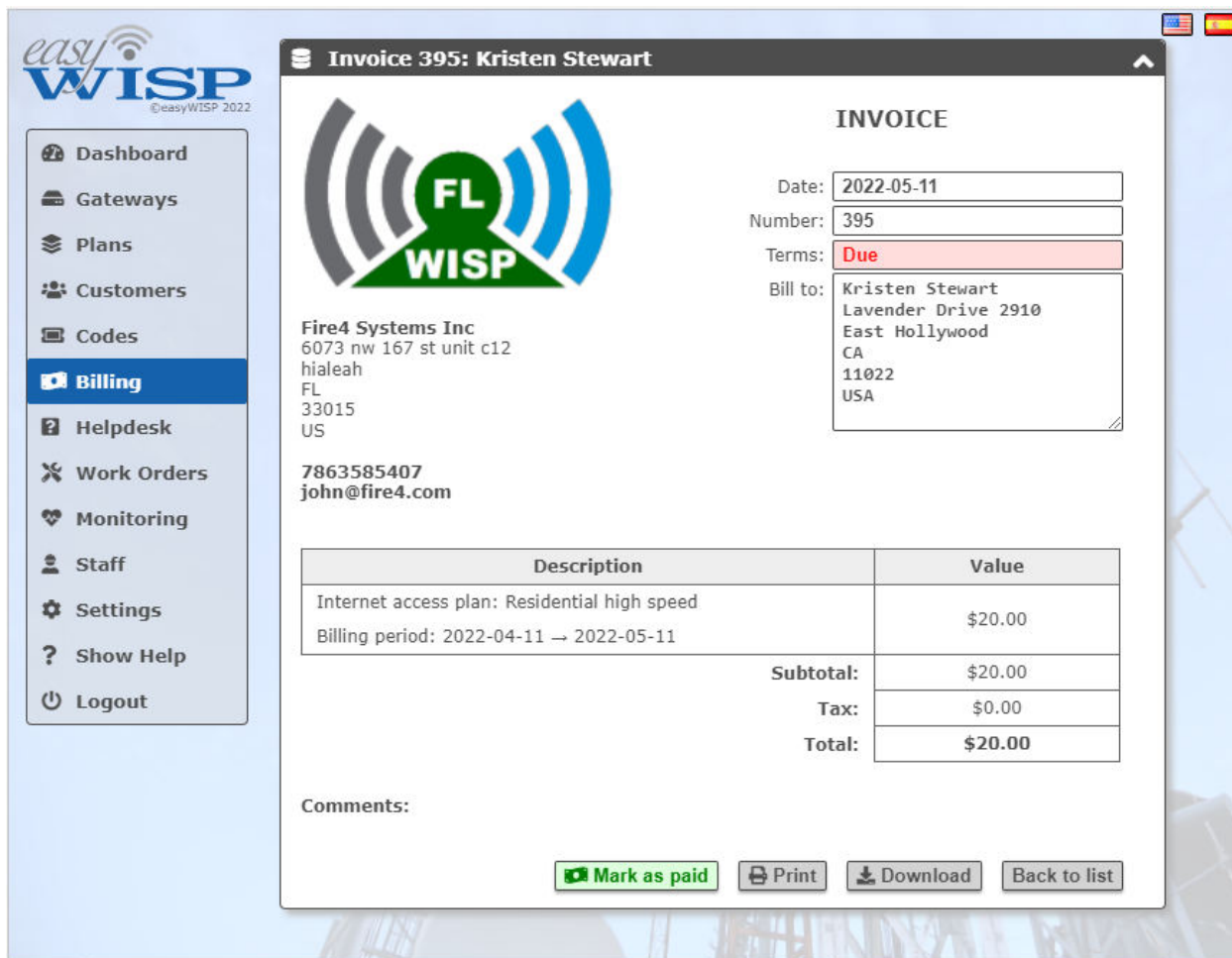
When sending a request for payment the text of the message can be edited. The WISP can save the edited text by checking the box in order to send the message to subsequent subscribers.

An example of an email message requesting payment is shown in the figure below.



In the case where an unpaid invoice is generated then when payment is received the WISP can open the invoice and click the button 'mark as paid'. This will update the billing system that the customer has paid for the billing cycle.

The figure below shows the unpaid invoice that was generated. The WISP clicks the 'mark as paid' button when payment is received.



The screenshot displays the EasyWISP Billing interface. On the left is a sidebar menu with options: Dashboard, Gateways, Plans, Customers, Codes, **Billing** (selected), Helpdesk, Work Orders, Monitoring, Staff, Settings, Show Help, and Logout. The main content area is titled "Invoice 395: Kristen Stewart". It features the Fire4 Systems Inc logo (a green circle with "FL" and "WISP" text) and contact information: 6073 nw 167 st unit c12, hialeah, FL 33015, US, 7863585407, john@fire4.com. To the right, under the heading "INVOICE", are fields for Date (2022-05-11), Number (395), Terms (Due), and Bill to (Kristen Stewart, Lavender Drive 2910, East Hollywood, CA 11022, USA). Below this is a table with two columns: Description and Value.

Description	Value
Internet access plan: Residential high speed	\$20.00
Billing period: 2022-04-11 → 2022-05-11	
Subtotal:	\$20.00
Tax:	\$0.00
Total:	\$20.00


Below the table is a "Comments:" section. At the bottom of the invoice window are four buttons: "Mark as paid" (green), "Print", "Download", and "Back to list".

When the print invoice option is selected the invoice is displayed in the window. The print button sends the invoice to the printer. The download button downloads the invoice as a PDF file.

The invoice can be downloaded as a PDF document and printed or sent to the subscriber. An example of a PDF invoice is shown below.

INVOICE SAMPLE.pdf

Page: 1 / 1 Find:



Fire4 Systems Inc
6073 nw 167 st unit c12
hialeah
FL
33015
US

7863585407
john@fire4.com

INVOICE

Date: 2020-05-22

Number: 1

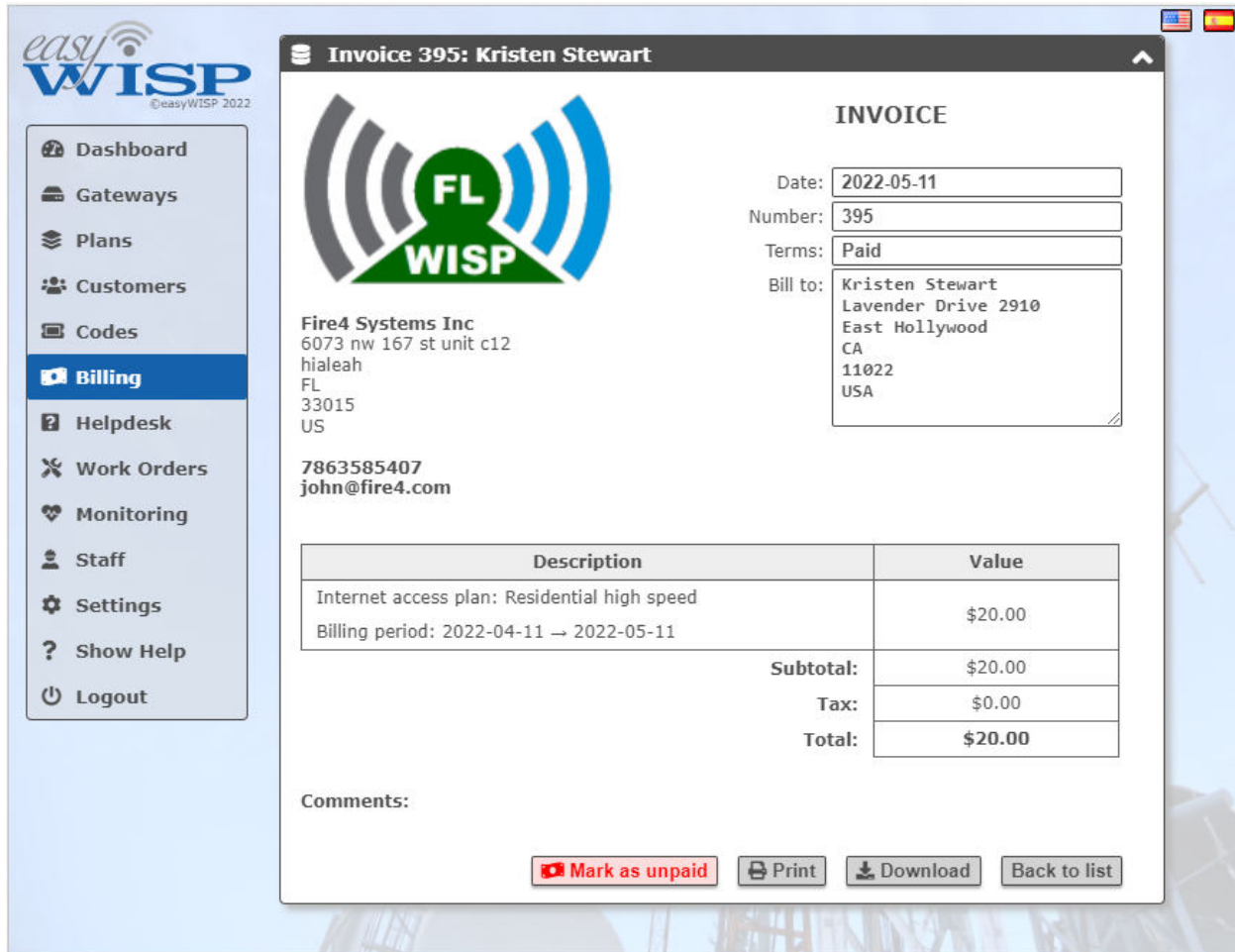
Terms: Paid

Bill to: Bradley Cooper
Mountain Drive 18223
Hollywood
CA
USA
12304

Description	Value
Internet access plan: Residential high speed	\$20.00
Subtotal:	\$20.00
Tax:	\$0.00
Total:	\$20.00

Comments:

The figure below shows the paid invoice that is generated. Note that the invoice status can be change to 'unpaid' is required.



Invoice 395: Kristen Stewart

INVOICE

Date: 2022-05-11
 Number: 395
 Terms: Paid
 Bill to: Kristen Stewart
 Lavender Drive 2910
 East Hollywood
 CA
 11022
 USA

Fire4 Systems Inc
 6073 nw 167 st unit c12
 hialeah
 FL
 33015
 US
 7863585407
 john@fire4.com

Description	Value
Internet access plan: Residential high speed	\$20.00
Billing period: 2022-04-11 → 2022-05-11	
Subtotal:	\$20.00
Tax:	\$0.00
Total:	\$20.00

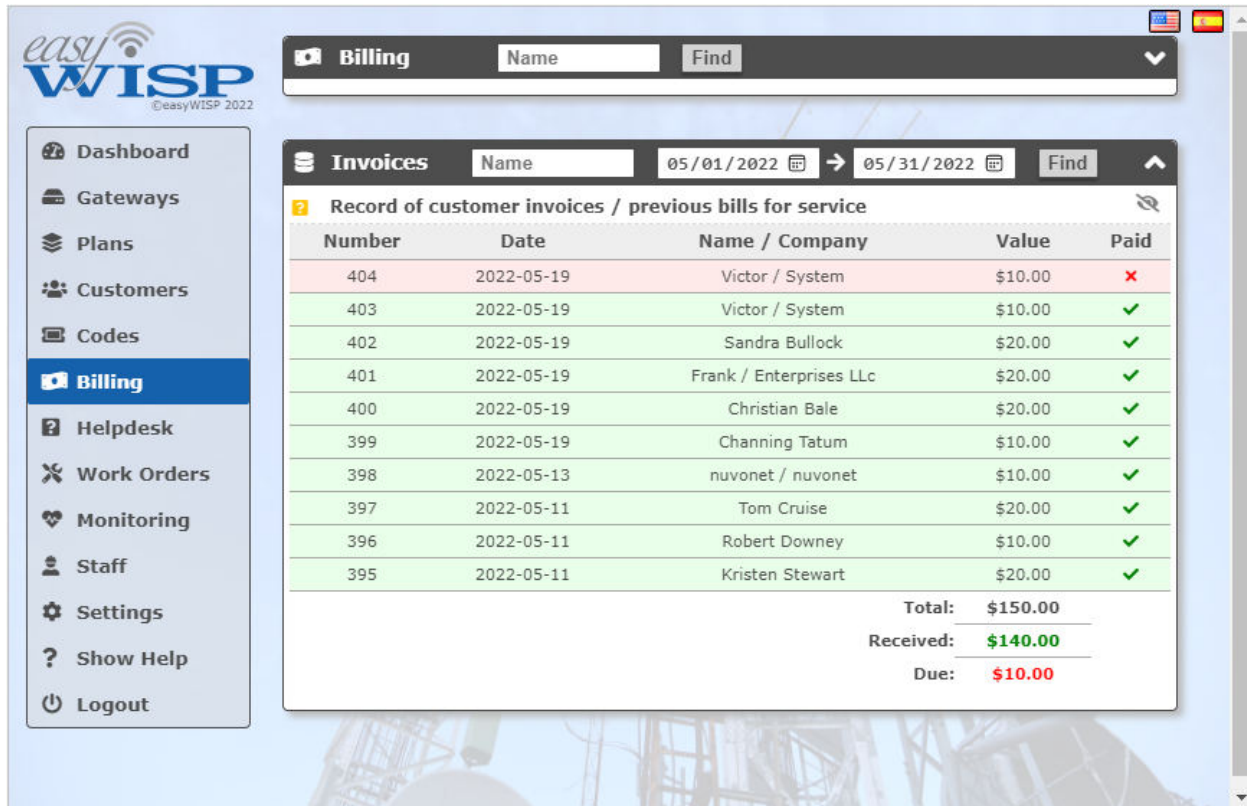
Comments:

[Mark as unpaid](#) [Print](#) [Download](#) [Back to list](#)

If the billing system is not updated by either method the customer Internet access will be disabled when the payment becomes past due.

As invoices are issued they are added to the invoice table shown below.

When subscriber payments are past due then the subscriber entry is shown in red. This is seen in the screen below.



The screenshot displays the EasyWISP Billing interface. On the left is a sidebar menu with options: Dashboard, Gateways, Plans, Customers, Codes, Billing (selected), Helpdesk, Work Orders, Monitoring, Staff, Settings, Show Help, and Logout. The main content area shows the 'Invoices' section with a search bar and date range filters (05/01/2022 to 05/31/2022). Below this is a table titled 'Record of customer invoices / previous bills for service'.

Number	Date	Name / Company	Value	Paid
404	2022-05-19	Victor / System	\$10.00	✗
403	2022-05-19	Victor / System	\$10.00	✓
402	2022-05-19	Sandra Bullock	\$20.00	✓
401	2022-05-19	Frank / Enterprises LLc	\$20.00	✓
400	2022-05-19	Christian Bale	\$20.00	✓
399	2022-05-19	Channing Tatum	\$10.00	✓
398	2022-05-13	nuvonet / nuvonet	\$10.00	✓
397	2022-05-11	Tom Cruise	\$20.00	✓
396	2022-05-11	Robert Downey	\$10.00	✓
395	2022-05-11	Kristen Stewart	\$20.00	✓
Total:			\$150.00	
Received:			\$140.00	
Due:			\$10.00	

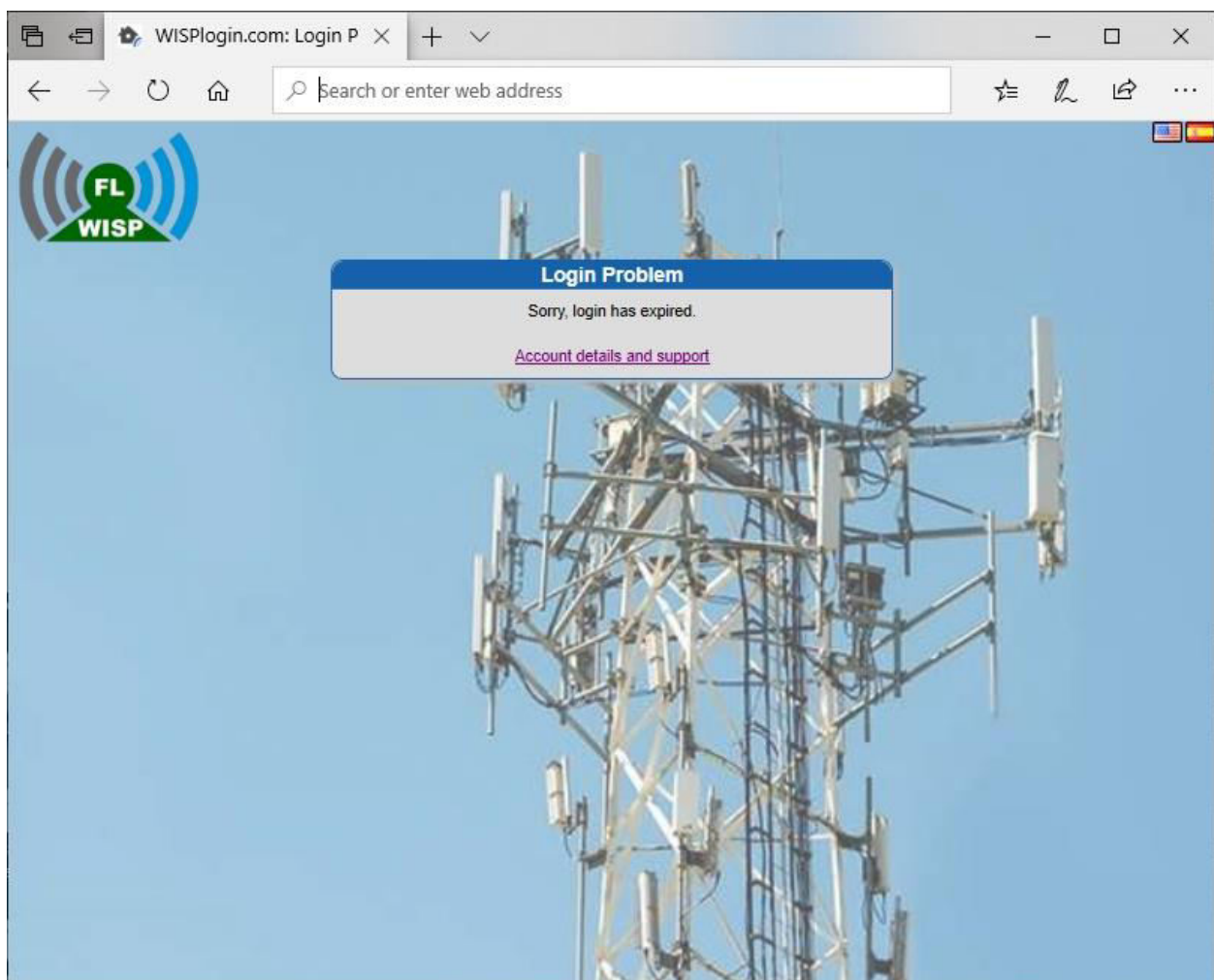
Each subscriber can login to the CRM portal and access the past and due invoices for that subscriber.

There are two cases where the subscriber can be deactivated.

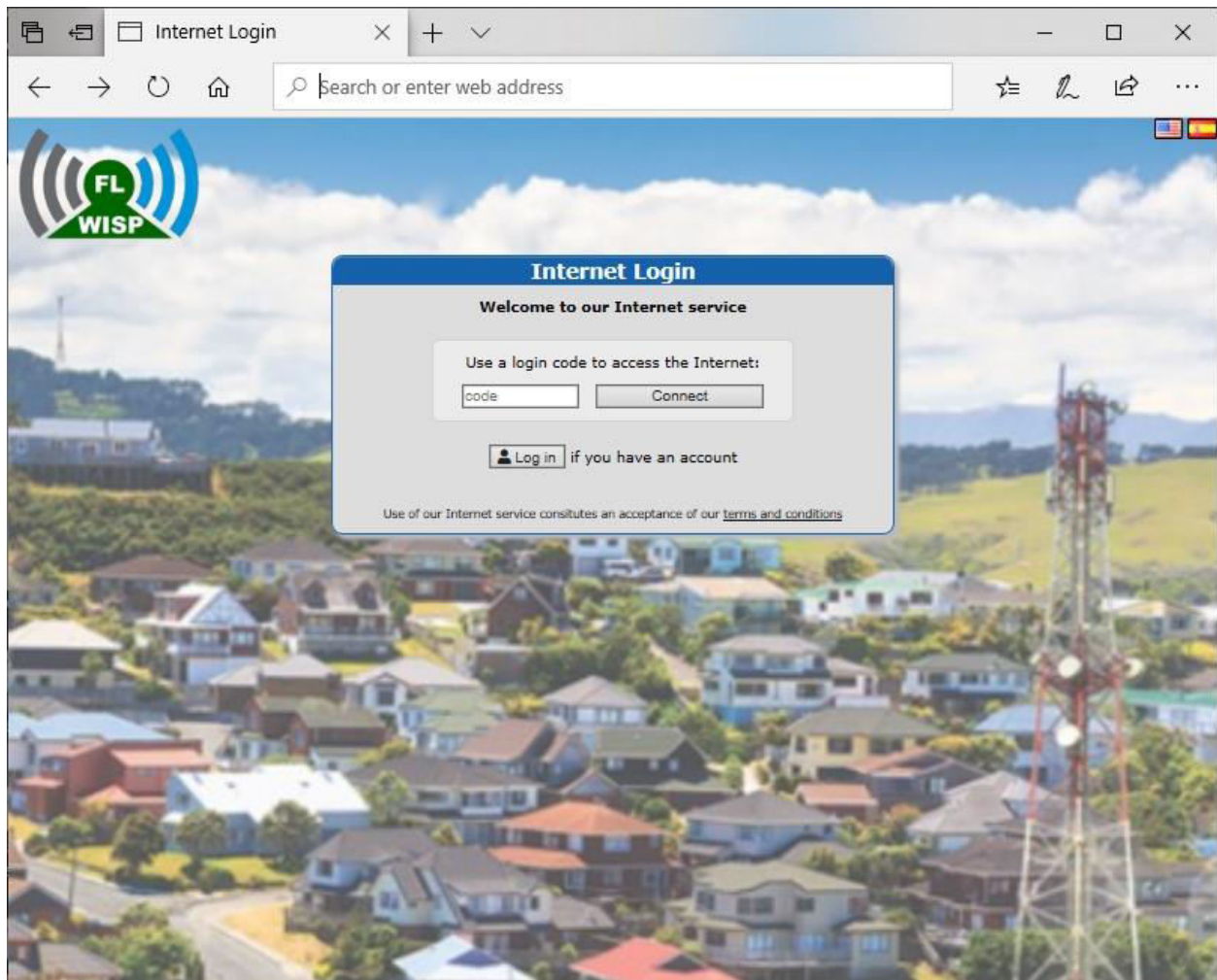
In the case that the subscribers billing period has expired and the account has not been paid then the subscribers access is deactivated.

The subscriber will also be deactivated if a download / upload byte count limit was set for the account and the limit has been reached within the current billing period.

The subscriber will then see the following screen.

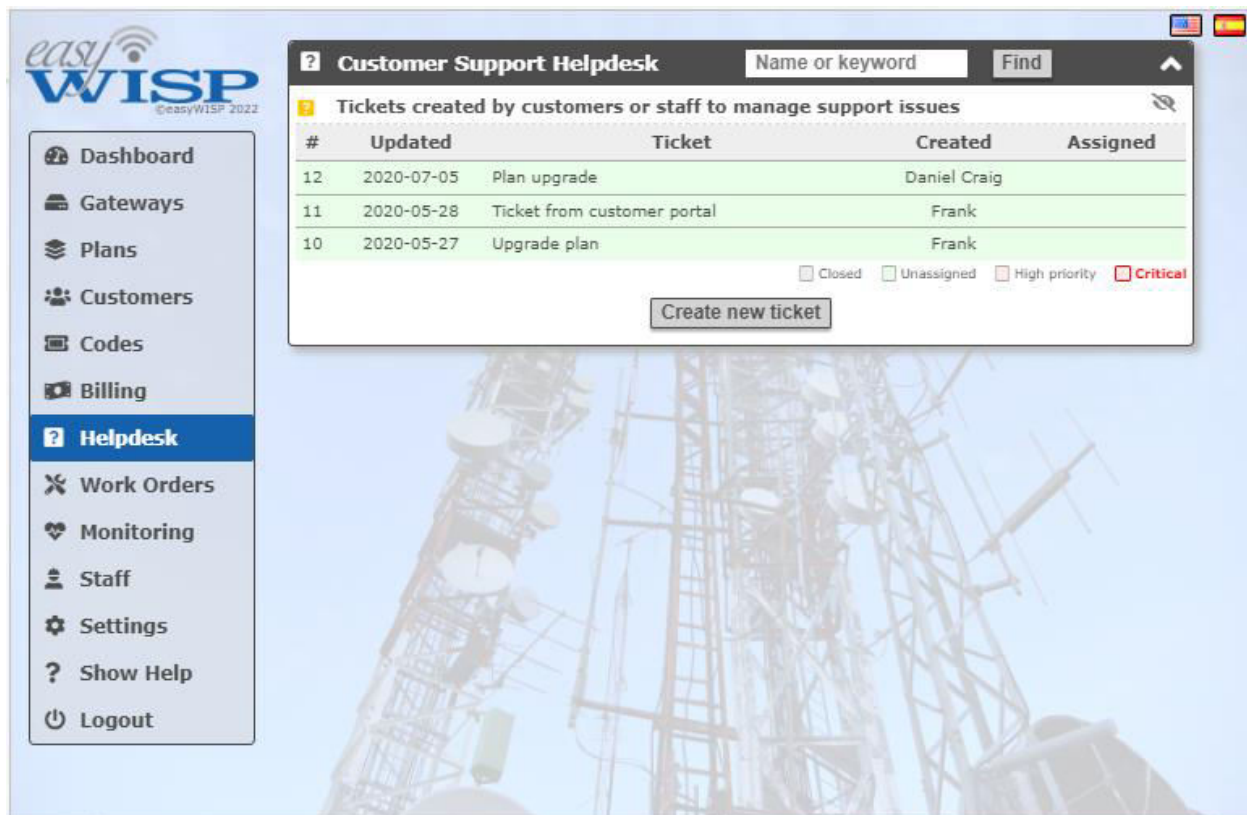


In this case the subscriber has the option of clicking on 'account details' and then purchasing an access code to enter which will enable Internet access. The login screen to enter the access code is shown below,



5.8. Help Desk.

The helpdesk page displays the help request tickets sent by subscribers through the subscriber portal. The customer support person can respond to the ticket to provide the information requested by the subscriber. The customer support person can also initiate a ticket.

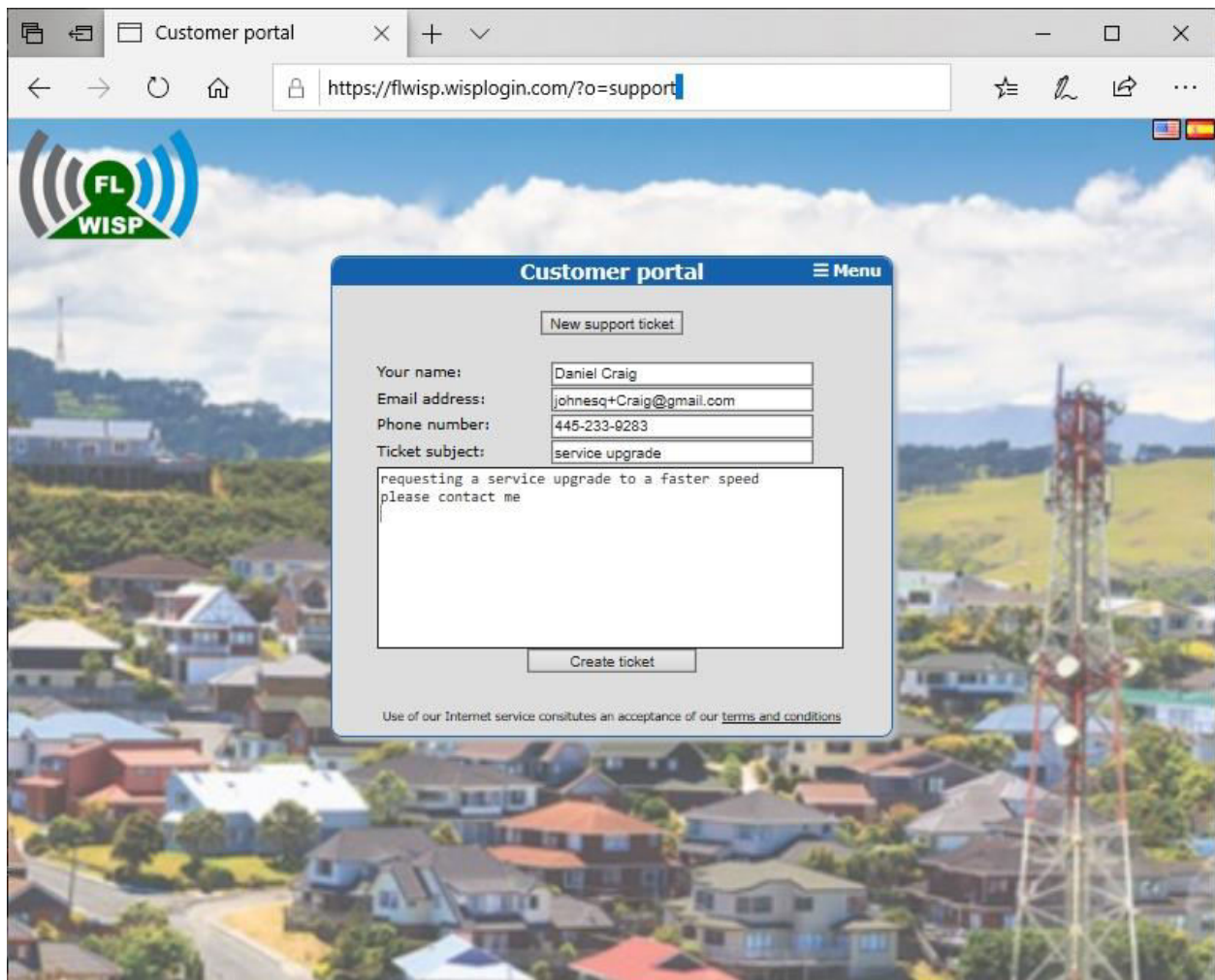


The screenshot shows the 'Customer Support Helpdesk' interface. On the left is a sidebar menu with the following items: Dashboard, Gateways, Plans, Customers, Codes, Billing, Helpdesk (highlighted), Work Orders, Monitoring, Staff, Settings, Show Help, and Logout. The main content area has a header with the 'easyWISP' logo and a search bar labeled 'Name or keyword' with a 'Find' button. Below the header, a section titled 'Tickets created by customers or staff to manage support issues' contains a table with the following data:

#	Updated	Ticket	Created	Assigned
12	2020-07-05	Plan upgrade		Daniel Craig
11	2020-05-28	Ticket from customer portal		Frank
10	2020-05-27	Upgrade plan		Frank

Below the table, there are filter checkboxes: ☐ Closed, ☐ Unassigned, ☐ High priority, and ☒ Critical. A 'Create new ticket' button is located at the bottom of the table area. The background of the interface features a faint image of telecommunications towers.

The subscriber can login to the subscriber portal using the username and password sent in the welcome message.



Customer portal

https://flwisp.wisplogin.com/?o=support

FL WISP

Customer portal Menu

New support ticket

Your name: Daniel Craig

Email address: johnesq+craig@gmail.com

Phone number: 445-233-9283

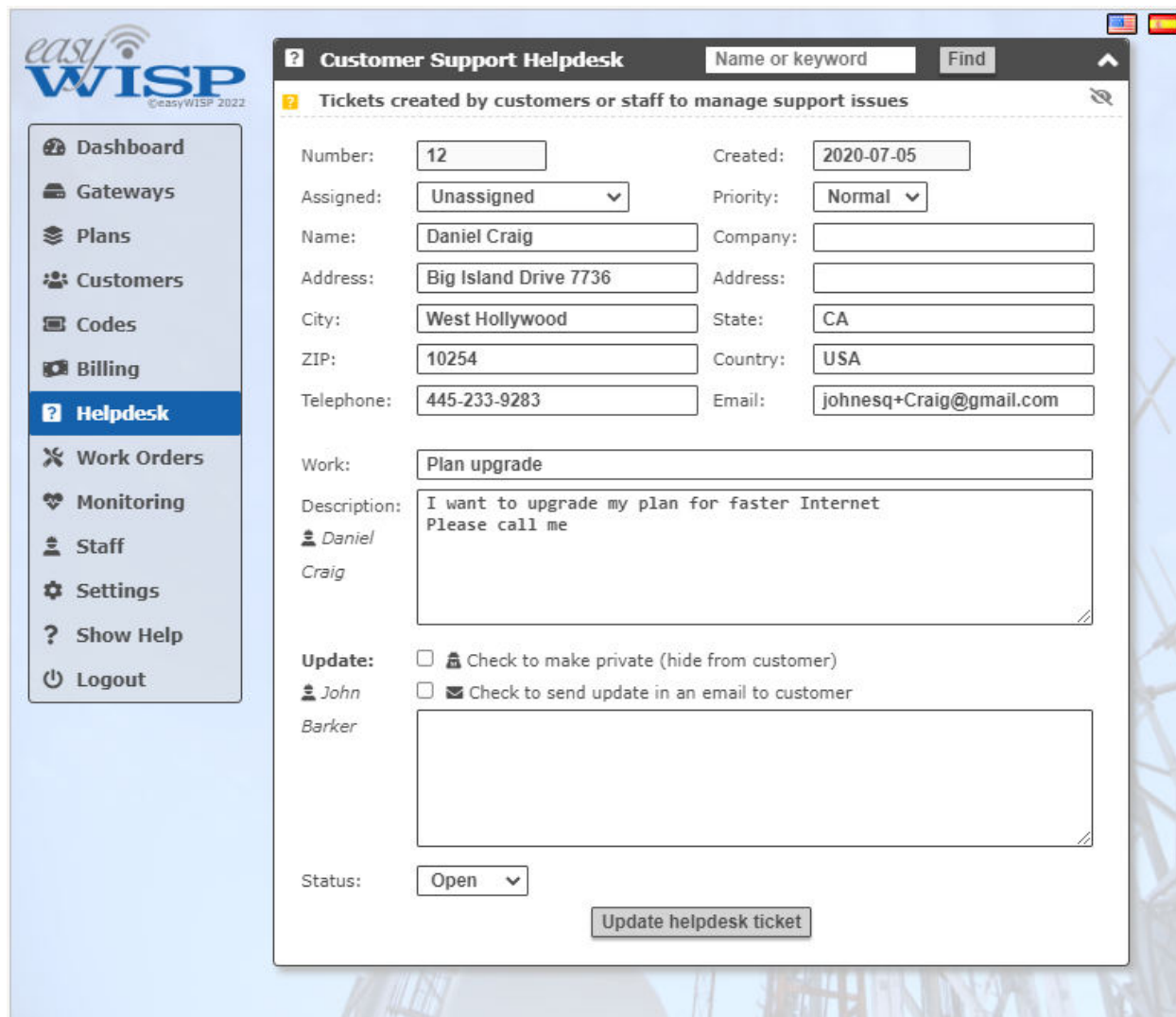
Ticket subject: service upgrade

requesting a service upgrade to a faster speed
please contact me

Create ticket

Use of our Internet service constitutes an acceptance of our [terms and conditions](#)

An opened support ticket is shown in the screen below.



The screenshot displays the 'Customer Support Helpdesk' interface. On the left is a sidebar menu with options: Dashboard, Gateways, Plans, Customers, Codes, Billing, Helpdesk (highlighted), Work Orders, Monitoring, Staff, Settings, Show Help, and Logout. The main content area is titled 'Customer Support Helpdesk' and includes a search bar. Below the title, it says 'Tickets created by customers or staff to manage support issues'. The ticket details are as follows:

Number:	12	Created:	2020-07-05
Assigned:	Unassigned	Priority:	Normal
Name:	Daniel Craig	Company:	
Address:	Big Island Drive 7736	Address:	
City:	West Hollywood	State:	CA
ZIP:	10254	Country:	USA
Telephone:	445-233-9283	Email:	johnesq+Craig@gmail.com

Work: Plan upgrade

Description: I want to upgrade my plan for faster Internet
Please call me

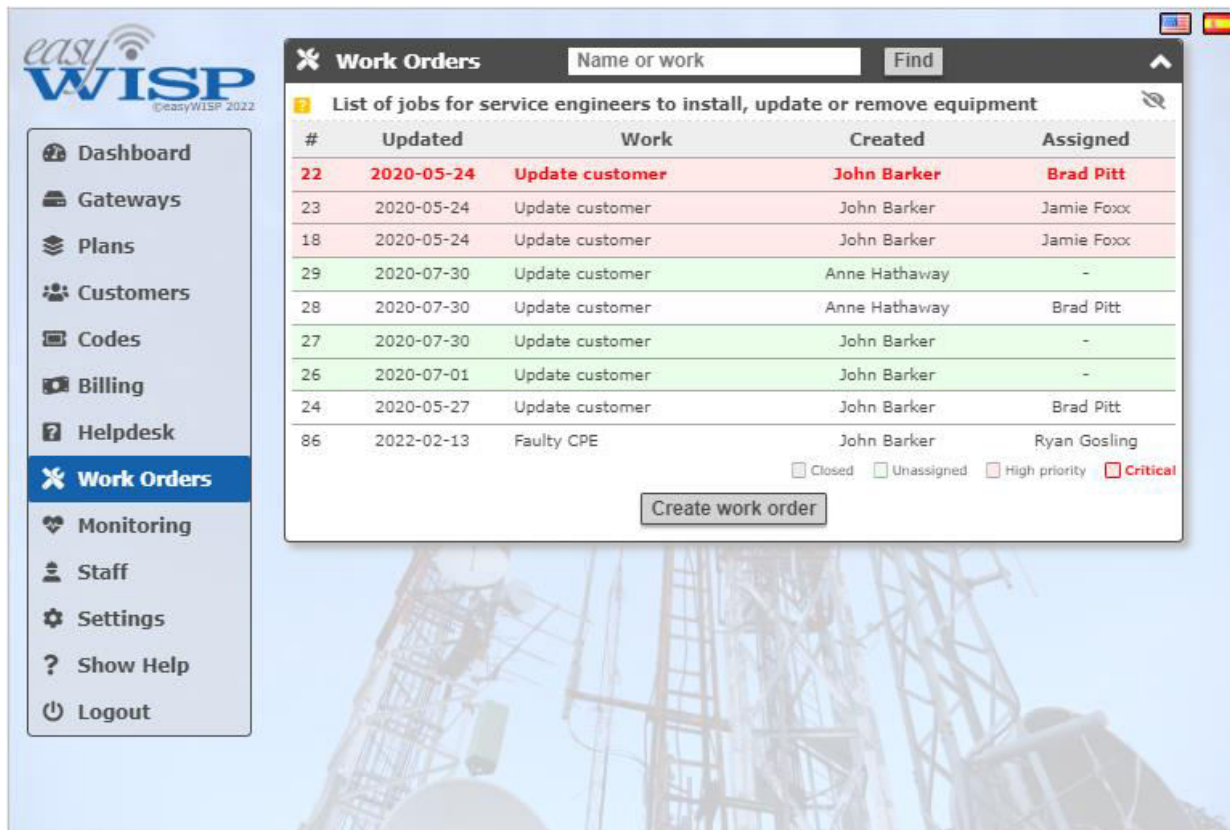
Update: ☐ Check to make private (hide from customer)
☐ Check to send update in an email to customer

Status: Open

Update helpdesk ticket

5.9. Work Orders.

Work orders are generated during the subscriber provisioning process. A work order is an instruction to a field service technician to prepare an installation at the subscriber's site.



Work Orders Name or work Find

List of jobs for service engineers to install, update or remove equipment

#	Updated	Work	Created	Assigned
22	2020-05-24	Update customer	John Barker	Brad Pitt
23	2020-05-24	Update customer	John Barker	Jamie Foxx
18	2020-05-24	Update customer	John Barker	Jamie Foxx
29	2020-07-30	Update customer	Anne Hathaway	-
28	2020-07-30	Update customer	Anne Hathaway	Brad Pitt
27	2020-07-30	Update customer	John Barker	-
26	2020-07-01	Update customer	John Barker	-
24	2020-05-27	Update customer	John Barker	Brad Pitt
86	2022-02-13	Faulty CPE	John Barker	Ryan Gosling

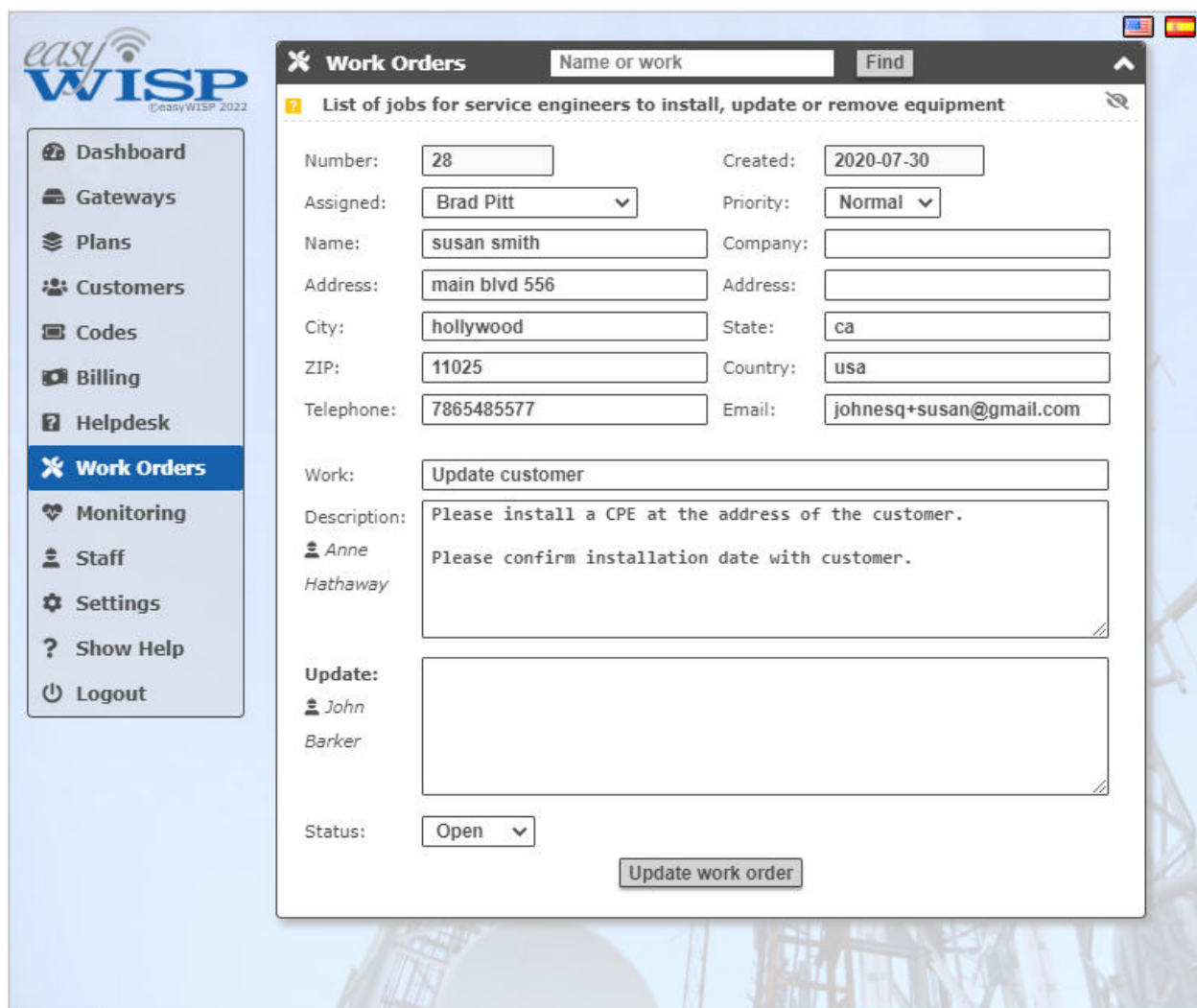
☐ Closed
 ☐ Unassigned
 ☐ High priority
 ☒ Critical

Create work order

Click on a work order to see the instructions. The field service technician has the information required to proceed with the CPE installation. The customer support representative or field service technician can call or email the new subscriber to schedule the installation and then add the date and time of the installation to the update notes field.

The work order can be printed by the field service technician and taken to the installation site.

The field service technician must also take a printed agreement prepared by the WISP which is signed by the subscriber after the installation work is completed, to state that the subscriber accepts the installation and that the installation is functional providing Internet access.



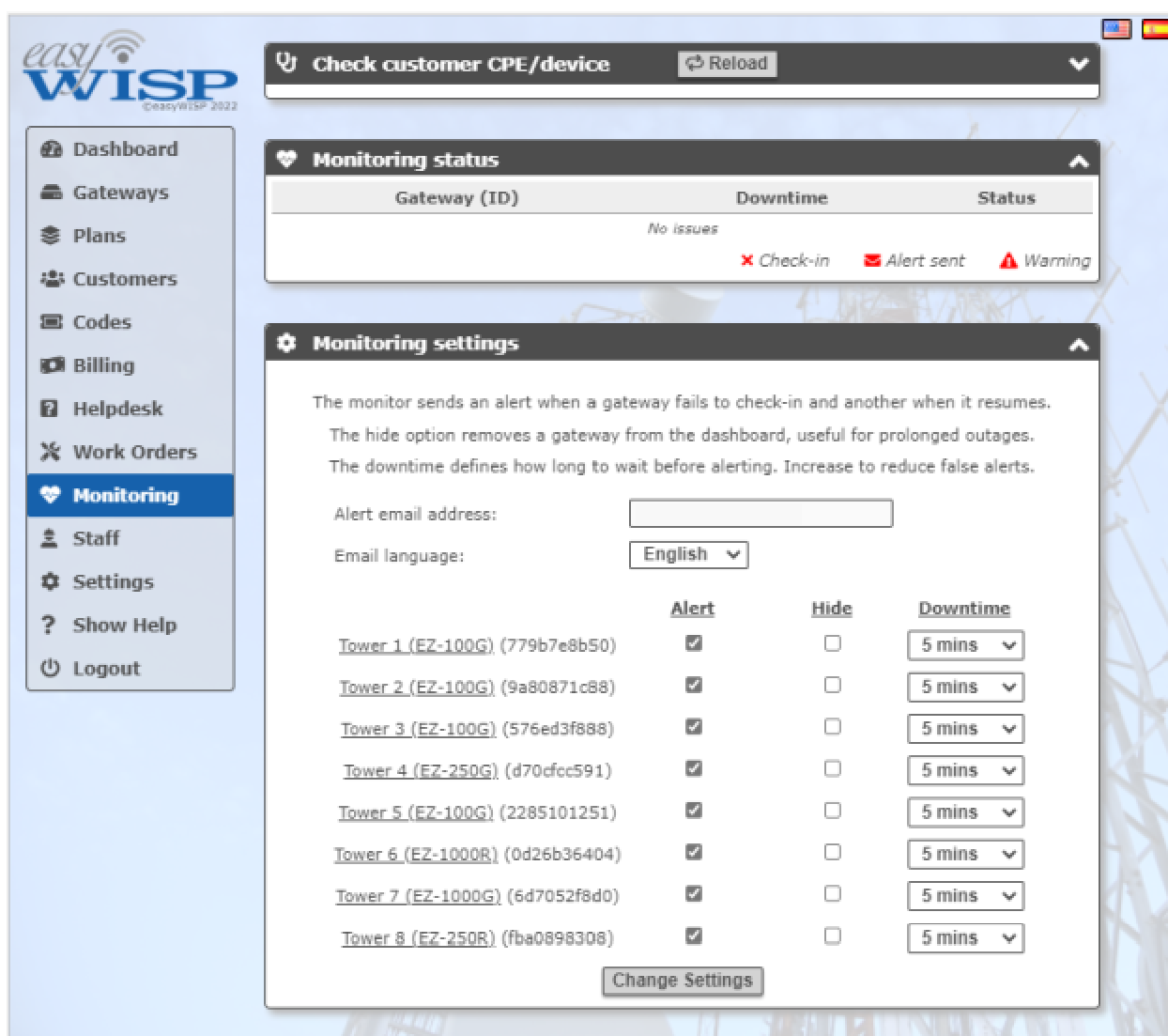
The screenshot displays the EasyWISP Work Orders management interface. On the left is a sidebar menu with options: Dashboard, Gateways, Plans, Customers, Codes, Billing, Helpdesk, Work Orders (selected), Monitoring, Staff, Settings, Show Help, and Logout. The main content area is titled 'Work Orders' and includes a search bar for 'Name or work' and a 'Find' button. Below this is a subtitle: 'List of jobs for service engineers to install, update or remove equipment'. The form contains the following fields:

- Number: 28
- Assigned: Brad Pitt (dropdown)
- Created: 2020-07-30
- Priority: Normal (dropdown)
- Name: susan smith
- Company: (empty)
- Address: main blvd 556
- City: hollywood
- State: ca
- ZIP: 11025
- Country: usa
- Telephone: 7865485577
- Email: johnesq+susan@gmail.com
- Work: Update customer
- Description: Please install a CPE at the address of the customer. Please confirm installation date with customer.
- Update: (empty)
- Status: Open (dropdown)

An 'Update work order' button is located at the bottom right of the form.

5.10. Monitoring easyWISP gateway equipment and WAN circuit for performance and failure.

The easyWISP Cloud has tools that monitor the performance of each easyWISP gateway and monitor each gateway for failure. When a failure occurs the easyWISP Cloud will send out an email alert to the administrator and field service technician. Failure warnings are shown on the Cloud display, in addition to email alerts sent to the WISP staff. Each easyWISP gateway must have the monitoring alert enabled and a delay time selected between the failure being detected and an alert being issued, then delay is selected as 5, 10 or 15 minutes.



The screenshot shows the easyWISP web interface with the 'Monitoring' section selected in the sidebar. The main content area displays the 'Monitoring status' and 'Monitoring settings' panels.

Monitoring status

Gateway (ID)	Downtime	Status
No issues		
	✗ Check-in	✉ Alert sent
		⚠ Warning

Monitoring settings

The monitor sends an alert when a gateway fails to check-in and another when it resumes.
 The hide option removes a gateway from the dashboard, useful for prolonged outages.
 The downtime defines how long to wait before alerting. Increase to reduce false alerts.

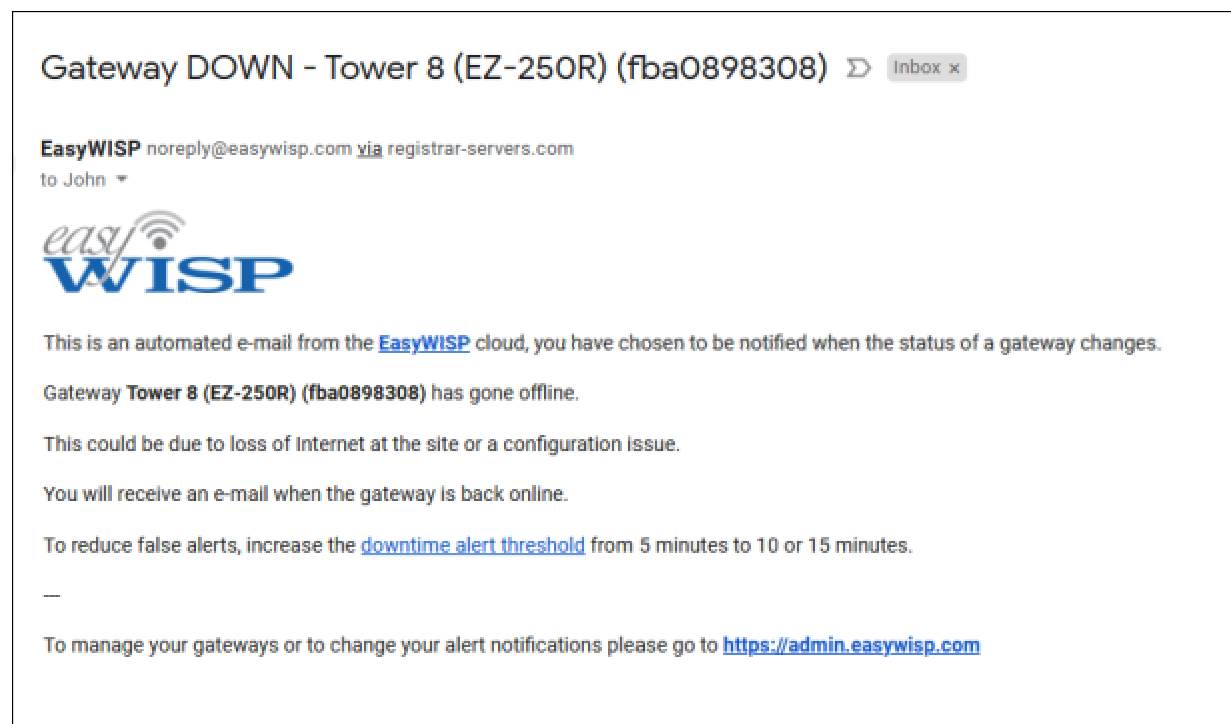
Alert email address:

Email language: English ▼

	Alert	Hide	Downtime
Tower 1 (EZ-100G) (779b7e8b50)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5 mins ▼
Tower 2 (EZ-100G) (9a80871c88)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5 mins ▼
Tower 3 (EZ-100G) (576ed3f888)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5 mins ▼
Tower 4 (EZ-250G) (d70fcc591)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5 mins ▼
Tower 5 (EZ-100G) (2285101251)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5 mins ▼
Tower 6 (EZ-1000R) (0d26b36404)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5 mins ▼
Tower 7 (EZ-1000G) (6d7052f8d0)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5 mins ▼
Tower 8 (EZ-250R) (fba0898308)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5 mins ▼

[Change Settings](#)

When an alert occurs an email message is sent to the email address specified then the monitoring is configured.



The gateway status is changed in the gateway inventory table to a red color as shown in the next figure.

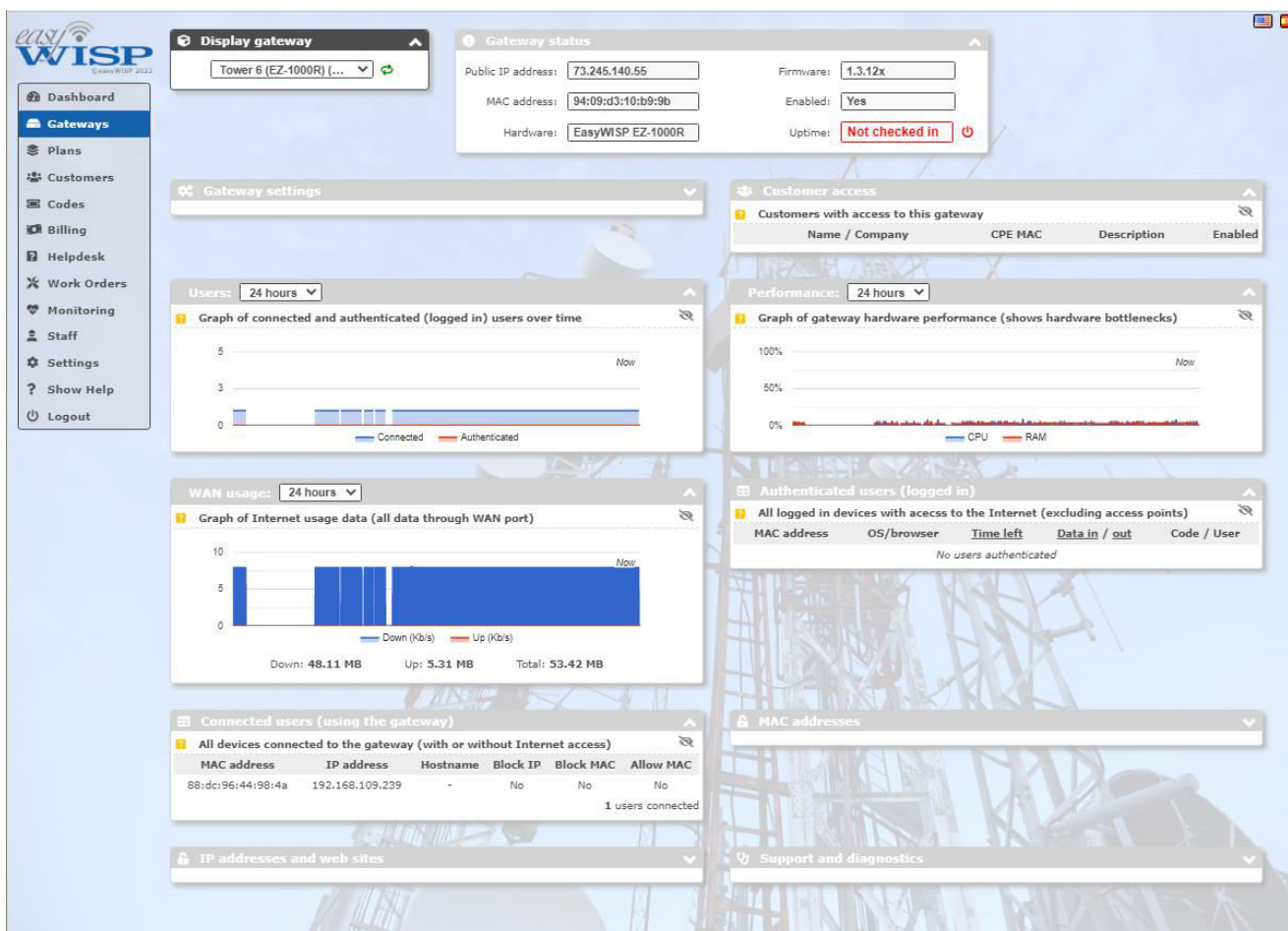
Gateway status Status reload disabled			
Current status of WISP gateways			
Gateway (ID)	Auth #	Conn #	Status
Tower 1 (EZ-100G) (779b7e8b50)	0	1	✓
Tower 2 (EZ-100G) (9a80871c88)	1	1	✓
Tower 3 (EZ-100G) (576ed3f888)	3	3	✓
Tower 4 (EZ-250G) (d70cfcc591)	2	2	✓
Tower 5 (EZ-100G) (2285101251)	1	1	✓
Tower 6 (EZ-1000R) (0d26b36404)	0	0	✗
Tower 7 (EZ-1000G) (6d7052f8d0)	2	2	✓
Tower 8 (EZ-250R) (fba0898308)	0	0	✗

✓ ✗ Check-in
↻ Recent reboot
⊘ Disabled
🔒 Hide
⚠ Alert

The monitoring page provides additional information about the status of gateways that are not communicating with the Cloud.

Monitoring status		
Gateway (ID)	Downtime	Status
Tower 6 (EZ-1000R)	16 hours	×
Tower 8 (EZ-250R)	16 hours	×
× Check-in 📧 Alert sent ⚠ Warning		

The easyWISP gateway status is also shown on the display gateway page. The gateway status uptime display is shown as a red box with the message 'not checked in'.



Display gateway
Tower 6 (EZ-1000R) [...]

Gateway status

Public IP address: 73.245.140.55 Firmware: 1.3.12x
 MAC address: 94:09:d3:10:b9:9b Enabled: Yes
 Hardware: EasyWISP EZ-1000R Uptime: Not checked in

Gateway settings

Customer access
Customers with access to this gateway

Name / Company	CPE MAC	Description	Enabled
No users authenticated			

Users: 24 hours
Graph of connected and authenticated (logged in) users over time

Performance: 24 hours
Graph of gateway hardware performance (shows hardware bottlenecks)

WAN usage: 24 hours
Graph of Internet usage data (all data through WAN port)

Down: 48.11 MB Up: 5.31 MB Total: 53.42 MB

Authenticated users (logged in)
All logged in devices with access to the Internet (excluding access points)

MAC address	OS/browser	Time left	Data in / out	Code / User
No users authenticated				

Connected users (using the gateway)
All devices connected to the gateway (with or without Internet access)

MAC address	IP address	Hostname	Block IP	Block MAC	Allow MAC
88:dc:96:44:98:4a	192.168.109.239	-	No	No	No

1 users connected

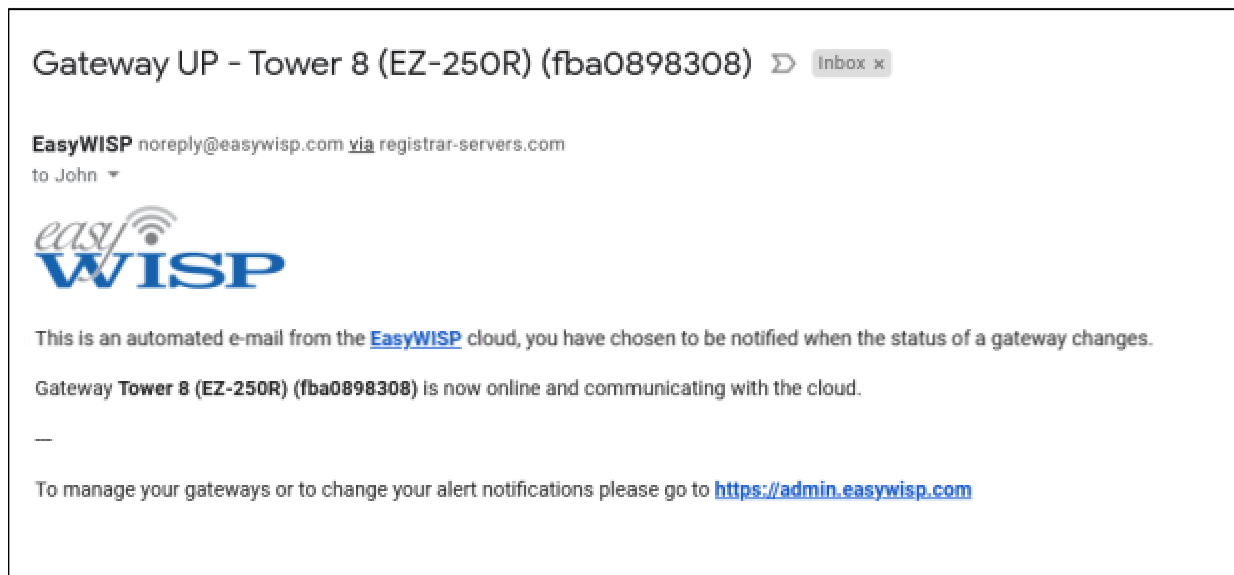
IP addresses and web sites

Support and diagnostics

The loss of connection will have one of several reasons that have to be diagnosed by the technician.

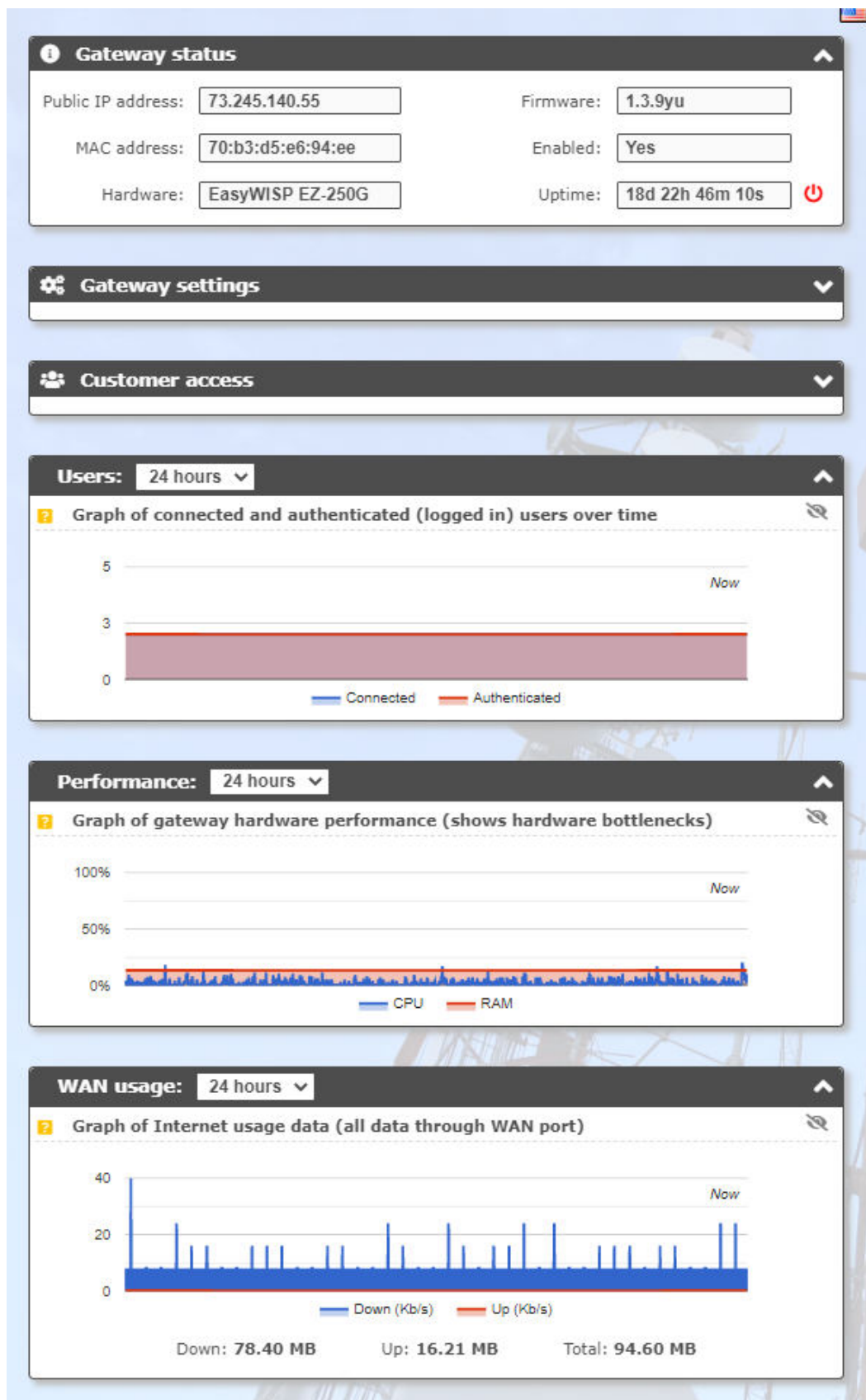
- Gateway failure.
- Power loss at the gateway site.
- WAN circuit failure.

When the gateway returns to communicate with the Cloud a message is sent to the staff advising that the gateway is now communicating.



Graphical performance data for each easyWISP gateway is shown in the next figure.

- Connected and authenticated users.
- Performance of the gateway % utilization.
- WAN bandwidth us, This parameter is very important as it indicates when the WAN capacity is at maximum and network congestion may occur.



The easyWISP Cloud system has a feature to test the circuit through to the subscribers CPE wireless. This is important when a customer calls and states there is not Internet service. Testing the circuit to the CPE will identify if there is a problem with the WISP network or at the customers site. The figure below shows the customer record and the button that is clicked to test the CPE circuit.

Customer welcome email:

If an email address is provided a welcome email can be sent to the customer. The email includes a username and auto-generated password to manage their account via the customer portal page. If the customer has no email address the details can be printed for the customer.

Welcome subject:

Welcome text:

Welcome Bradley Cooper,

Thank-you for joining our network.

An account has been created for you on our customer portal at
<https://flwisp.wisplogin.com>, your login details are as follows:

Username: BradleyCooper

XXXXXXXX will be replaced with new password

Save welcome text: ☐ Save for next customer ☒ Use default

Customer provisioning:

Work order: ☐ Create work order for CPE installation

Assign work to:

Order comments:

Please make the following changes

Internet access management:

Customer enabled: ☒ **Internet access allowed**

i Recurring plans only, a login code can be created for single use

Internet access plan:

i Enter same MAC again if access is needed on multiple gateways

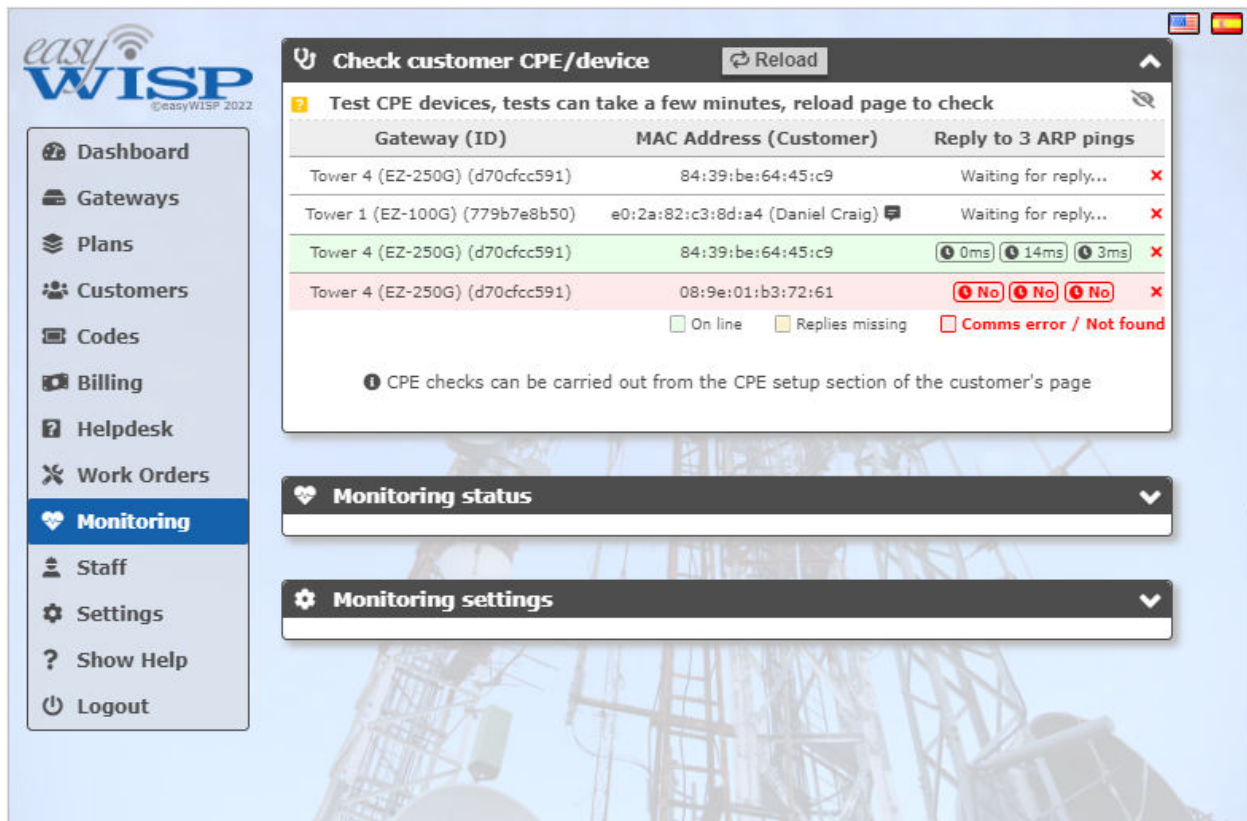
🔍 Test access from gateway to customer CPE (results on Monitoring page)

	CPE MAC address	Description	Gateway	Allow
1	<input type="text" value="e8:40:f2:3b:c5:c3"/>	<input type="text" value="Bradley Cooper res"/>	<input type="text" value="Tower 3 (E..."/>	<input checked="" type="checkbox"/> <input checked="" type="button" value="🔍"/> <input type="button" value="🗑️"/>

+ Add

TEST
CPE

The monitoring page is opened to view the status of the CPE test. The result is shown as red which indicates no connection, as green which indicates a good connection, and white which indicates that the test is in progress.



Check customer CPE/device Reload

Test CPE devices, tests can take a few minutes, reload page to check

Gateway (ID)	MAC Address (Customer)	Reply to 3 ARP pings
Tower 4 (EZ-250G) (d70cfcc591)	84:39:be:64:45:c9	Waiting for reply... ×
Tower 1 (EZ-100G) (779b7e8b50)	e0:2a:82:c3:8d:a4 (Daniel Craig)	Waiting for reply... ×
Tower 4 (EZ-250G) (d70cfcc591)	84:39:be:64:45:c9	0ms 14ms 3ms ×
Tower 4 (EZ-250G) (d70cfcc591)	08:9e:01:b3:72:61	No No No ×

☒ On line
 ☐ Replies missing
 ☐ Comms error / Not found

Monitoring status

Monitoring settings

Dashboard

Gateways

Plans

Customers

Codes

Billing

Helpdesk

Work Orders

Monitoring

Staff

Settings

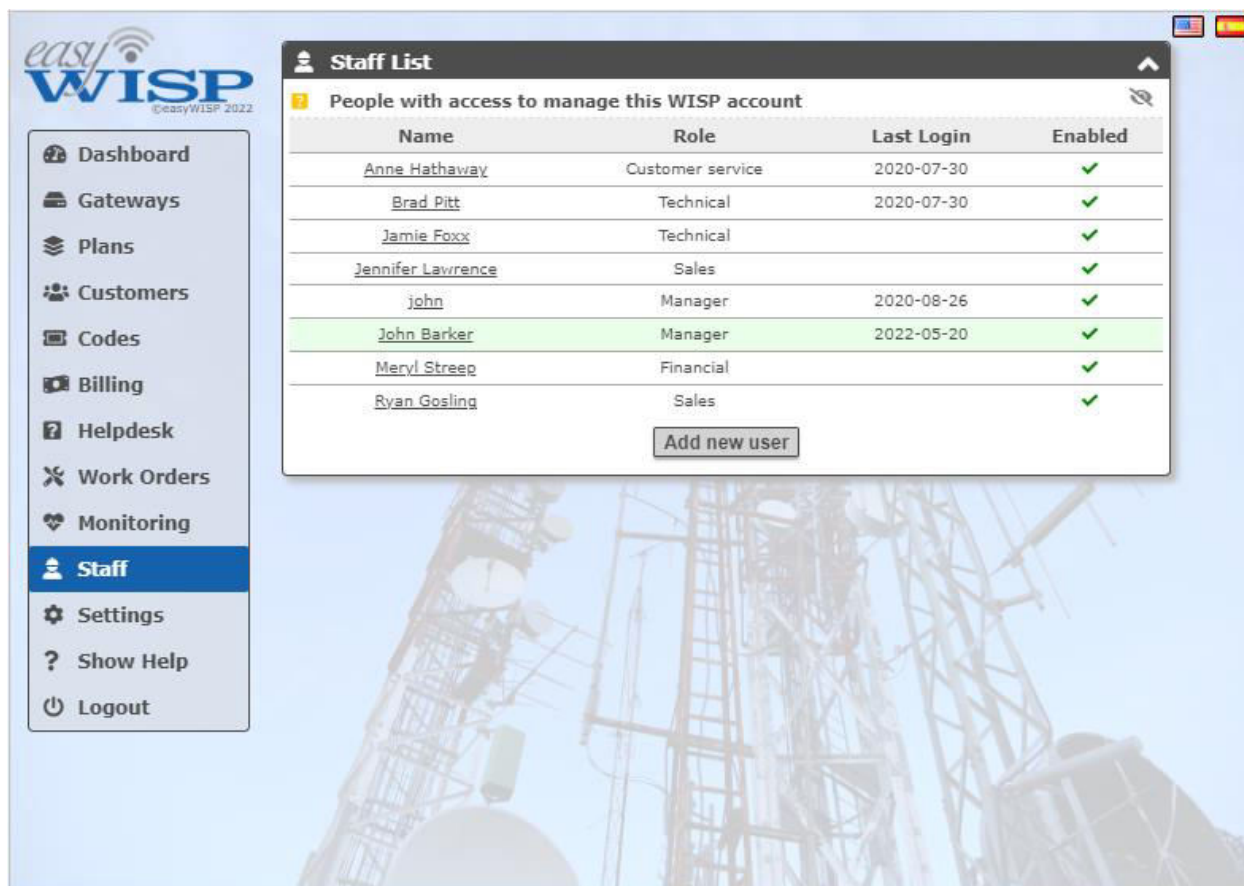
Show Help

Logout

easyWISP
©easyWISP 2022

5.11. Staff.

Click on the staff menu entry to list the staff having access to the WISP account. The list of staff is shown in the screen below.



Name	Role	Last Login	Enabled
Anne Hathaway	Customer service	2020-07-30	✓
Brad Pitt	Technical	2020-07-30	✓
Jamie Foxx	Technical		✓
Jennifer Lawrence	Sales		✓
john	Manager	2020-08-26	✓
John Barker	Manager	2022-05-20	✓
Meryl Streep	Financial		✓
Ryan Gosling	Sales		✓

[Add new user](#)

Click on the 'add new user' button to add a staff member to the list of staff who have access to the Cloud account.

The screen on the following page shows the staff entry display.

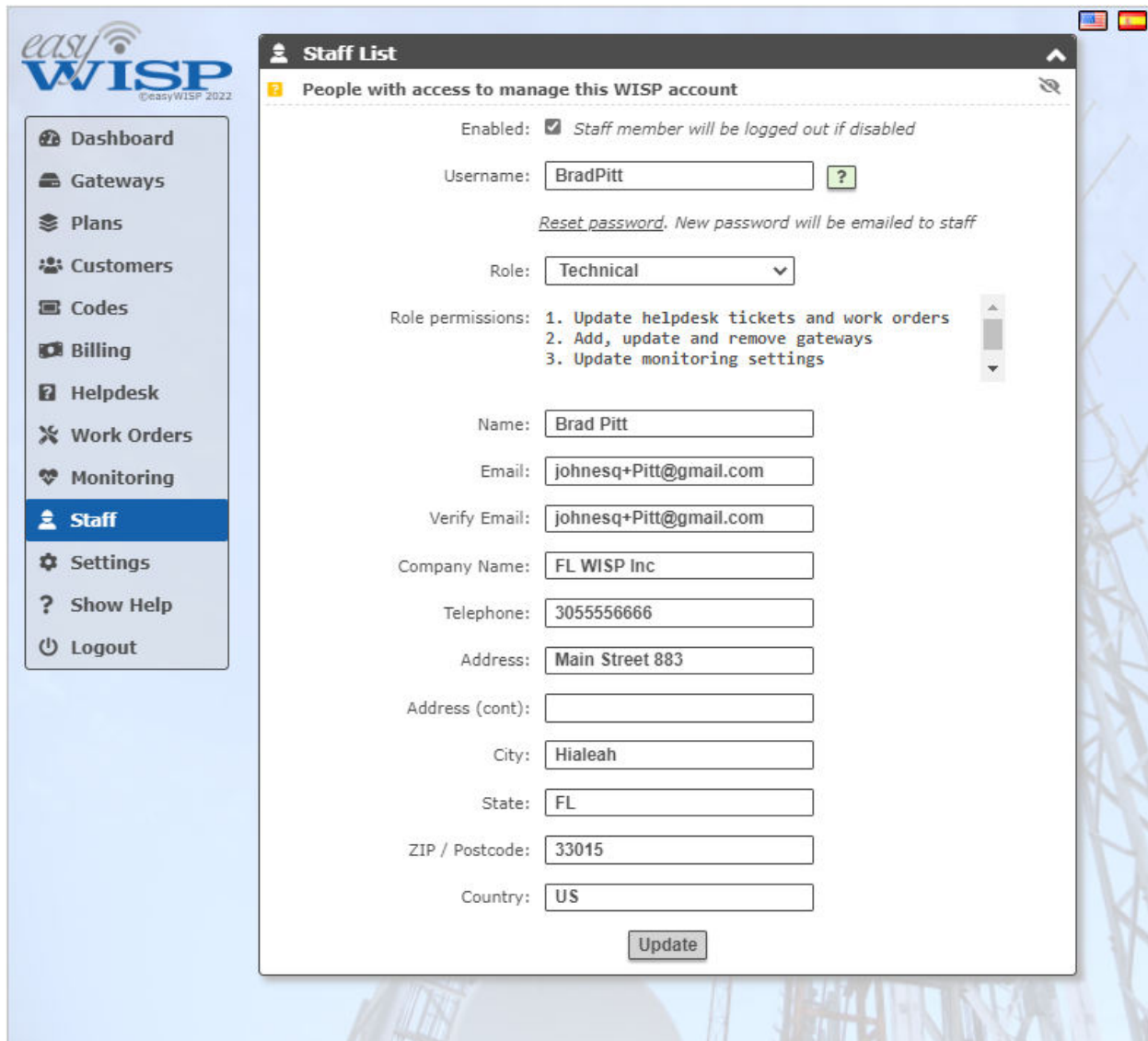
The first parameter is a check box that permits the WISP owner to enable or disable staff.

Each staff member is given a username by the WISP, which is entered into the space below.

The role entry has a drop down entry with two options, manager and viewer.

Next the personal information of the staff member is entered: including name, email company name (if sub-contractor), telephone and address.

Finally the update button is clicked to add the staff member.



The screenshot shows the 'Staff List' window in the easyWISP interface. The left sidebar contains a menu with options: Dashboard, Gateways, Plans, Customers, Codes, Billing, Helpdesk, Work Orders, Monitoring, **Staff** (selected), Settings, Show Help, and Logout. The main window is titled 'Staff List' and contains a sub-header 'People with access to manage this WISP account'. Below this, there are several form fields and a list of role permissions.

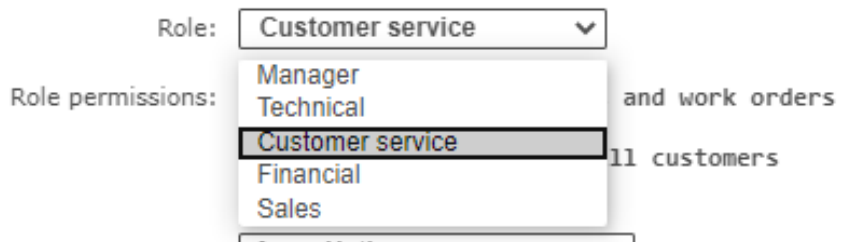
Form Fields:

- Enabled: ☒ Staff member will be logged out if disabled
- Username: ?
- [Reset password](#). New password will be emailed to staff
- Role:
- Name:
- Email:
- Verify Email:
- Company Name:
- Telephone:
- Address:
- Address (cont):
- City:
- State:
- ZIP / Postcode:
- Country:
-

Role permissions:

1. Update helpdesk tickets and work orders
2. Add, update and remove gateways
3. Update monitoring settings

The easyWISP Cloud defines five roles, where each has different access privileges to the Cloud system. These are shown in the figure below.



The screenshot shows a dropdown menu for the 'Role' field. The dropdown is open, displaying five options: Manager, Technical, **Customer service** (highlighted), Financial, and Sales. The 'Role' field above the dropdown is set to 'Customer service'. To the right of the dropdown, the text 'and work orders' and '11 customers' is visible.

The roles are:

- Manager.
- Technical.
- Customer service.
- Financial.
- Sales.

The manager can enter and modify data in any part of the system. The manager is likely to be the WISP owner. Each of the other roles has limited access to the system as follows;

Technical. Role permissions:

1. Update helpdesk tickets and work orders.
2. Add, update and remove gateways.
3. Update monitoring settings.

Customer service. Role permissions:

1. Update helpdesk tickets and work orders.
2. Update customer details.
3. Create login codes & bill customers.

Financial. Role permissions:

1. Update helpdesk tickets and work orders.
2. View customer details.
3. Bill customers.

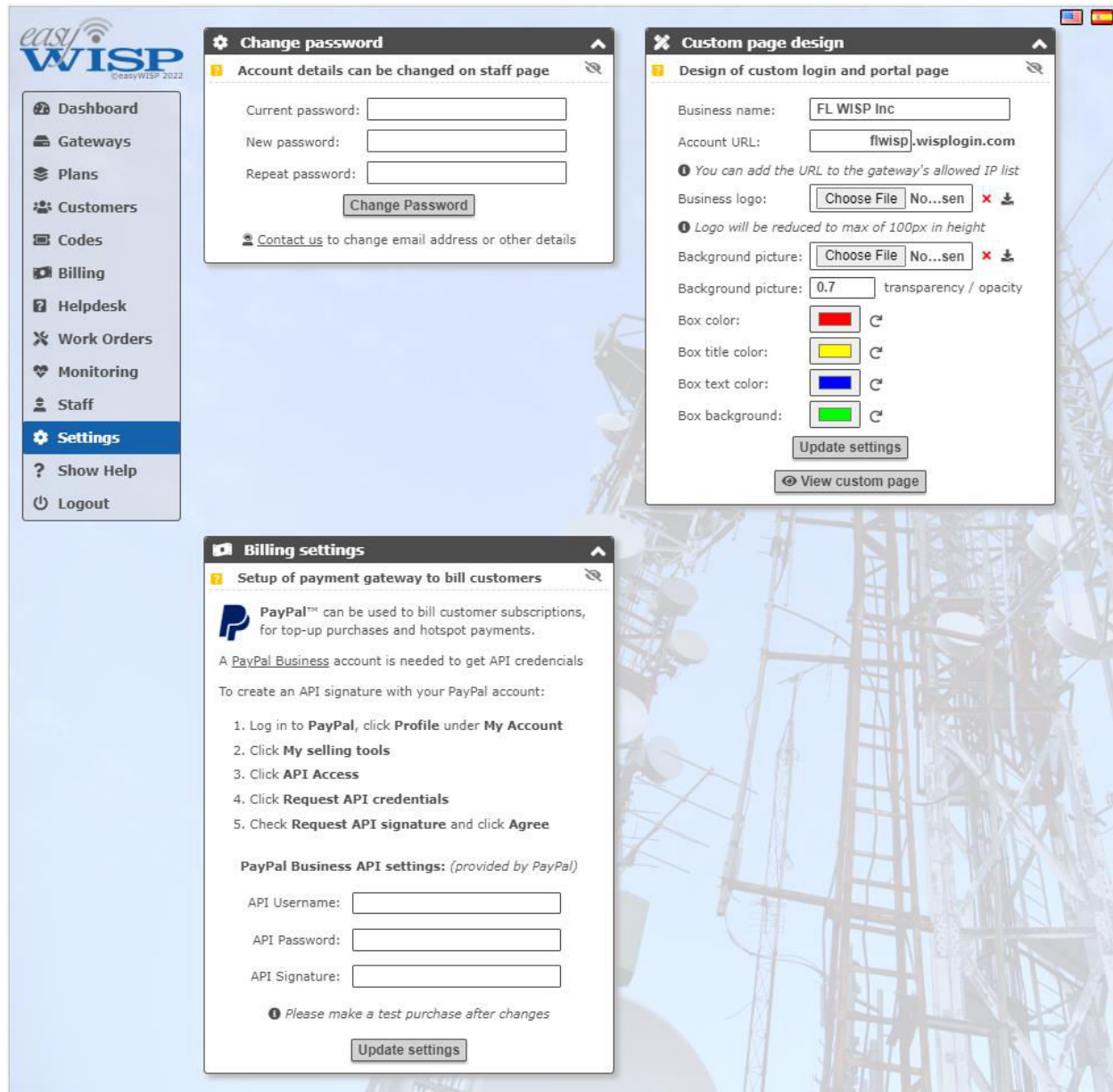
Sales. Role permissions:

1. Update helpdesk tickets and work orders.
2. Add customers.
3. Create login codes & bill customers.

When the new staff member entry process is completed a password will be send via email to the staff member.

5.12. Settings.

The settings page permits the WISP administrator to configure functional settings for the account. The settings screen is shown below.



The screenshot displays the EasyWISP Settings page with a sidebar menu on the left and three main settings panels on the right.

Sidebar Menu:

- Dashboard
- Gateways
- Plans
- Customers
- Codes
- Billing
- Helpdesk
- Work Orders
- Monitoring
- Staff
- Settings**
- Show Help
- Logout

Change password panel:

Account details can be changed on staff page

Current password:

New password:

Repeat password:

[Contact us](#) to change email address or other details

Custom page design panel:

Design of custom login and portal page

Business name:

Account URL:

You can add the URL to the gateway's allowed IP list

Business logo:

Logo will be reduced to max of 100px in height

Background picture:

Background picture: transparency / opacity

Box color:


Box title color:

Box text color:

Box background:

Billing settings panel:

Setup of payment gateway to bill customers

 **PayPal™** can be used to bill customer subscriptions, for top-up purchases and hotspot payments.

A [PayPal Business](#) account is needed to get API credentials

To create an API signature with your PayPal account:

1. Log in to **PayPal**, click **Profile** under **My Account**
2. Click **My selling tools**
3. Click **API Access**
4. Click **Request API credentials**
5. Check **Request API signature** and click **Agree**

PayPal Business API settings: (provided by PayPal)

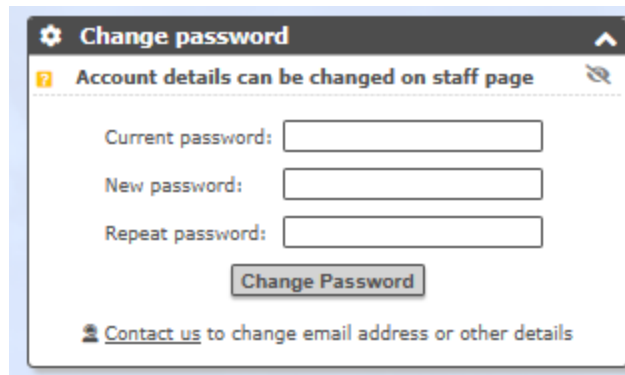
API Username:

API Password:

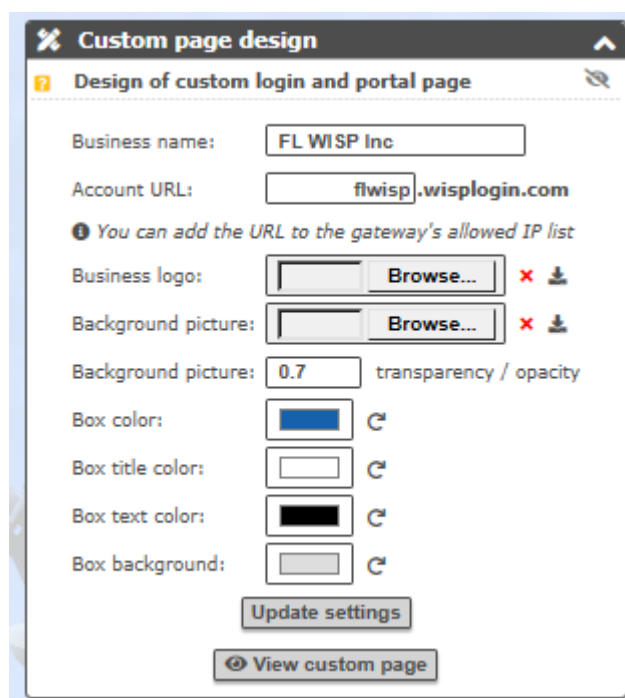
API Signature:

Please make a test purchase after changes

The first box permits the administrator to change the password. Always create a strong password using upper and lower case characters, numerals and non-alphanumeric symbols.



The custom page design box is used to create the subscriber portal page. The box is shown in the figure below.

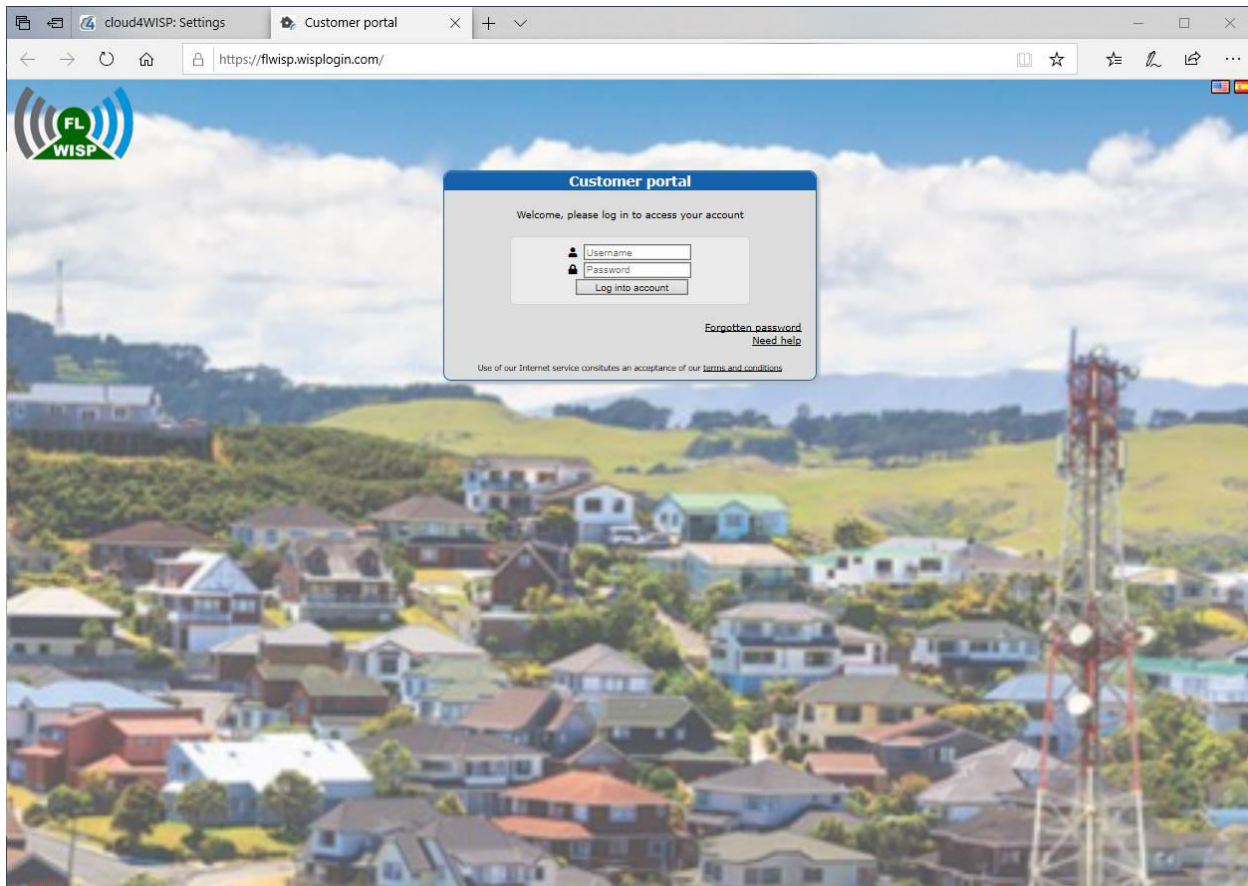


- The business name will be displayed on the login page and can be modified in the business name box.
- The portal URL is derived from the name provided by the WISP when the account is created. The subscriber will use the following URL to access the portal.

wispname.wisplogin.com

- The business logo is uploaded to display on the login page. The logo is a JPG and is scaled to 100px x 100px maximum. The logo file size should be less than 50KB.
- A background picture or design is uploaded to display on the login page. The background picture is a JPG and is scaled to 300px x 300px maximum. The background file size should be less than 200KB.
- The background picture transparency from 0.1 (very transparent) to 1 (no transparency).
- The login box color can be changed. Click on the color bar, then select a new color.
- The login box title color can be changed. Click on the color bar, then select a new color.
- The login box text color can be changed. Click on the color bar, then select a new color.
- The login box background color can be changed. Click on the color bar, then select a new color.

A login screen example for the user portal is shown below. The subscriber's username was entered by the WISP when the subscriber's account was created. Subsequent to account creation the subscriber is sent an email with the username plus an auto-generated password. The subscriber will use the username and password to login the first time, and then the subscriber can change the password.



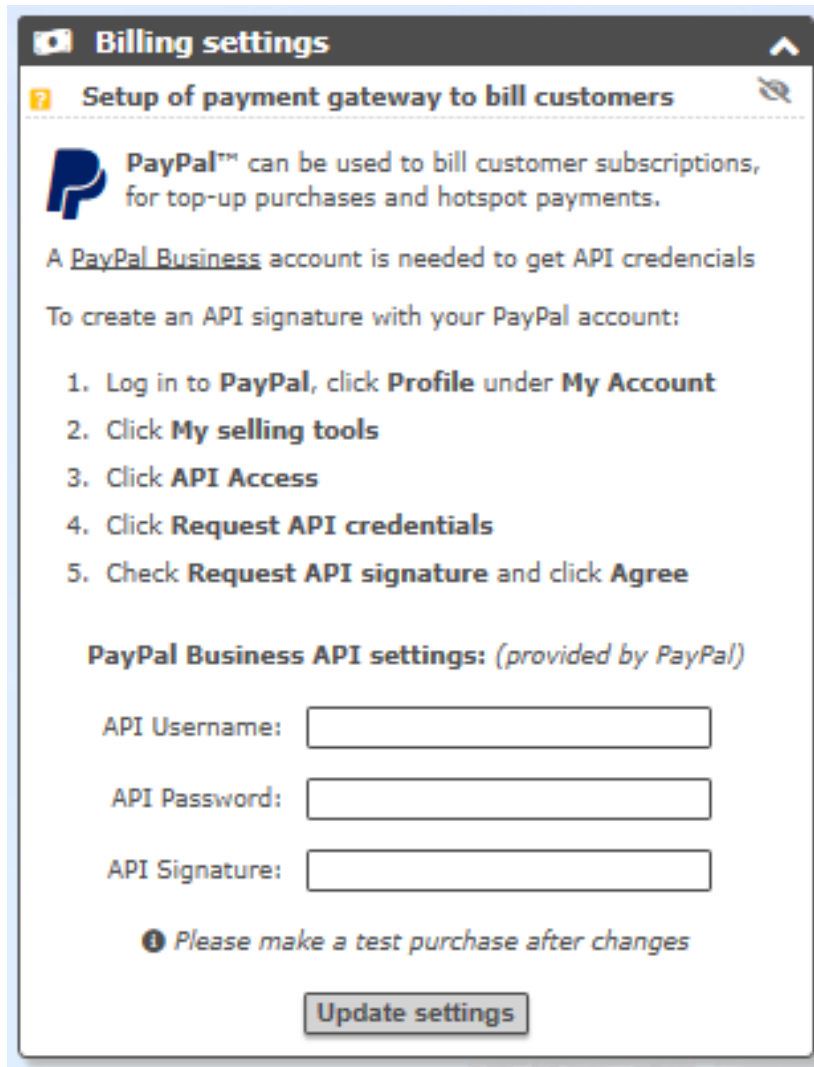
Should the WISP wish to permit subscribers to pay for the Internet service on-line using a credit card the Cloud provides a payment gateway for PayPal™. Paypal was chosen because this is the only payment gateway that can be used in the 50+ countries where easyWISP products are sold. The PayPal account must be a business account to charge credit cards, a standard PayPal account can only be used for sending and receiving payments with other PayPal users.

When a PayPal business account is created, three parameters are provided:

- Username.
- Password.
- Signature (encryption key).


The three parameters are entered in the box shown below. The update settings button is then clicked.

The WISP must make a test purchase before offering the service to subscribers to ensure that the PayPal account has been set up correctly and PayPal has authorized the account to receive credit card payments.



Billing settings

Setup of payment gateway to bill customers

 **PayPal™** can be used to bill customer subscriptions, for top-up purchases and hotspot payments.

A PayPal Business account is needed to get API credentials

To create an API signature with your PayPal account:


1. Log in to **PayPal**, click **Profile** under **My Account**
2. Click **My selling tools**
3. Click **API Access**
4. Click **Request API credentials**
5. Check **Request API signature** and click **Agree**

PayPal Business API settings: *(provided by PayPal)*

API Username:

API Password:

API Signature:

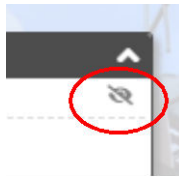
 Please make a test purchase after changes

Update settings

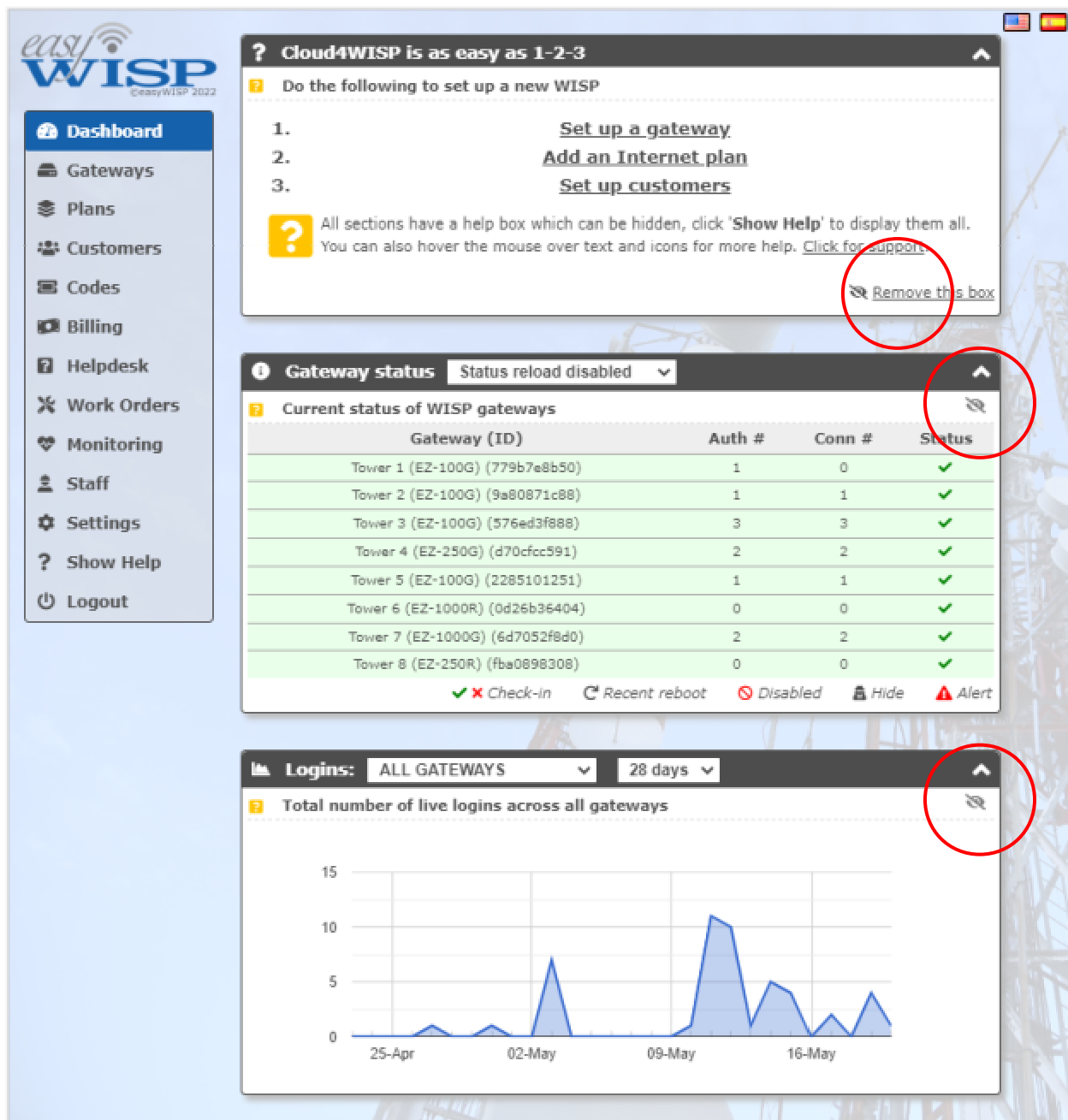
The Cloud will add country specific payment gateways in future if there is a volume demand for additional payment gateways.

5.13. Show Help.

Many display boxes has a character that indicated the box can be removed or reduced to avoid screen clutter. This character is shown in the figure below.



The character can be seen on most menu screen boxes, as shown in the screen below.



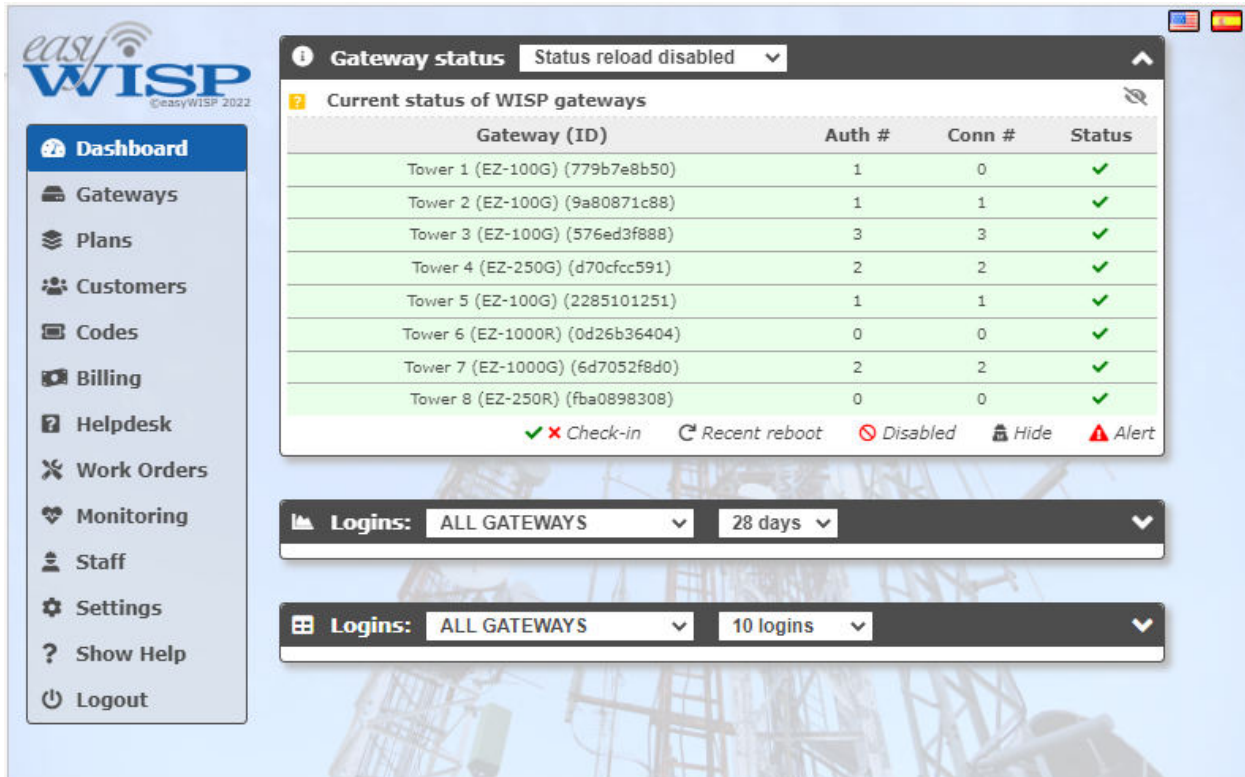
The screenshot shows the EasyWISP dashboard with a sidebar menu on the left and several help boxes on the right. The sidebar menu includes: Dashboard, Gateways, Plans, Customers, Codes, Billing, Helpdesk, Work Orders, Monitoring, Staff, Settings, Show Help, and Logout. The main content area contains three help boxes:

- Cloud4WISP is as easy as 1-2-3**: A box with a question mark icon and a list of steps: 1. Set up a gateway, 2. Add an Internet plan, 3. Set up customers. It also includes a note about help boxes and a 'Remove this box' icon circled in red.
- Gateway status**: A box with a status reload dropdown and a table of gateway status. It includes a 'Remove this box' icon circled in red.
- Logins**: A box with a dropdown for 'ALL GATEWAYS' and a date range of '28 days'. It displays a line graph of live logins across all gateways. It includes a 'Remove this box' icon circled in red.

Gateway (ID)	Auth #	Conn #	Status
Tower 1 (EZ-100G) (779b7e8b50)	1	0	✓
Tower 2 (EZ-100G) (9a80871c88)	1	1	✓
Tower 3 (EZ-100G) (576ed3f888)	3	3	✓
Tower 4 (EZ-250G) (d70cfc591)	2	2	✓
Tower 5 (EZ-100G) (2285101251)	1	1	✓
Tower 6 (EZ-1000R) (0d26b36404)	0	0	✓
Tower 7 (EZ-1000G) (6d7052f8d0)	2	2	✓
Tower 8 (EZ-250R) (fba0898308)	0	0	✓

Legend: ✓ Check-In, ↺ Recent reboot, ⛔ Disabled, 🛡 Hide, ⚠ Alert

Clicking the symbol reduces screen clutter.



The screenshot shows the EasyWISP web interface. On the left is a sidebar menu with options: Dashboard, Gateways, Plans, Customers, Codes, Billing, Helpdesk, Work Orders, Monitoring, Staff, Settings, Show Help, and Logout. The main content area is titled 'Gateway status' with a dropdown menu set to 'Status reload disabled'. Below this is a section 'Current status of WISP gateways' containing a table with 8 rows of gateway data. At the bottom of the table are icons for 'Check-in', 'Recent reboot', 'Disabled', 'Hide', and 'Alert'. Below the table are two 'Logins' filter sections, both set to 'ALL GATEWAYS'.

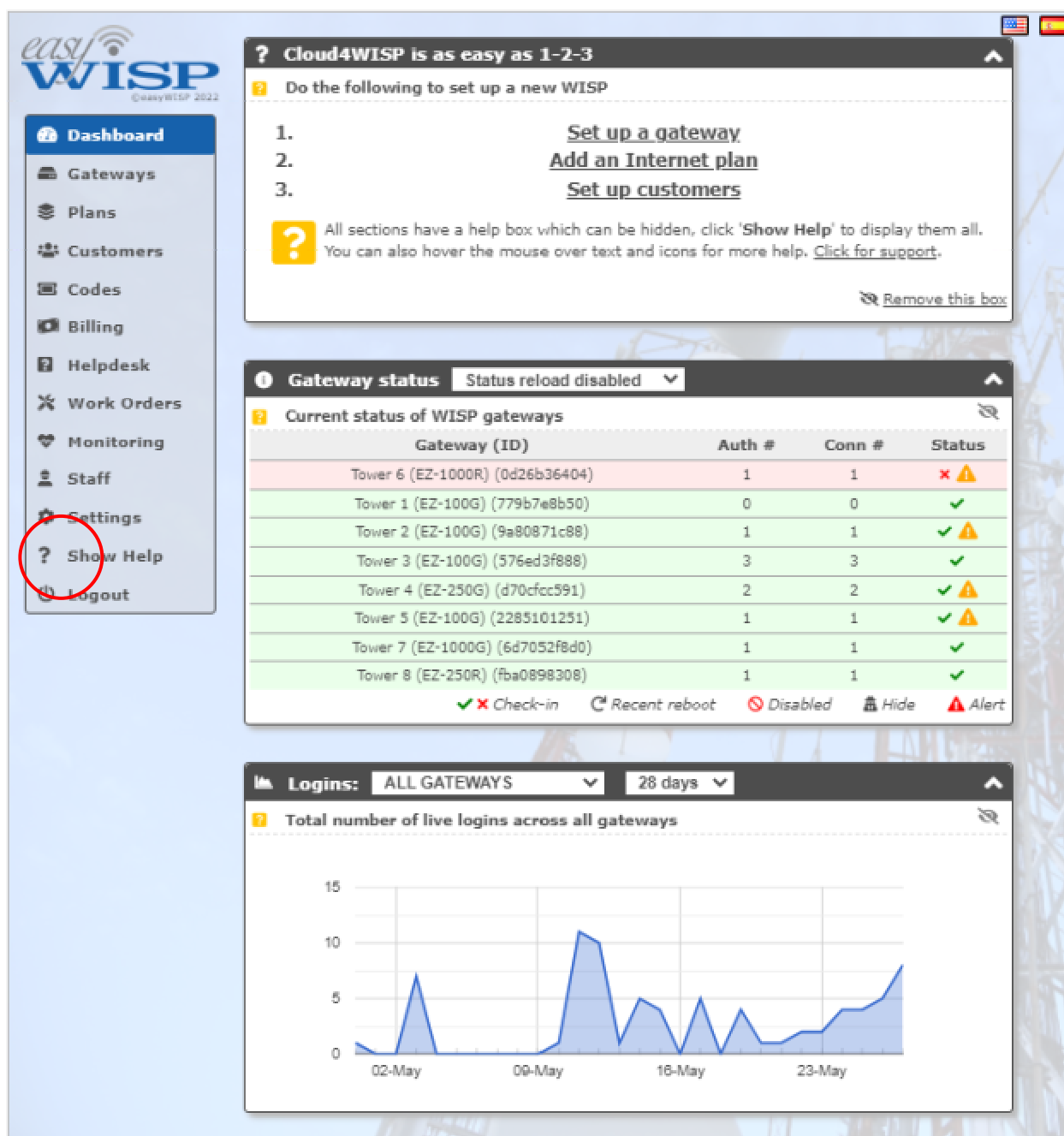
Gateway (ID)	Auth #	Conn #	Status
Tower 1 (EZ-100G) (779b7e8b50)	1	0	✓
Tower 2 (EZ-100G) (9a80871c88)	1	1	✓
Tower 3 (EZ-100G) (576ed3f888)	3	3	✓
Tower 4 (EZ-250G) (d70cfcc591)	2	2	✓
Tower 5 (EZ-100G) (2285101251)	1	1	✓
Tower 6 (EZ-1000R) (0d26b36404)	0	0	✓
Tower 7 (EZ-1000G) (6d7052f8d0)	2	2	✓
Tower 8 (EZ-250R) (fba0898308)	0	0	✓

✓ ✗ Check-in ↻ Recent reboot ⛔ Disabled 🗑 Hide ⚠ Alert

Logins: ALL GATEWAYS 28 days

Logins: ALL GATEWAYS 10 logins

Click on the 'show help' menu entry opens boxes that were closed or simplified.



The screenshot shows the EasyWISP dashboard interface. On the left sidebar, the 'Show Help' menu item is circled in red. Three help boxes are displayed on the right:

? Cloud4WISP is as easy as 1-2-3

Do the following to set up a new WISP

1. [Set up a gateway](#)
2. [Add an Internet plan](#)
3. [Set up customers](#)

All sections have a help box which can be hidden, click 'Show Help' to display them all. You can also hover the mouse over text and icons for more help. [Click for support.](#)

[Remove this box](#)

Gateway status

Status reload disabled

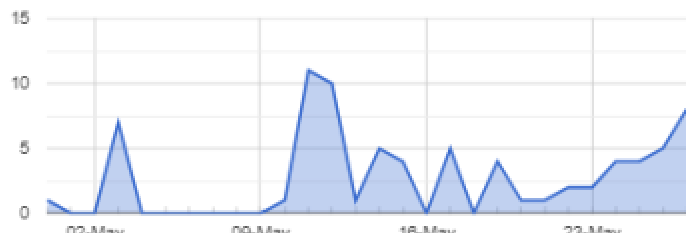
Current status of WISP gateways

Gateway (ID)	Auth #	Conn #	Status
Tower 6 (EZ-1000R) (0d26b36404)	1	1	✗ ⚠
Tower 1 (EZ-100G) (779b7e8b50)	0	0	✓
Tower 2 (EZ-100G) (9a80871c88)	1	1	✓ ⚠
Tower 3 (EZ-100G) (576ed3f888)	3	3	✓
Tower 4 (EZ-250G) (d70cfc591)	2	2	✓ ⚠
Tower 5 (EZ-100G) (2285101251)	1	1	✓ ⚠
Tower 7 (EZ-1000G) (6d7052f8d0)	1	1	✓
Tower 8 (EZ-250R) (fba0898308)	1	1	✓

✓ ✗ Check-in ↻ Recent reboot ⛔ Disabled 🏠 Hide ⚠ Alert

Logins: ALL GATEWAYS 28 days

Total number of live logins across all gateways



5.14. Logout.

Logout terminates the current session and returns the browser to the login screen.



6. Customer Relationship Management (CRM) portal

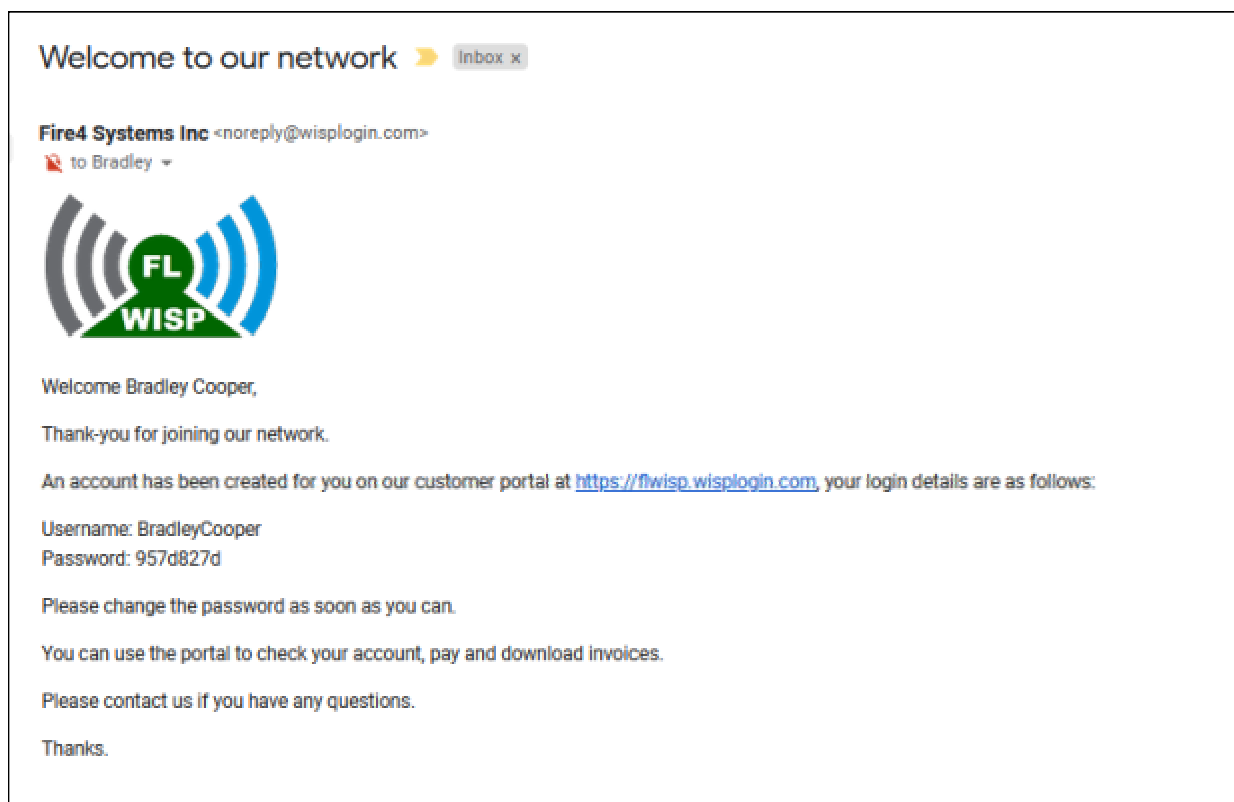
6. Customer Relationship Management (CRM) portal.

The Customer Relationship Management (CRM) portal is a service provided by easyWISP that permits the WISP subscribers to access information about the subscribers account, to make an on-line purchase of Internet access, and to open a support request ticket that will be sent to the customer support person. The CRM portal page is fully customizable. The customization process is described in the settings section.

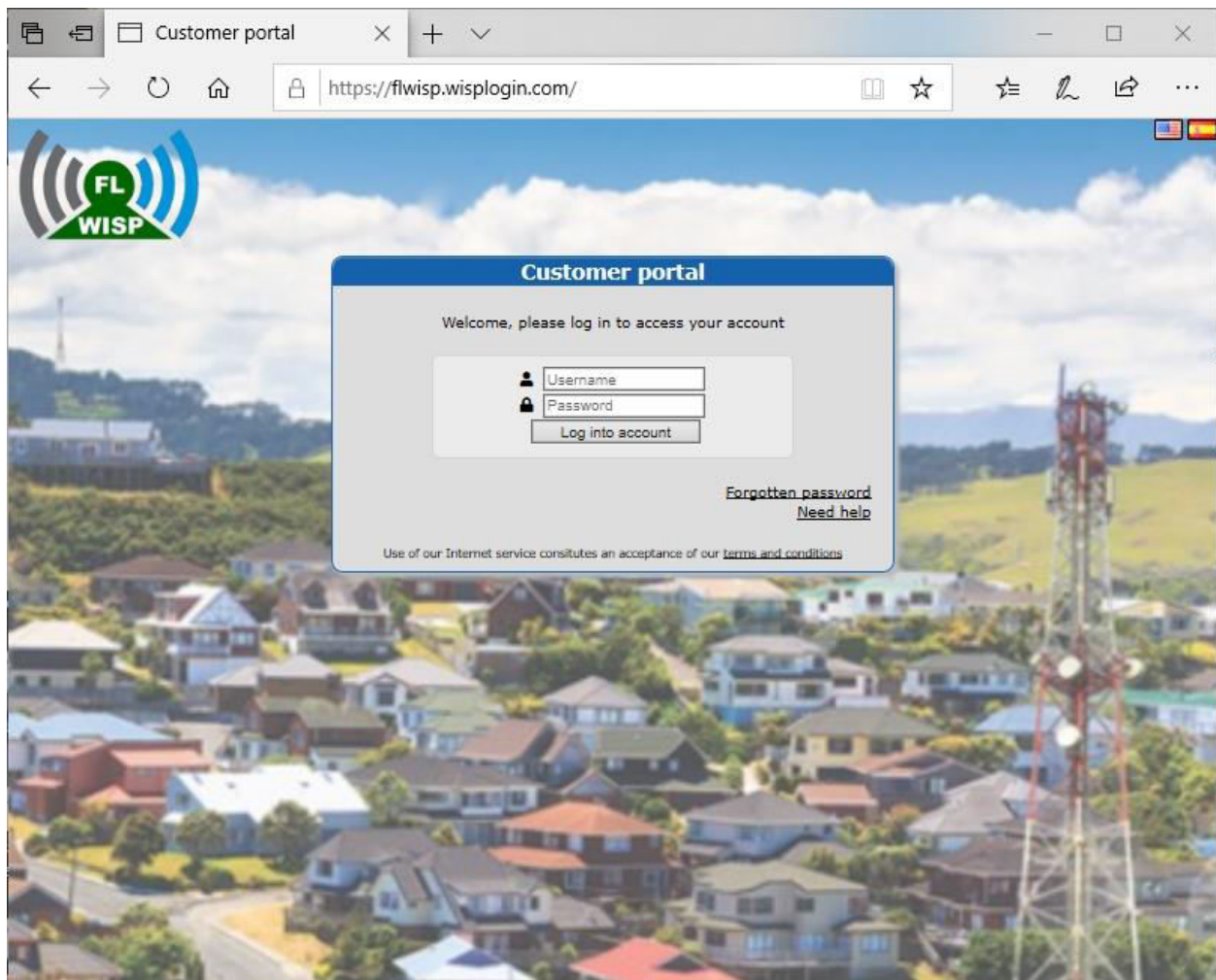
When a new subscriber account is created a greeting message is sent to the new subscriber. The greeting message contains the username that was created for the subscriber by the WISP, and also contains a password that is auto-generated by the Cloud. The WISP does not have access to the subscriber's password. The subscriber is also advised of the portal URL, which always begins with the portal name chosen by the WISP when the Cloud account is created.

<https://wispname.wisplogin.com>

An example of a subscriber-greeting message is shown below.



The subscribers opens a browser and enters the URL for the portal. The subscriber will then see the portal login screen. An example of the portal login screen is shown below.

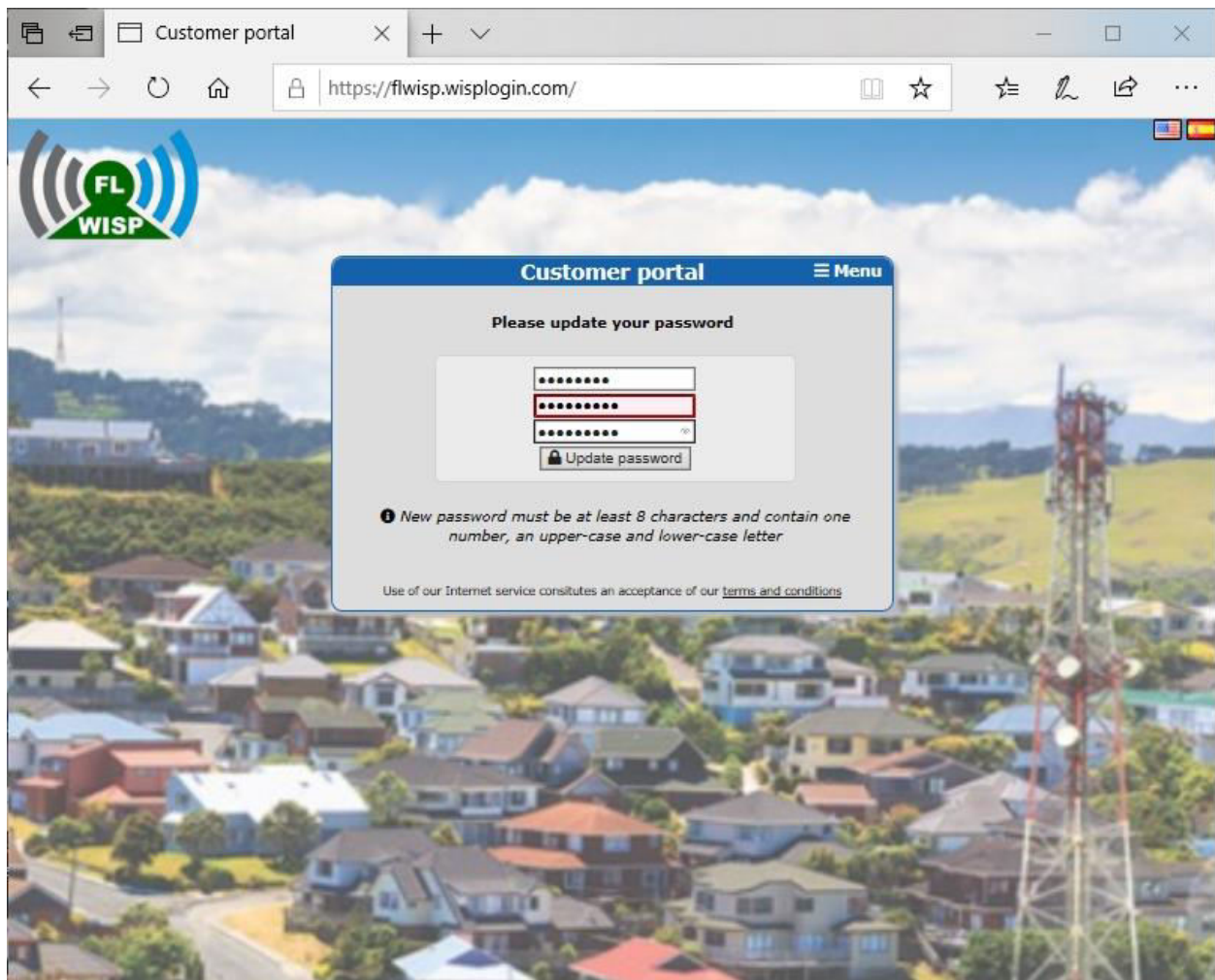


The first time that the subscriber logs into the portal the screen will request the subscriber to change the password. The password provided may have the following characteristics

- 8 characters minimum
- must contain at least one number
- must contain at least one uppercase letter
- must contain at least one lowercase letter

If the password does not comply with the minimum requirements the subscriber will be asked to enter a new password.

The password entry screen is shown below.

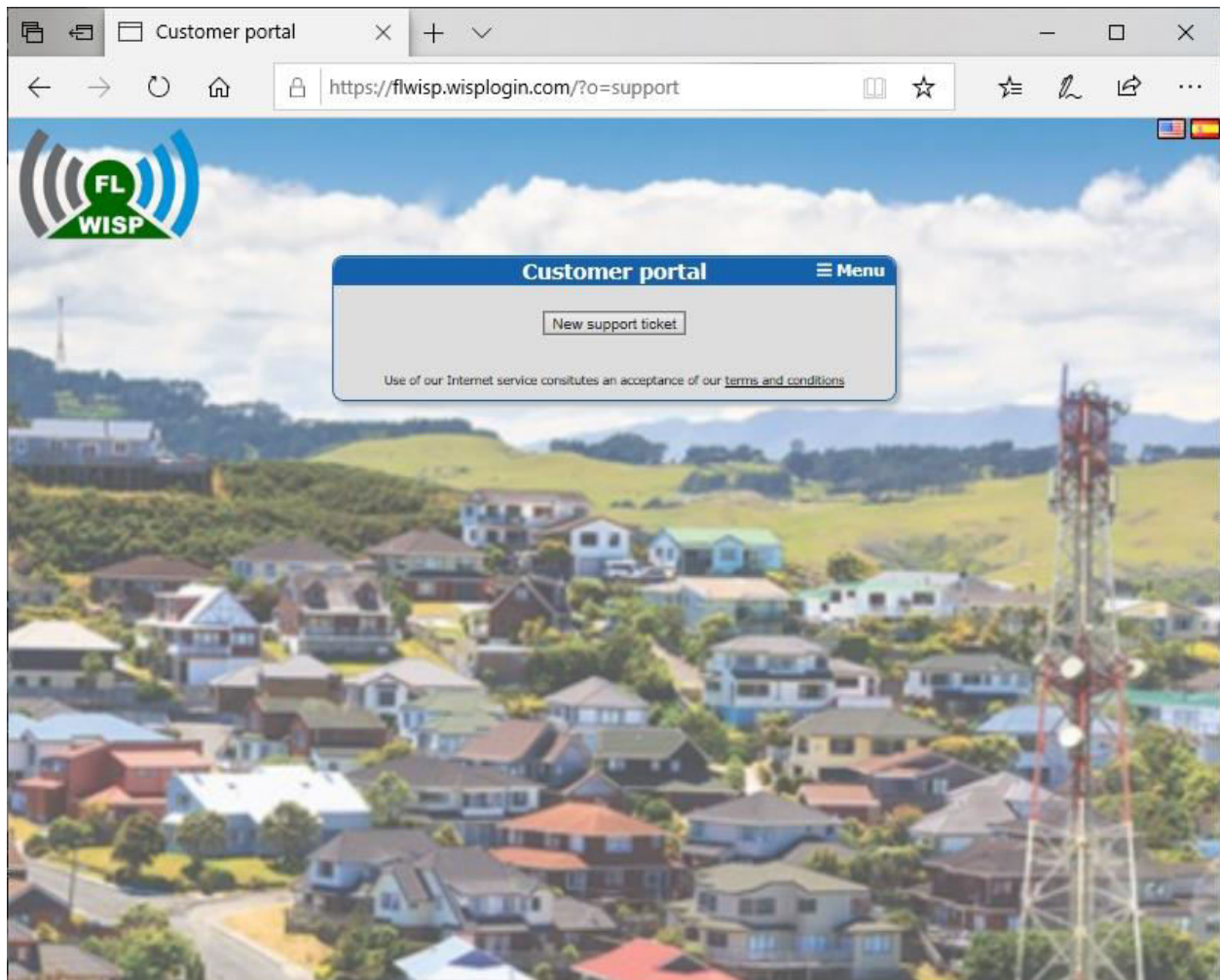


When the subscriber has completed the password process the screen below will be displayed. The menu has five options.

- Account: shows details of the account use
- Billing: provides a means of purchasing additional Internet access
- Support: provides access to the ticket system to send a support request ticket
- Password: change the current password
- Logout

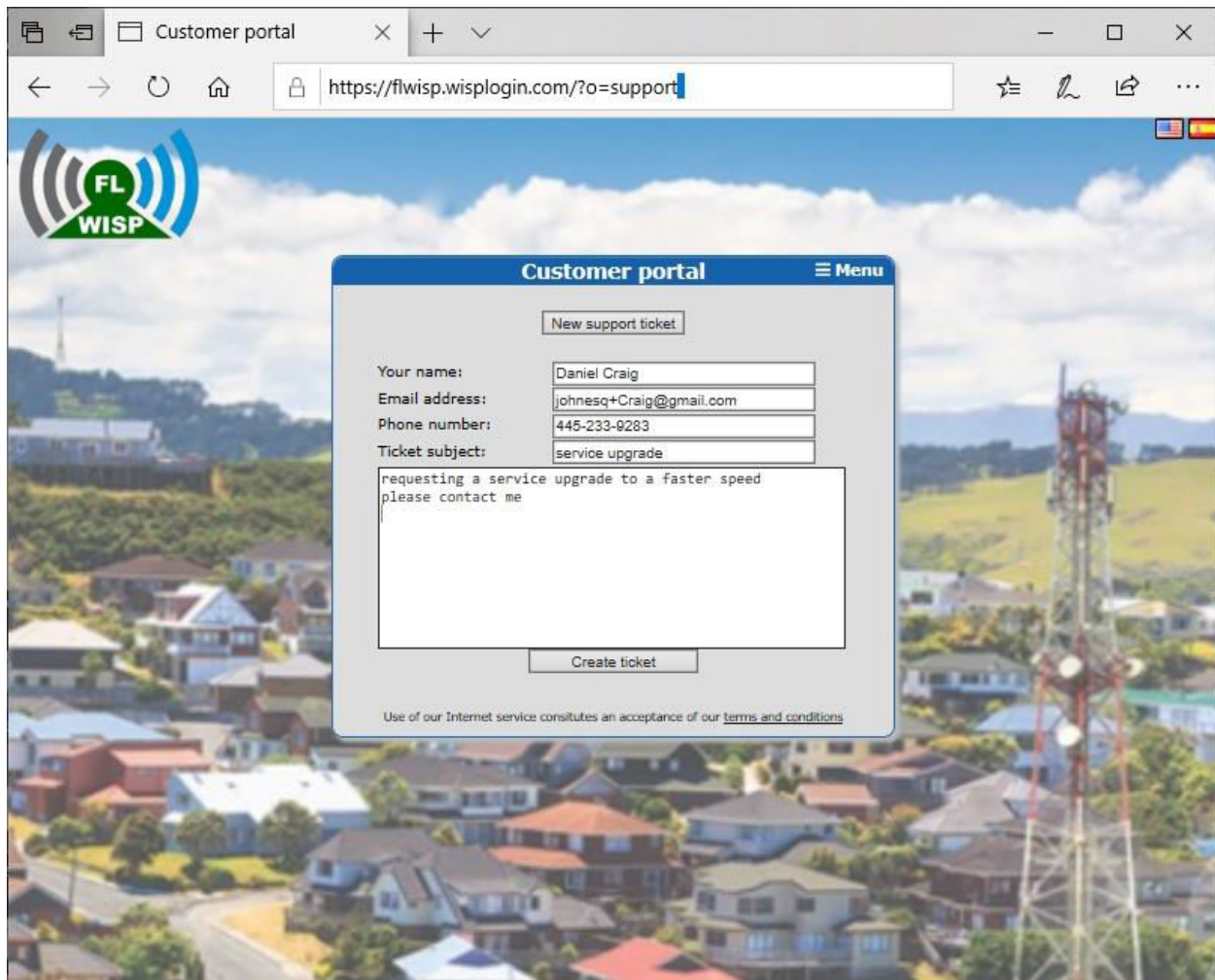


Selecting the support option from the menu will display the screen shown below. The subscriber will then click on the button to open a new support ticket.



The support ticket page adds the name, address and phone number from the subscribers account. The subscriber then types the subject followed by the message.

An example of a portal support ticket is shown below.

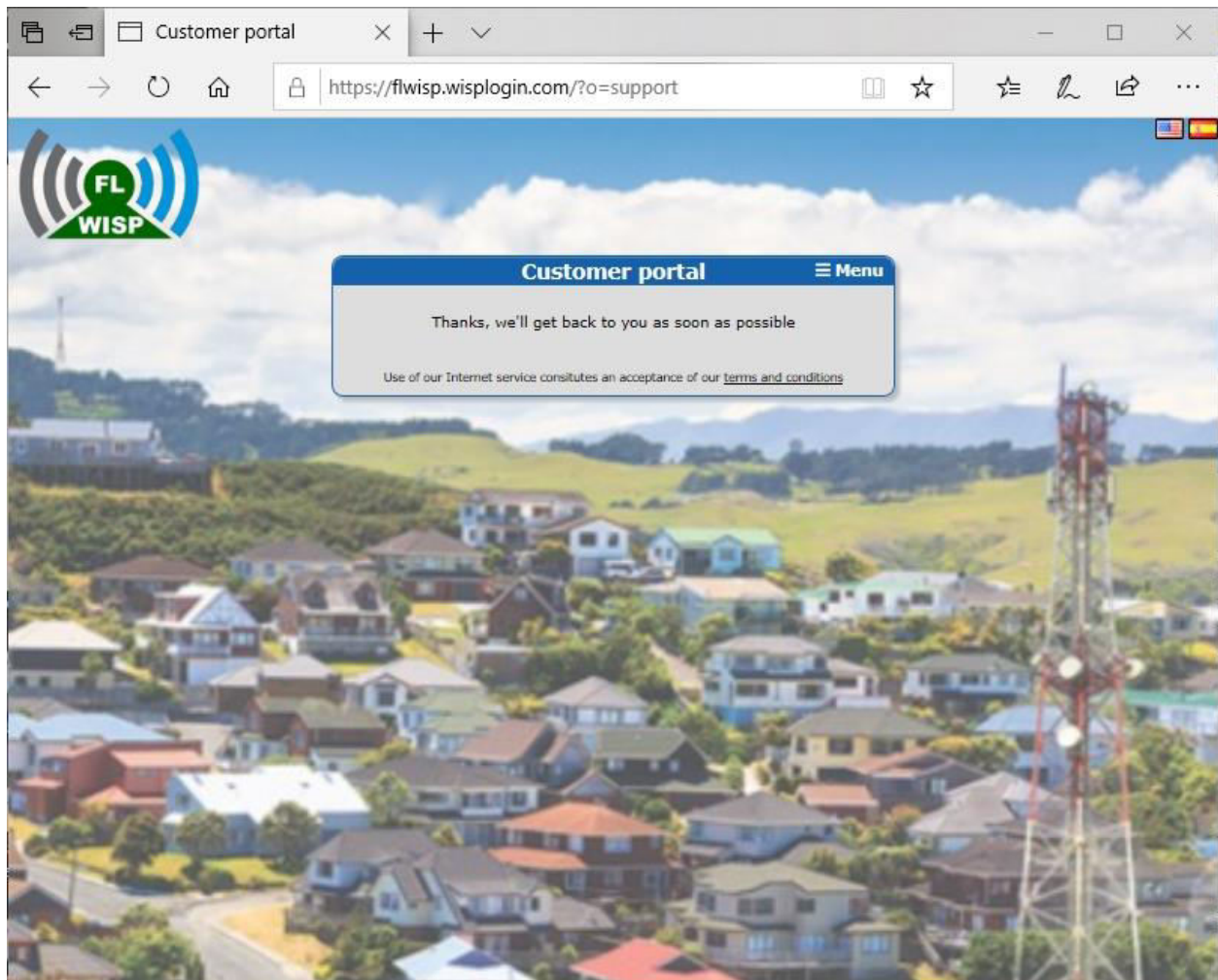


The screenshot shows a web browser window with the address bar displaying `https://flwisp.wisplogin.com/?o=support`. The page features a background image of a suburban neighborhood with a telecommunications tower in the foreground. In the top left corner, there is a logo for 'FL WISP' with a signal icon. The main content area is titled 'Customer portal' and includes a 'Menu' icon. A 'New support ticket' button is located at the top of the form. The form fields are as follows:

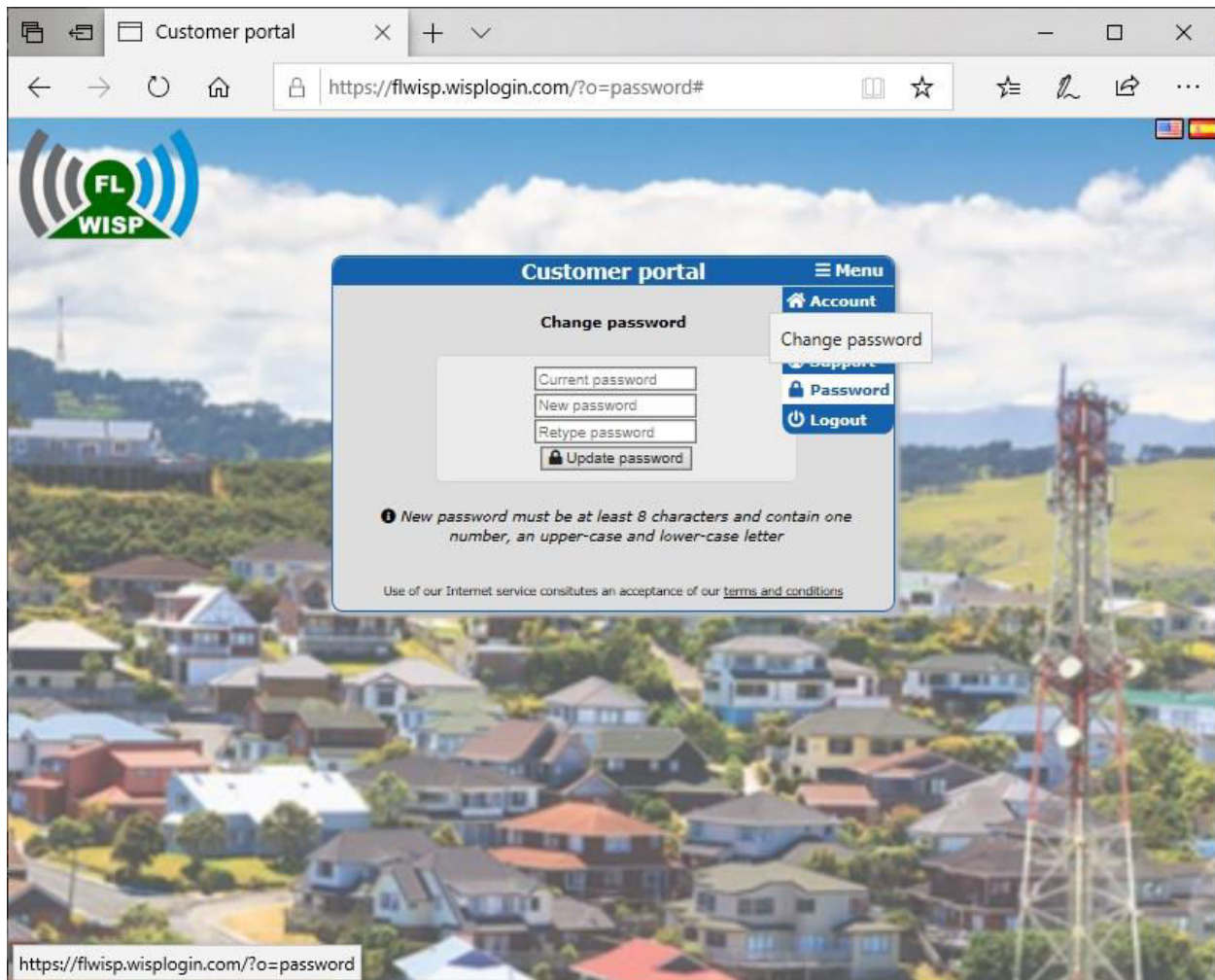
Your name:	Daniel Craig
Email address:	johnesq+craig@gmail.com
Phone number:	445-233-9283
Ticket subject:	service upgrade

Below the subject field is a large text area containing the message: "requesting a service upgrade to a faster speed please contact me". At the bottom of the form is a 'Create ticket' button. A small disclaimer at the very bottom states: "Use of our Internet service constitutes an acceptance of our [terms and conditions](#)".

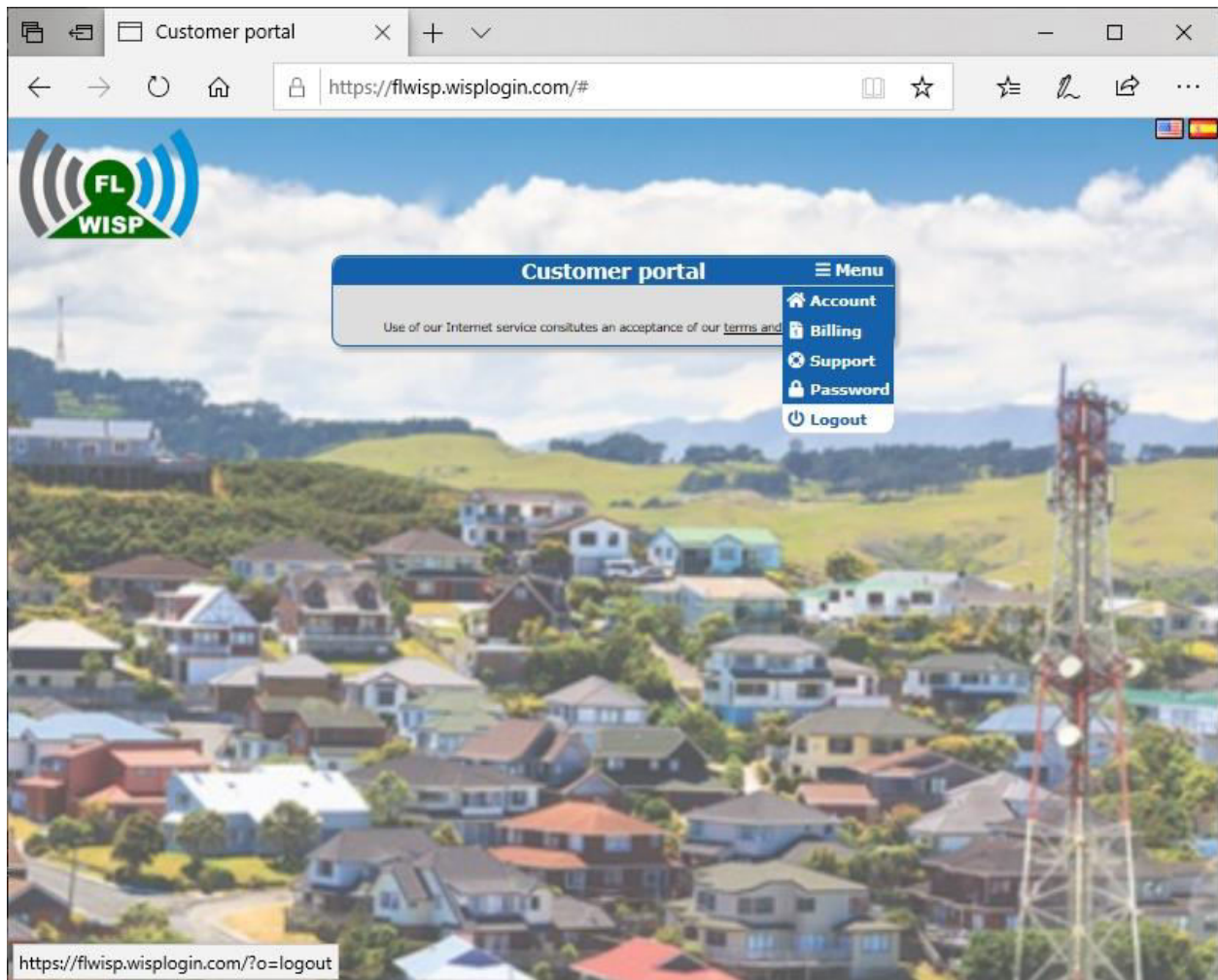
When the subscriber clicks the create ticket button the screen below appears with the auto-reply after sending the ticket.



The password change menu option permits the subscriber to enter the current password then type the new password twice before clicking update password.



When the subscriber has finished interacting with the portal the logout menu entry is clicked.

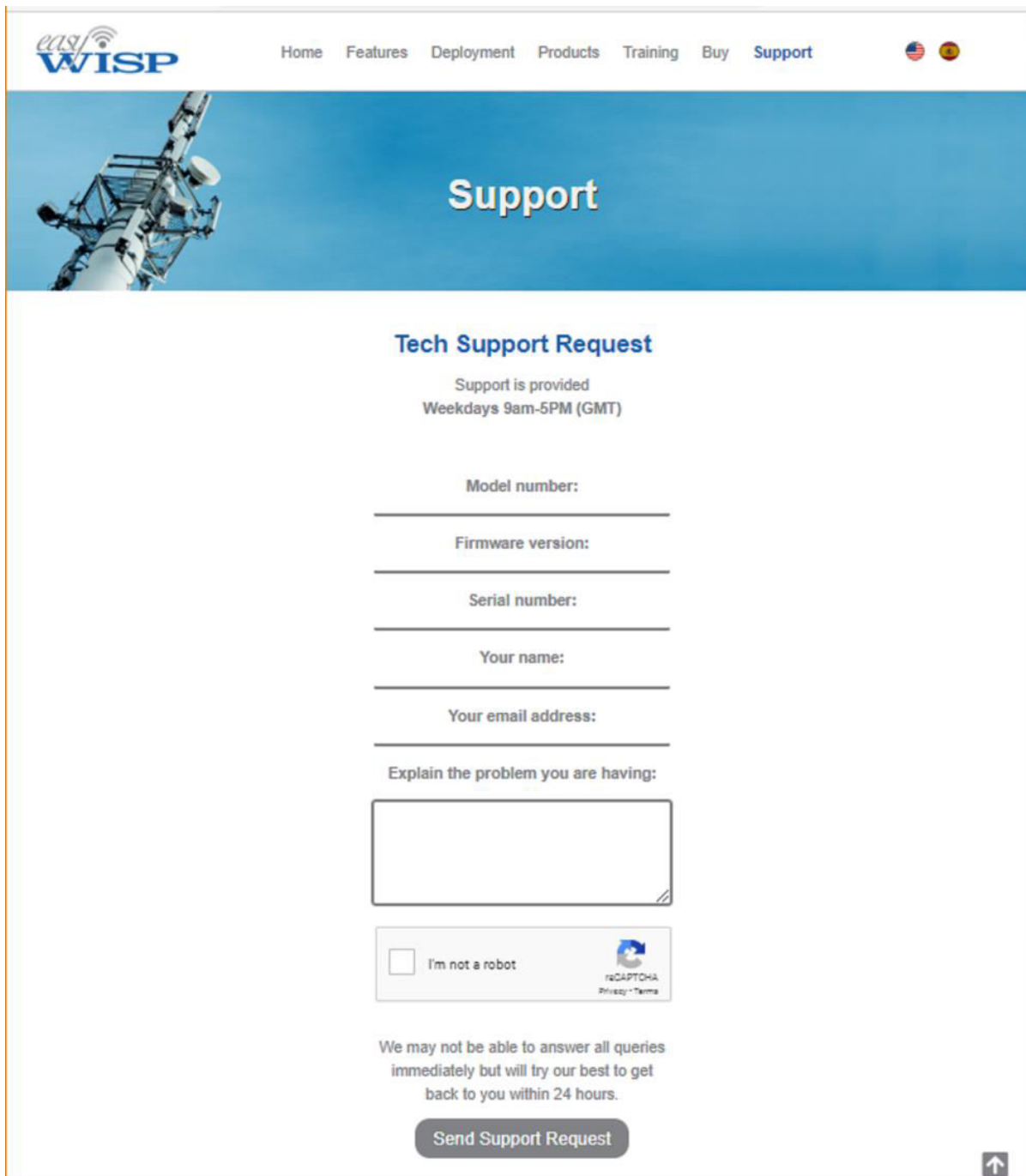


7. Support for easyWISP customers

7. Support for easyWISP customers.

Free online technical support is provided for easyWISP WIAP customers. Go to the easyWISP website and click on the support tab. The Cloud system has been designed to be very intuitive to minimize the requirement for technical support. We request that WISP's read this manual carefully before contacting technical support.

The free technical support page is shown below.



The screenshot shows the 'Support' page of the easyWISP website. The page has a blue header with the easyWISP logo and navigation links: Home, Features, Deployment, Products, Training, Buy, and Support. There are also flags for the United States and Germany. The main content area has a blue background with a radio tower image and the word 'Support' in large white letters. Below this is a 'Tech Support Request' form. The form includes a title 'Tech Support Request', a note 'Support is provided Weekdays 9am-5PM (GMT)', and several input fields: 'Model number:', 'Firmware version:', 'Serial number:', 'Your name:', and 'Your email address:'. There is also a text area for 'Explain the problem you are having:'. At the bottom of the form is a reCAPTCHA widget with the text 'I'm not a robot' and a 'Send Support Request' button. A small upward arrow icon is in the bottom right corner.

easyWISP

Home Features Deployment Products Training Buy Support

Support

Tech Support Request

Support is provided
Weekdays 9am-5PM (GMT)

Model number:

Firmware version:

Serial number:

Your name:

Your email address:

Explain the problem you are having:

☐ I'm not a robot

reCAPTCHA
Privacy - Terms

We may not be able to answer all queries immediately but will try our best to get back to you within 24 hours.

Send Support Request

