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AUGUST
2026

TELECOM SYSTEMS MANAGE RURAL COMMUNITY SATELLITE INTERNET

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Telecom systems can manage rural community satellite Internet services

Telecom businesses in underserved markets can provide low-cost rural community WiFi Internet for a minimal investment, by combining a satellite Internet service with Guest Internet products and cloud service; the cloud service integrates with the Telco's subscriber management system and Mobile Money payment gateway. The Telecom Company can charge for the service with both pay-on-demand (no-contract-prepaid-service) and subscriptions, using Mobile Money and other forms of payment.

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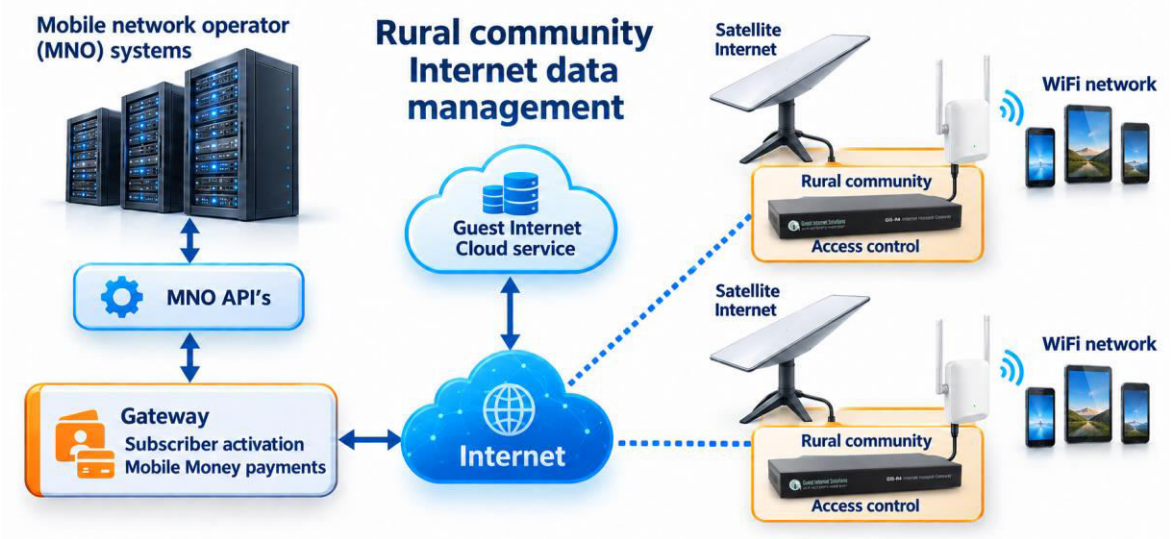
1. A small investment budget Internet data service for rural communities

Telecom Companies have budget constraints when planning to provide a their mobile phone service over a large area. Each mobile tower and connection to the network can cost in excess of $250,000 for the installation plus the cost of maintenance and operation. The investment can be justified for an urban area where one tower can provide a service for thousands of people within range of the tower. The return on investment (ROI) calculation for a tower installation is based on having a population density of 5,000 to 10,000 people within the area covered by the tower. It does not make business sense to install towers in rural areas when a tower might provide a service for only a few hundred people in nearby villages. The investment for a 4G/5G tower in a low-population density rural area will not be recovered.

Telecommunications technology is in continuous development and new technologies create new profitable business opportunities for Telecom Companies. The development of new technologies can enable Telecom Companies to provide an Internet data service for small communities where a few hundred people are in range of the service. It is now possible to provide a profitable Internet data service for a village of 100 to 500 people with an investment of less than $10,000. The cost of the Internet data service for residents can be less than 2 cents per hour of connection for a pay-on-demand service (also called a no-contract-prepaid-service, or a pay-as-you-go service), and less for a subscription service. The cost of Internet access is affordable for the poorest communities. A low cost data service also opens voice communications using mobile apps such as WhatsApp using VoIP (voice over Internet protocol) technology. A 4G-LTE tower may be supporting more voice calls using mobile VoIP apps, such as WhatsApp, than calls placed over the cellular network.

The adoption of new technologies can be extremely beneficial for mobile phone companies as they offer a path to expand the customer base quickly with the minimum investment, and add new and profitable data services to the Telecom Companies portfolio. The Telecom Company can deploy a managed infrastructure that will provide a data service for rural communities. The infrastructure is built with several technologies that are integrated by the Guest Internet management system. The diagram illustrates the technology components.



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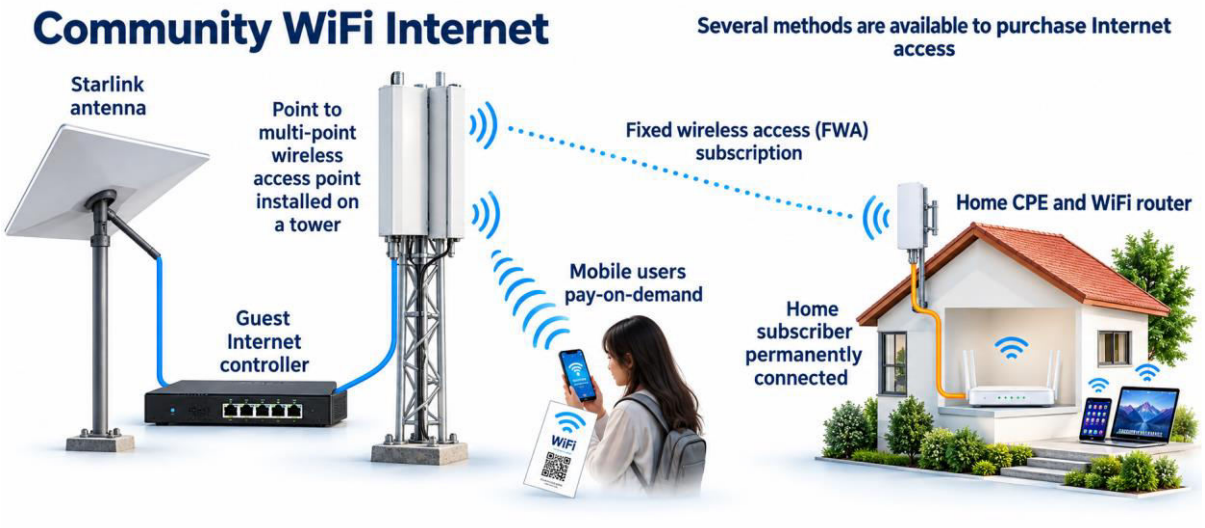
The mobile network operator systems provide the subscriber management and Mobile Money payment service that is required to manage and charge rural community customers. A gateway is customized for each Telco, to interface the Telecom Company systems with the Guest Internet cloud service. Each rural community is managed by the Guest Internet cloud service, and there is no limit to the number of rural communities managed via the Guest Internet cloud. Each rural community has a satellite antenna to provide the Internet service for the community, which connects to the Guest Internet access controller (broadband network gateway – BNG), The WiFi network infrastructure connects to the Guest Internet controller.

2. Satellite Internet can provide a WiFi Internet service for a community

A rural community of several hundred people can access an Internet service via one satellite antenna such as the Starlink service. Communities can have more then 100 people connected to a Starlink service simultaneously via WiFi infrastructure, when each person is given a low maximum download speed of 1Mb/s to 1.5Mb/s. This may represent a rural village of 300 to 700 residents; where from 5% to 20% of residents may be using the Internet simultaneously. Although the data speed limit may seem low, it is adequate for many Internet uses, including VoIP. Central to the community Internet service is the Guest Internet access controller. The controller receives customer activation commands from the Guest Internet cloud service, which in turn is administered by the MNO systems via the gateway, as illustrated in the next diagram. The Guest Internet controller has important management features; several are listed below.

- Authenticate both pay-on-demand and subscription users onto the network.
- Impose pre-determined access time, data speed and data use limits (rate plan).
- Prevent abuse of the service, such as blocking the use of copyrighted file sharing.
- Monitor network use, identify congestion, provide detailed reports.
- Failure monitoring at several points in the network, send alerts to the administrator.



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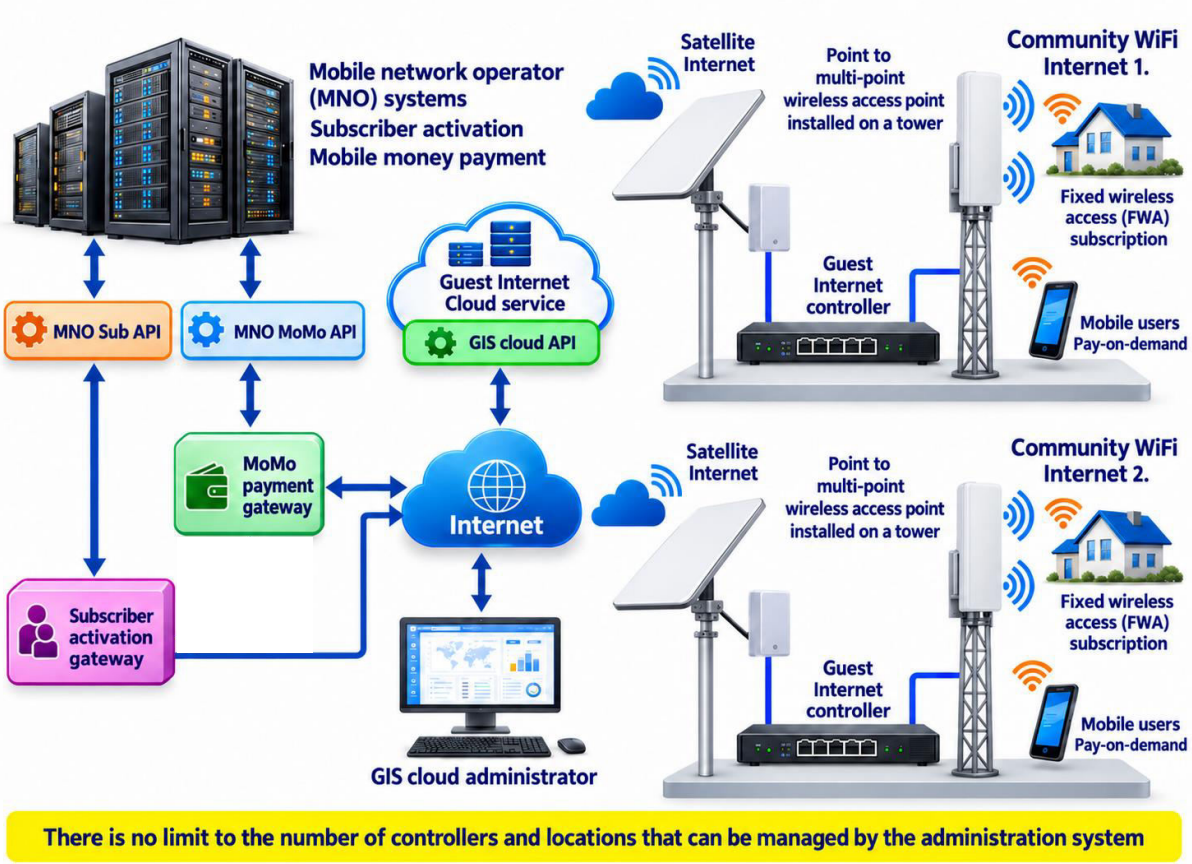
3. Telecom Company systems can manage a satellite community Internet service

Telecom Companies can add an unlimited number of rural community Internet data installations, while using current customer management and network infrastructure. The next diagram illustrates at a high level how the Telecom Company infrastructure can manage many rural Internet data installations. The Internet data service manages two types of customers.

- Subscribers, permanently connected via the community fixed wireless access (FWA), also called “fixed wireless broadband" (FWB).
- Pay-on-demand time limited access, mobile users and FWA can use pay-on-demand.

Data subscribers are added to the Telecom Company subscription management system. The subscriber activation gateway extracts subscriber information (ID and rate plan) via an API and activates that subscriber on the Guest Internet cloud, which in turn activates the subscriber at the rural community. When a subscriber account is past due (delinquent) then the subscriber can be deactivated using the same process via the subscriber activation gateway.

Pay-on-demand users purchase an access code that is valid for a pre-determined time. The purchase has a pre-determined rate plan (maximum down/up data speed). The purchase can be made via a physical voucher or scratch-off card using cash, or via an online credit payment using Mobile Money or similar. The Guest Internet controller provides a payment page that forwards the user to the MoMo payment gateway, which then places the charge with the Telecom Company Mobile Money payment processor.



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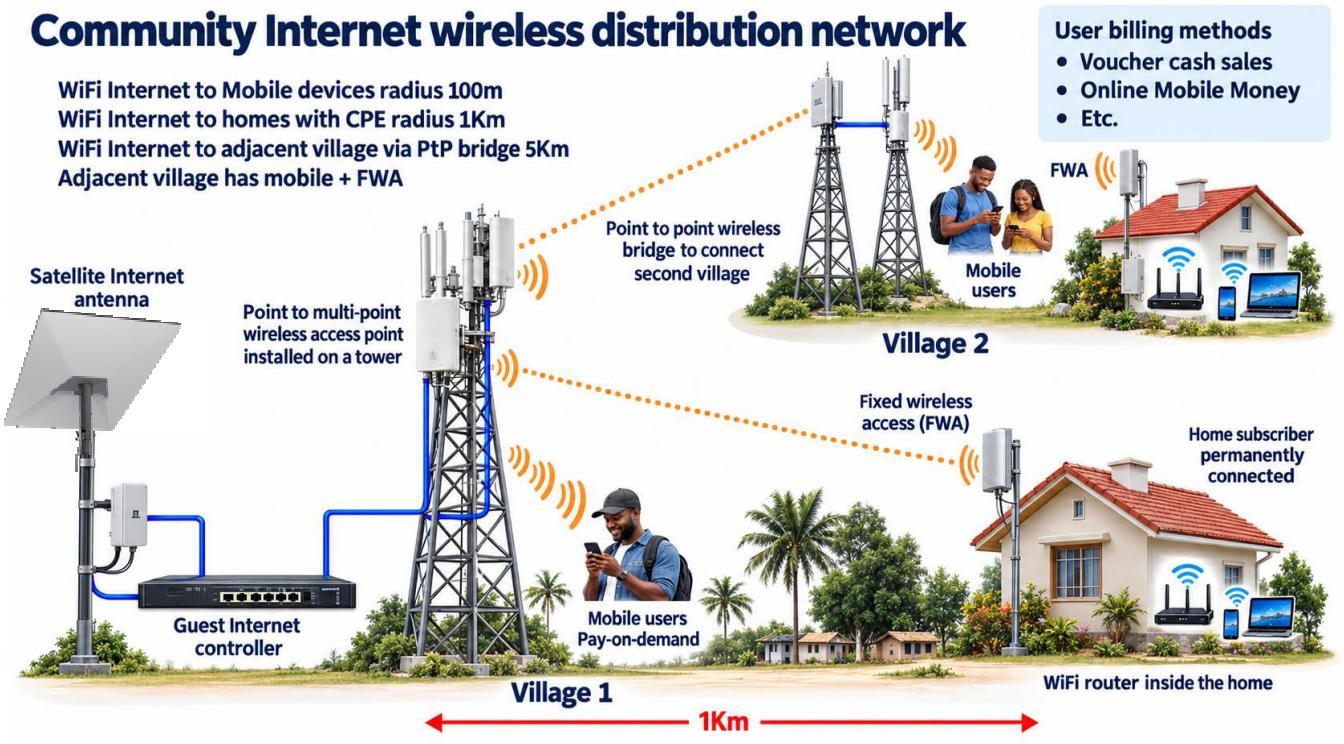
4. Overview of the community Internet infrastructure design

The network infrastructure that is required for a community installation can have the following elements.

- Satellite antenna (Starlink), one or more satellite antennas can be installed, determined by the number of people in the community who will be request access to the Internet.
- Guest Internet access controller and service manager, the guest Internet controller can be operated locally or via the Guest Internet cloud as part of a larger group.
- Point-to-multipoint wireless access point that provides the outdoor WiFi for the community. Mobile devices can connect directly to this wireless access point over a short range, where the mobile device determines the range. Fixed wireless access (FWA) over longer distances to homes using encrypted WiFi.
- Home installation for fixed wireless access (FWA) with an external CPE antenna and indoor wireless router providing WiFi for mobile devices.
- Connect one or more adjacent villages to the network using point to point wireless bridges, each remote community will require a Guest Internet controller, point-to-multi-point wireless access point and possible home installations.

The investment for each community is low because the installation uses commercial grade wireless WiFi products. The cost for the community installation shown in the diagram will be less than $10,000, while a 4G-LTE tower with Internet connection will cost in excess of $250,000.



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5. Community service provisioning: pay-on-demand and subscription

The Guest Internet community Internet management system can simultaneously provide two types of access methods to provide customers with the Internet service.

Pay-on-demand: The customer is a mobile user or can have a FWA service to a home. The customer can purchase a time-limited access code that has a pre-determined rate plan (maximum data speed, etc). The customer is offered several access durations with each at a pre-determined cost for the customer. Duration examples are 1 hour, 8 hours, 1 day, 1 week, etc. The time starts counting with the first network access using the code. When the time expires the customer is disconnected from the network. Several methods of purchasing the access code are available. The pay-on-demand customer is not a registered subscriber on the telecom database, and is classified as a casual user. Because pay-on-demand is time limited more people can use the network infrastructure, than would be possible with a subscription.

Subscription: The customer is registered as a subscriber on the Telecom Company subscription management system. The subscriber can be a mobile user who has access to 4G towers, plus access to any community Internet data service. The subscriber can also be a fixed wireless access (FWA) customer with the community Internet access in the home. The Telecom Company customer management system may identify mobile and FWA customers.

Each type of provisioning service has an associated rate plan.

- Maximum download and upload data speed.
- Optionally sets download and upload data caps.

One Guest Internet community installation can provide both pay-on-demand and subscription access. This is illustrated in the diagram below.

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6. Methods of charging the customer for a subscription Internet service

The Telecom Company has established methods of charging a mobile phone subscriber for the monthly fee. The Guest Internet system can also add monthly payment online for mobile customers using Mobile Money (MoMo) or other forms of credit.

The fixed wireless access (FWA) customer in a community that is serviced with the Satellite Internet plus WiFi managed by Guest Internet can be billed using established subscription charging methods. The customer can also pay for the subscription online using Mobile Money. The FWA customer will have a permanent connection to the Internet while monthly payments are on time. If the FWA customer account becomes past due then the authentication within the Guest Internet WiFi management can be suspended.

In the case of Internet access suspension then the customer will be presented with the pay-on-demand login screen. A login screen example is shown in the next figure. Note that the Telecom Company will have a branded and customized login screen as part of the service deployment process. The subscriber can purchase Internet access on demand. After purchase the FWA customer has Internet access restored.

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7. Methods of charging the customer for a pay-on-demand Internet service

The Telecom Company can have several concurrent methods to charge for the community Internet service. These methods include the following.

- Cash payments with the sale of pre-paid vouchers of several types
- Online payments using credit services, which includes Mobile Money.

The Telecom Company is likely to offer a Mobile Money service for customers and may provide an API for online payment processing. The Mobile Money API is required by the Guest Internet system for the processing of payments online.

When a pay-on-demand customer connects to the community WiFi network the device will display the login page. The Telecom Company will brand and customized login screen and include the required features for the business operation, as part of the service deployment process, including immediate access to the Telecom services.

The next figure illustrates a login page example. The login page can include a box to enter a pre-paid code purchased via a voucher. The customer can also select the online payment method where a list of purchase options will be displayed. The options include the duration of access and the cost of the purchase. After completion of the purchase the customer will receive an access code, which will be displayed on the screen. The Guest Internet gateway can also send the access code to the customer's device via a SMS message. The login page can also provide many other features such as charged advertising banners, limited free access and direct access to the Telecom Company website without login.

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Two methods of preparing pre-paid vouchers for cash sales are illustrated with the following examples. Selling access vouchers gives the Telecom Company additional flexibility to provide a data service for communities. The Telecom Company can distribute the pre-paid vouchers through retailers The same retailers might have an agreement with the Telecom Company to provide Mobile Money services.

Internet service pay on demand cash sales: Use the Guest Internet controller or cloud group to print vouchers with access codes and rate plan for retail cash sales.

Internet service pay on demand cash sales: Use the Guest Internet controller or cloud group to download access codes with rate plan to print scratch-off cards for retail cash sales.

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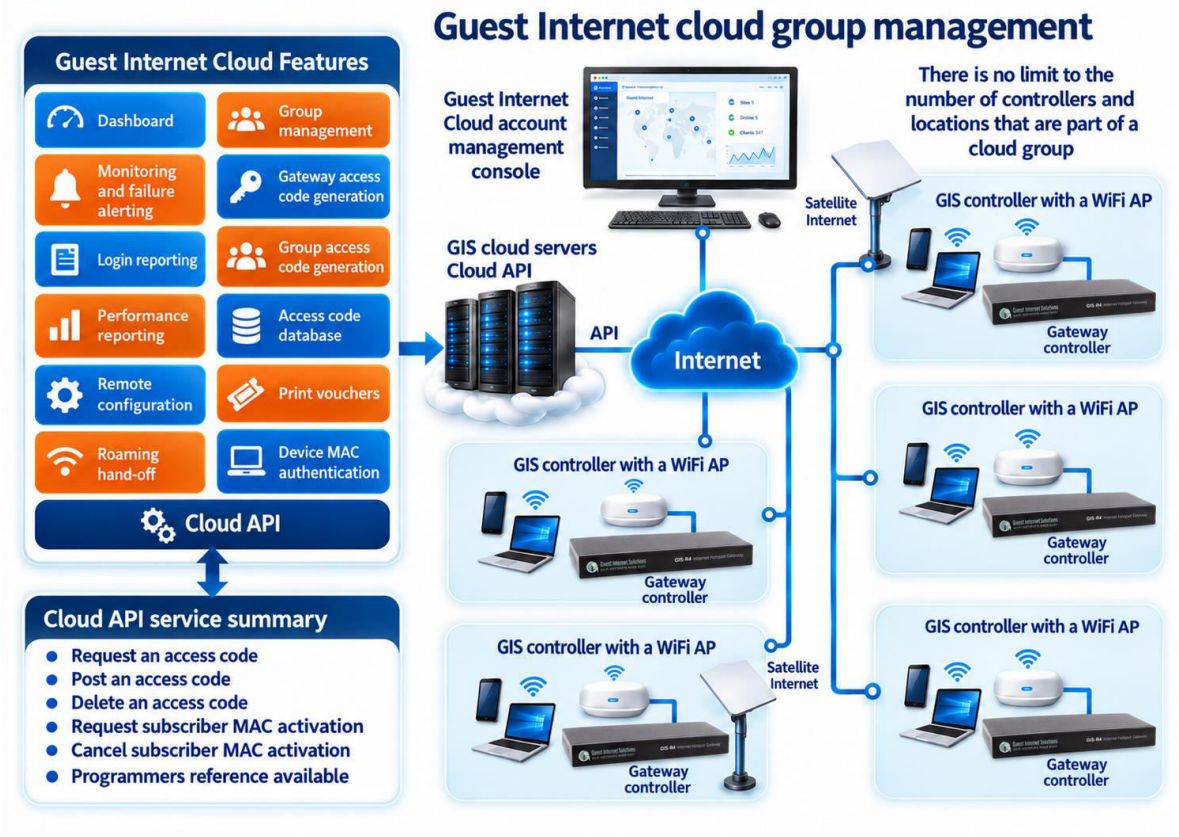
8. Group cloud management of many controllers in multiple locations

The Guest Internet community Internet management system has two components.

The Guest Internet controller: Each location where the community Internet service is provided has a Guest Internet controller; the controller is a broadband network gateway. The controller receives instructions from the Guest Internet cloud service for large multi-location installations. For one location only a controller can be managed locally via the UI. Guest Internet manufactures a series of controllers that provide data throughput and user capacity options.

The Guest Internet cloud: The Guest Internet cloud service is used to manage one or many Guest Internet controllers in different locations. The cloud receives performance information from each controller and displays this information as graphical reports. Information can be displayed for each controller, for controller groups, and for the installed controllers. The cloud sends user group authentication information to the controllers in each group, this includes access codes with the corresponding rate plan, and MAC addresses also with corresponding rate plan. The cloud monitors and reports code and data use. When the pay-on-demand code duration expires the user is disconnected from the Internet. A subscriber with MAC authentication can be suspended when the account is past due.

Any Guest Internet controller in the cloud group can authenticate access codes generated for that cloud group. A device MAC address posted in the cloud group account will allow authentication of subscriber access by the appropriate controller. The diagram illustrates the cloud management of controllers.



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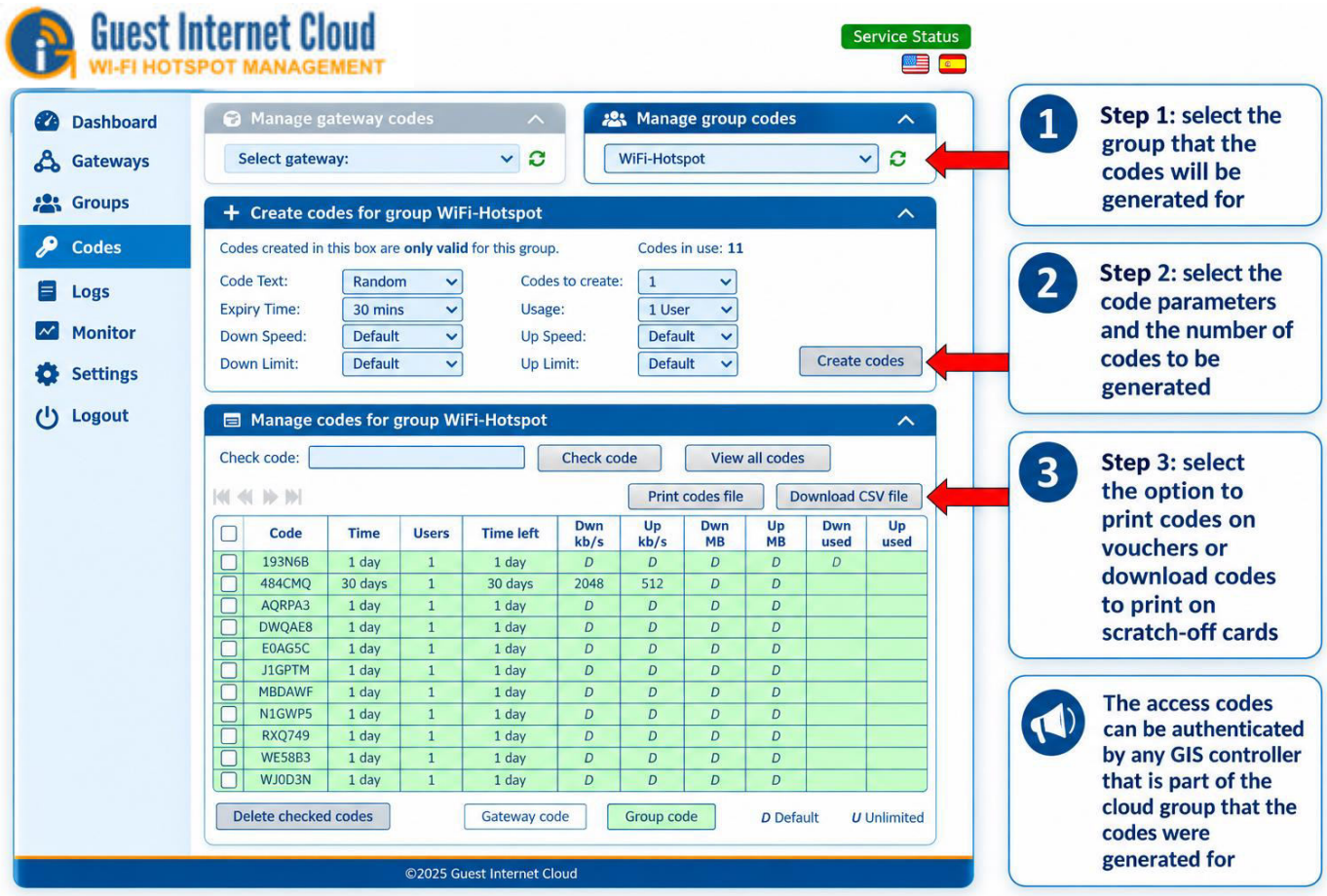
9. A cloud group issues access codes and can set device authentication

Cloud group access codes and MAC authentication codes can be generated or entered either manually using the Guest Internet cloud user interface, or generated/entered via the API. This section describes manual access code generation using the cloud user interface. A later section describes the API interface that is used by automated pay-on-demand (no-contract-pre-pay) and subscription systems.

Codes can be generated for individual Guest Internet gateway controllers, or generated for a group of controllers. Any controller in that group will authenticate a code generated for a group. Up to 10,000 random codes can be generated at one time, each with the same characteristics. Alternatively the administrator can set one unique code of up to 9 alpha/numeric characters. The code can be a device MAC address that will authenticate that device onto the network. This last option is used to authenticate fixed wireless access (FWA) customers where the MAC address is the residential CPE that is authenticated by the Guest Internet controller. The Guest Internet controller does have MAC spoofing detection and blocking in the case that an attempt is made to access the network using MAC duplication. The next figure shows the cloud code generation screen for manual operation.



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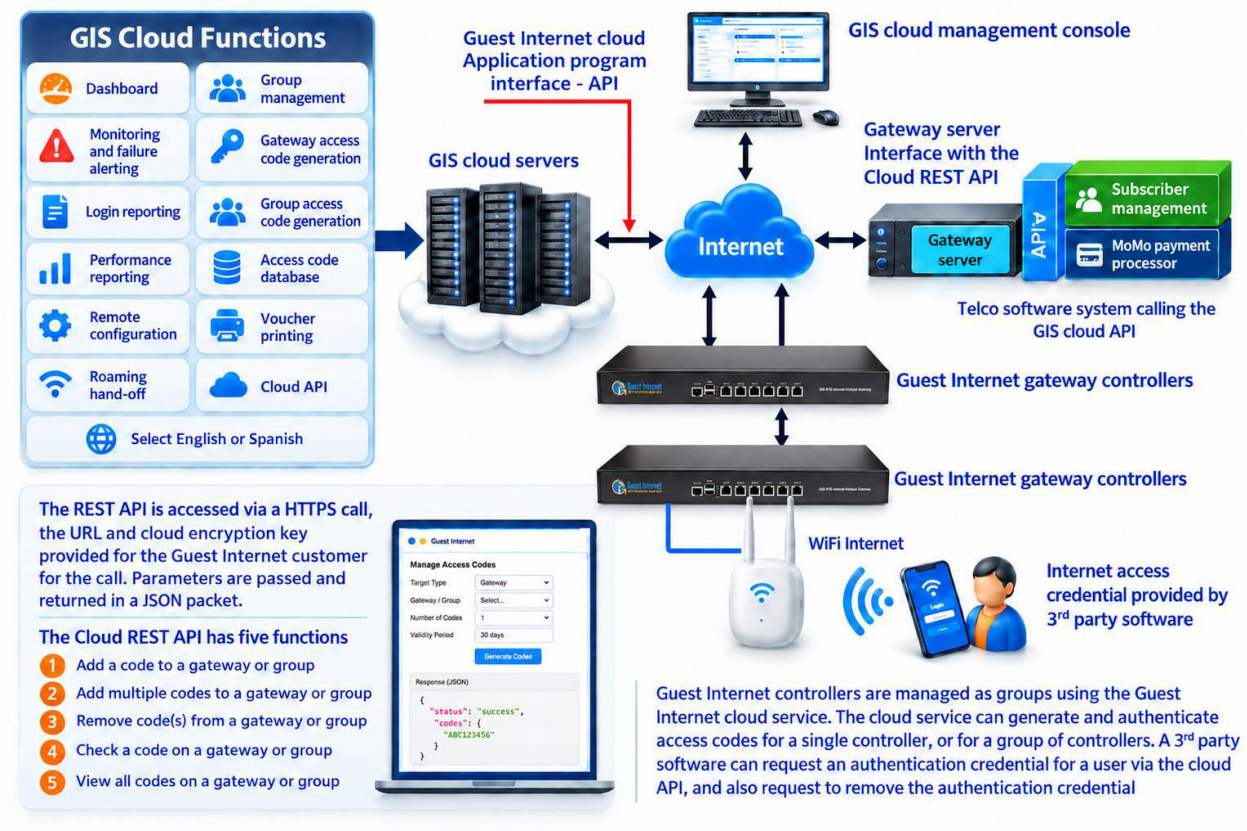
10. The GIS cloud API service for remote user management

The integration between the Telecom Company billing and payment systems with a community WiFi data service that is managed by the Guest Internet system is made via the Guest Internet cloud API. The powerful API provides the features that permit the Telecom Company to control the Internet access for subscribers, and also to sell Internet access to anonymous customers. There are two forms of delivering and billing the community Internet service that are described below, and illustrated in the diagram.

Pay-on-demand billing: Also called “no-contract-pre-paid” service or “pay-as-you-go” service. The Guest Internet cloud service can interface with the mobile network operator Mobile Money (MoMo) service that permits users to purchase Internet access in blocks of time, where several options of time (and optionally maximum data speed) are presented for the customer to choose. The customer receives an access code after a payment that can be used at any community location, but cannot be shared with others.

Subscriber billing: The Telecom Company subscriber billing system can also manage the community data service billing for fixed wireless access (FWA) and mobile service subscribers by authenticating the subscriber via the Guest Internet cloud service. The rate plan (maximum data speed) that the Telecom Company has negotiated with the subscriber will be applied to the subscriber’s data connection for FWA or mobile device connection. The data service can be activated when the contract is made with the subscriber and deactivated if the subscribed becomes past due.



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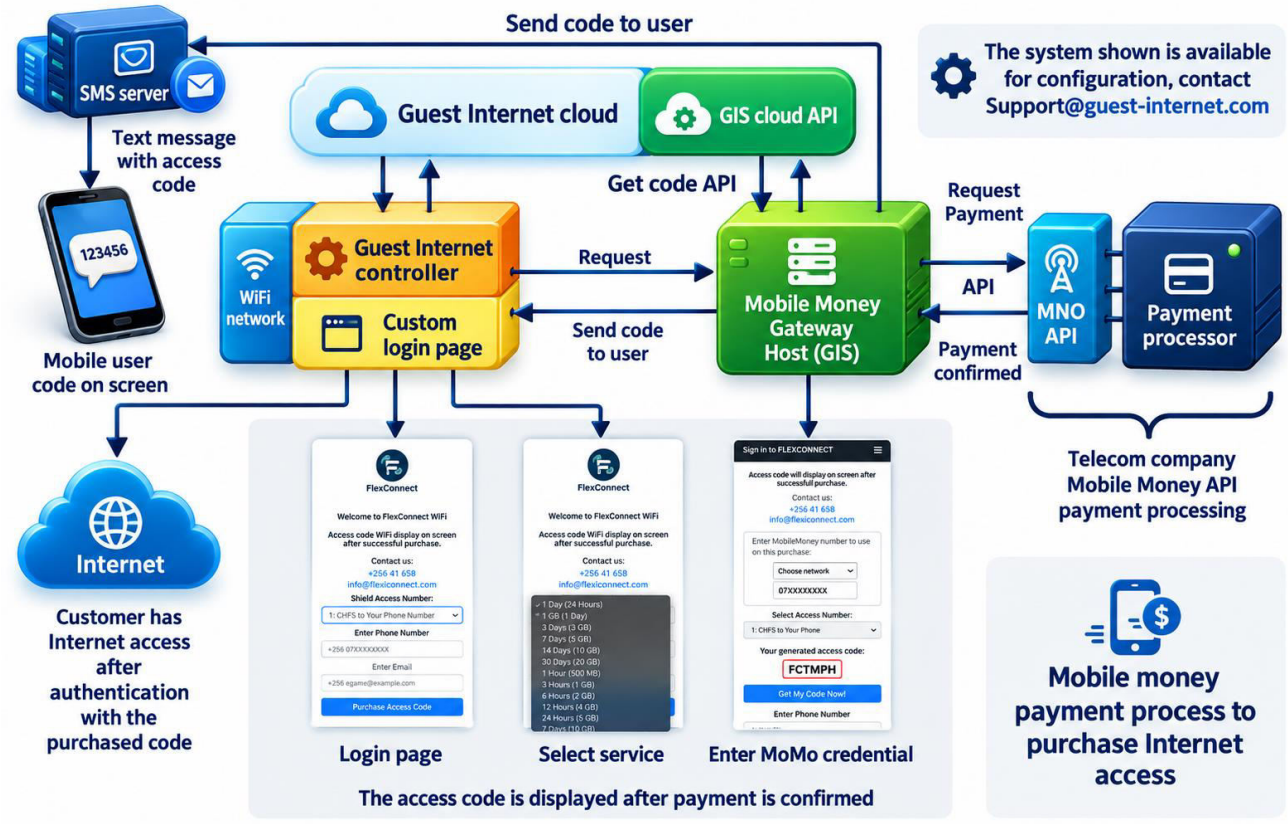
11. Integration of the cloud API for online purchase using Mobile Money

A pay-on-demand service (no-contract-pre-paid) and also a weekly/monthly subscription service can be charged using several methods concurrently; two methods are listed below.

- Sale of printed vouchers or scratch-off cards for sale via cash payments.
- Online purchase using a credit service, an example is Mobile Money.

Online purchase of Internet access requires an interface to a credit payment processor, and Mobile Money is the popular method in Africa of making an electronic payment. The Telecom Company that is selling the Internet service has a Mobile Money merchant account to receive payments. The Guest Internet controller has a custom login page developed for the sale of Internet access. The display offers several duration options, each at a different price point, and can also offer alternative rate plan (maximum data speed) options. The Telecom Company determines the Internet access offers for local market conditions. The payment gateway can be hosted by Guest Internet, or hosted by the Telecom Company. The gateway receives the purchase request from the user via the Guest Internet controller then requests the payment credentials. The gateway then communicates with the payment processor to request the payment. When the payment is confirmed the gateway requests the Guest Internet cloud for an access code with parameters for the option purchased then displays the code for the user and can send to the users mobile device via SMS. If the payment is not confirmed then the user is advised via the login page that the payment was declined. Guest Internet can provide a document on request that describes this system in detail.



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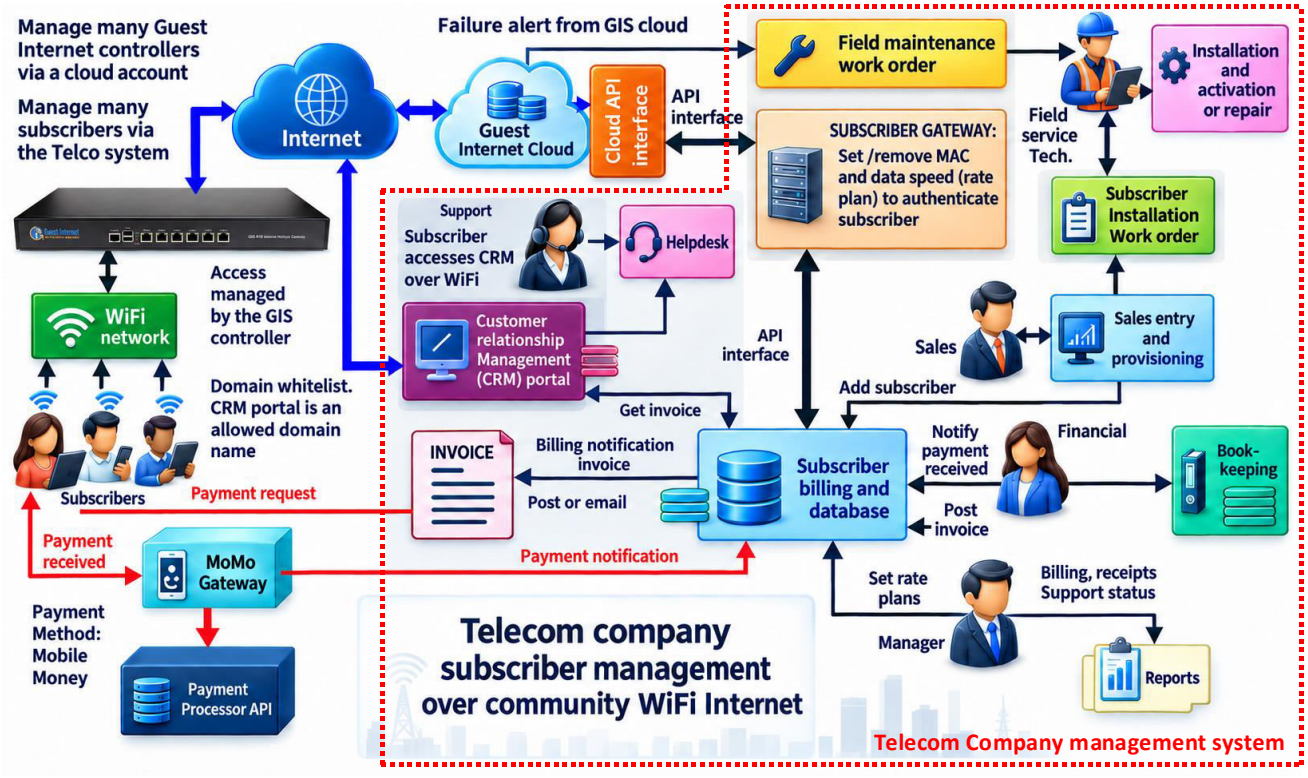
12. Telecom subscriber activation, authentication over WiFi with Guest Internet

The Telecom Company subscriber management system that monitors and bills 4G/5G subscribers can also be used to bill subscribers of the community WiFi Internet service, where the Internet services connects to any ISP, including the Starlink satellite service. The Guest Internet cloud management system provides two authentication methods concurrently.

- Generation (or setting) of a time and data speed limited access code
- Setting a subscriber authentication code, this is the MAC address of the fixed wireless access (FWA) client premise equipment (CPE) or alternatively the mobile device WiFi MAC address. If providing a WiFi subscription service for a mobile device then randomized MAC must be disabled.

The primary application for MAC authentication with a community WiFi Internet service is for buildings that are connected to the network via fixed wireless access (FWA). The MAC address of the client premise equipment (CPE) authenticates the subscriber onto the network. The Telecom Company subscriber management system posts the subscriber activation and deactivation via the subscriber gateway. In most systems the subscriber is identified by the account number plus authentication information for the 4G networks. The subscriber gateway maintains an account to MAC translation table for FWA subscribers in order to activate and deactivate the MAC address on the Guest Internet cloud API. The subscriber has access to the Telecom Company CRM portal via WiFi network without login using the Guest Internet controller domain name bypass feature. The diagram illustrates the subscriber management integration with the Guest Internet cloud.



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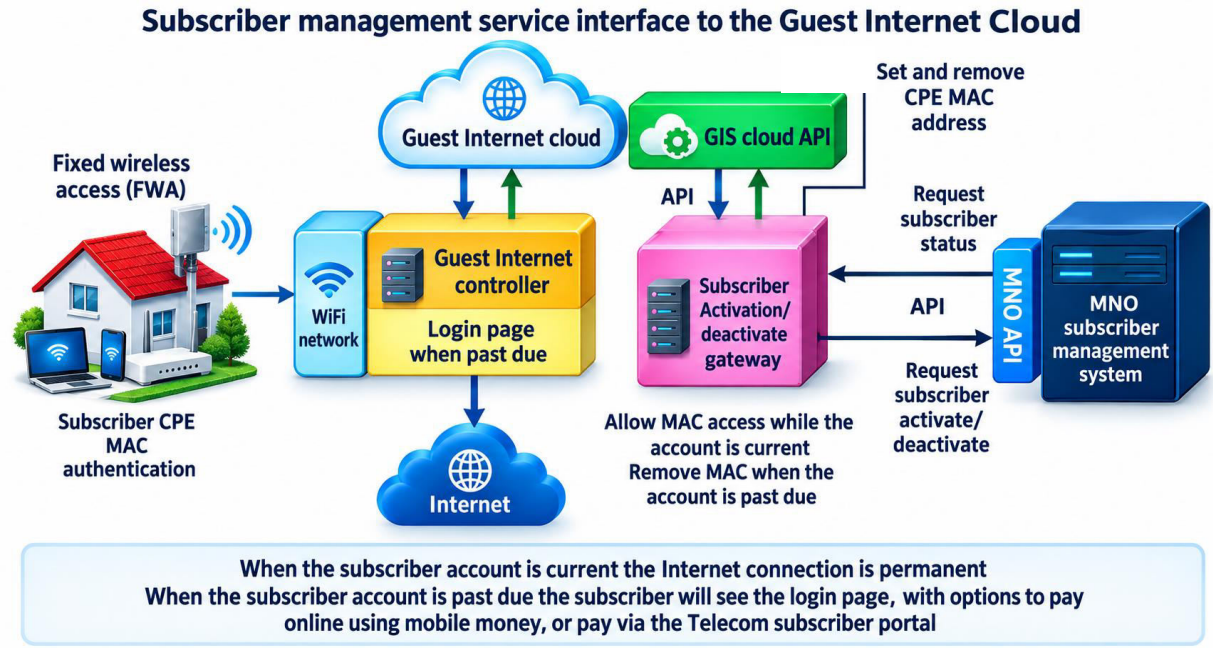
13. Integration of the cloud API with a subscriber management system

The Telecom Company subscriber management system has gateway software installed on a server to translate the FWA subscriber activation or deactivation request for the Guest Internet cloud API. The gateway sends the cloud API a JSON packet with the subscriber CPE MAC address plus a command to activate or deactivate the MAC address. The API call is usually made for a controller group using the group ID, rather than for an individual controller, however the API call can be made for any controller using the controller ID.

When the CPE MAC address has been posted to the cloud with the instruction to activate the MAC, the cloud passes the MAC to a Guest Internet controller in the case that the MAC was specified for a controller, or to a group of controllers where the MAC was specified for a group. The Guest Internet controller monitors the MAC address of each device that is connecting to the network, and the MAC sent for authentication is routed through to the Internet. There are two methods of activating a subscriber using the CPE MAC address.

- Permanent activation where the subscriber remains permanently activated, but can be deactivated at any time by the billing system, in the case of a late payment, etc. After deactivation the subscriber looses access to the Internet.
- Periodic activation, where the MAC is activated for a period of time that corresponds to the billing cycle (e.g. monthly). The subscriber has to be reactivated each month after payment of the account. If the subscriber is past due then the MAC is not reactivated and the subscriber looses access to the Internet.

The subscriber has access to the Telecom Company portal even when the account is deactivated, the Telecom Company portal domain name is added to the Guest Internet controller allowed domain list. The subscriber can post a payment online with access to the portal.



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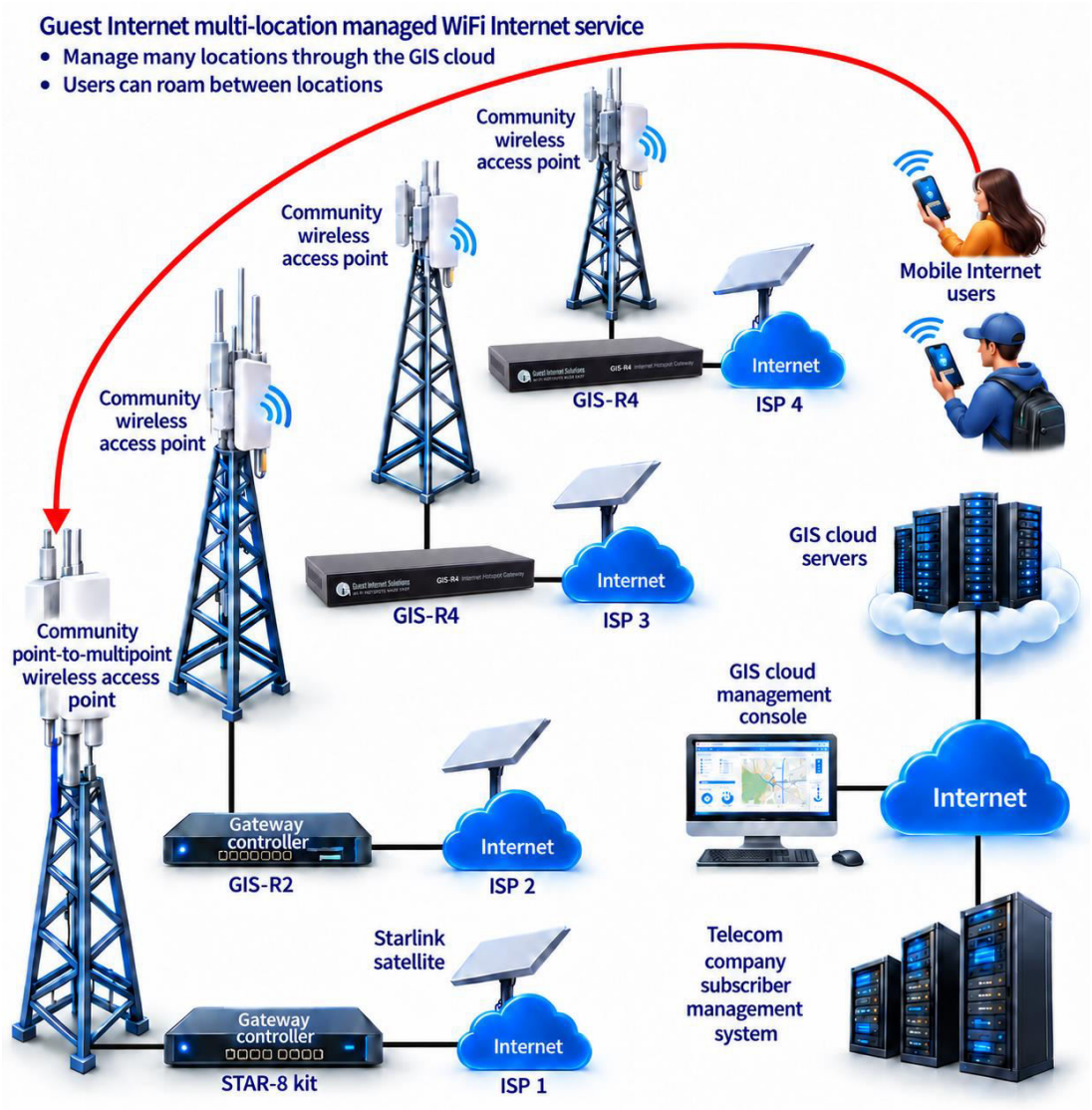
14. Roaming between locations where the controllers are part of a group

The Guest Internet cloud permits roaming between controllers that are allocated to the cloud group which the access code was generated for. With roaming activated, a user who connects to the Internet at one location using an access code can then move to a different location, with a different Guest Internet controller and a different ISP service, and then be automatically connected to the Internet service. The users can repeat this process by moving to a different location. The user will remain connected to the Internet until the duration of the code expires.

The Guest Internet cloud manages the hand-off process from one controller location to the next. The roaming information is maintained in each controller of the group. If a controller looses power where the roaming user has been connected then the roaming is interrupted. Roaming identifies the MAC address of the mobile device, therefore if the mobile device has randomized MAC enabled the device cannot roam. Roaming can only function with mobile devices that have randomized MAC disabled. Roaming is illustrated in the next figure.



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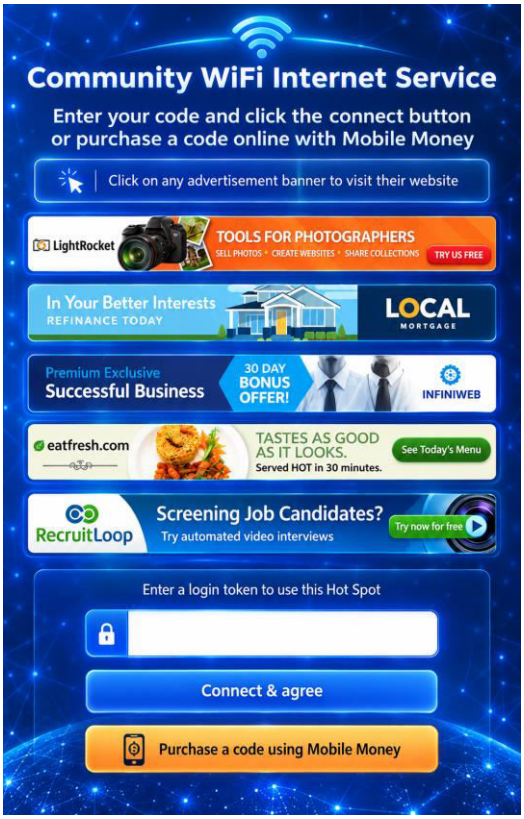
15. Community WiFi Internet service branding, messaging and advertising

The Guest Internet WiFi service management system includes comprehensive resources that enable the Telecom Company to brand the community WiFi Internet service. The system has three points of contact with the customer.

- The login page for pay-on-demand customers.
- Login page for entry of codes from vouchers and scratch-off cards for pay-on-demand customers.
- The login page displayed to fixed wireless access (FWA) subscribers and mobile subscribers when the account payment is past-due.



The custom login page is coded using HTML/CSS and javascript. For flexibility the page contents can be downloaded from a Telecom Company server for a dynamic login page updates and can include real-time interaction with customers.

The login page can include access to websites before authentication, therefore providing access to the Telecom Company CRM web page, and also to advertising partners who can promote products and services to the Telecom Company customers.

Guest Internet provides a login page development kit with sample templates that enable fast preparation of a login page design.

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16. The user view for access to the WiFi Internet service

The Guest Internet management system provides user authentication and Internet access through either of two methods.

- Subscriber.
- Pay-on-demand.

Subscriber: can be one of two types.

Mobile phone subscriber who can also have access to any WiFi Internet network. The Telecom Company can include WiFi Internet access as part of the mobile phone plan, or the WiFi access can be an additional service charge for the customer.

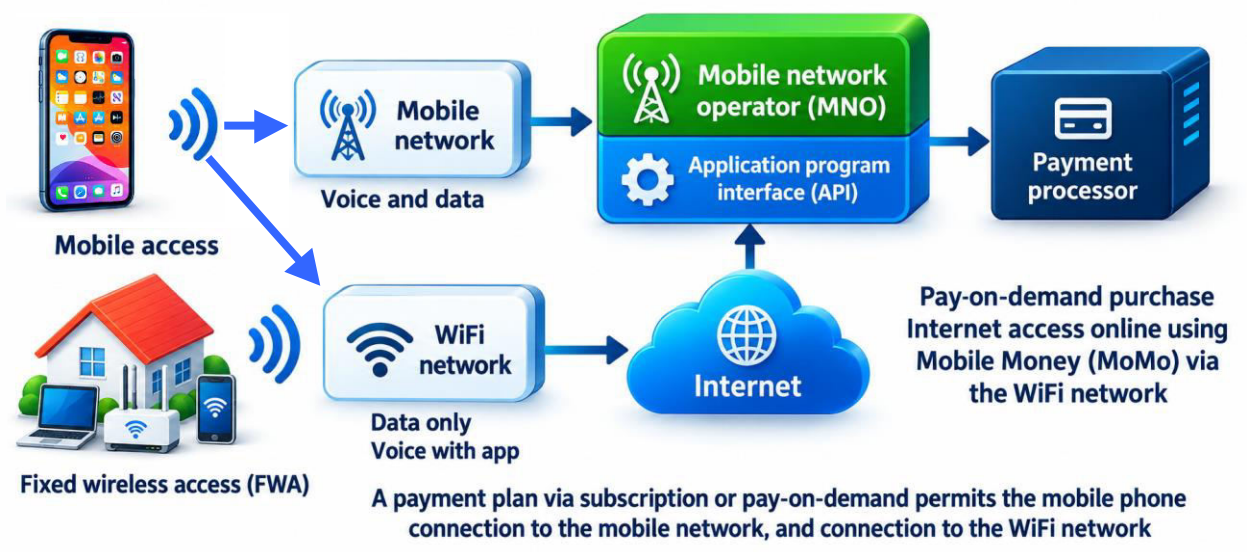
Fixed wireless access (FWA) customer whose Internet account is separate from any mobile phone account. The FWA subscriber may be a mobile phone customer of a competitor but also purchase a subscription through the Telecom Company. This type of customer provides an opportunity to up-sell a mobile service from the Telecom Company.

Pay-on-demand: can apply to any customer.

A mobile phone customer who may have a pay-on-demand mobile phone service can also use the phone for a pay-on-demand access to the WiFi Internet service, with payment either by voucher purchase or by payment online using Mobile Money or a similar credit service.

A mobile phone owner who does not have the phone registered on the Telecom Company mobile network, can however connect the phone to a WiFi Internet network with a pay-on-demand purchase, either through a voucher purchase on online payment using Mobile Money or a similar credit service.

A fixed wireless access (FWA) customer who has the residential equipment installation that connects to a nearby WiFi Internet service can purchase Internet access by pay-on-demand, either through a voucher purchase or online payment using Mobile Money or similar service.



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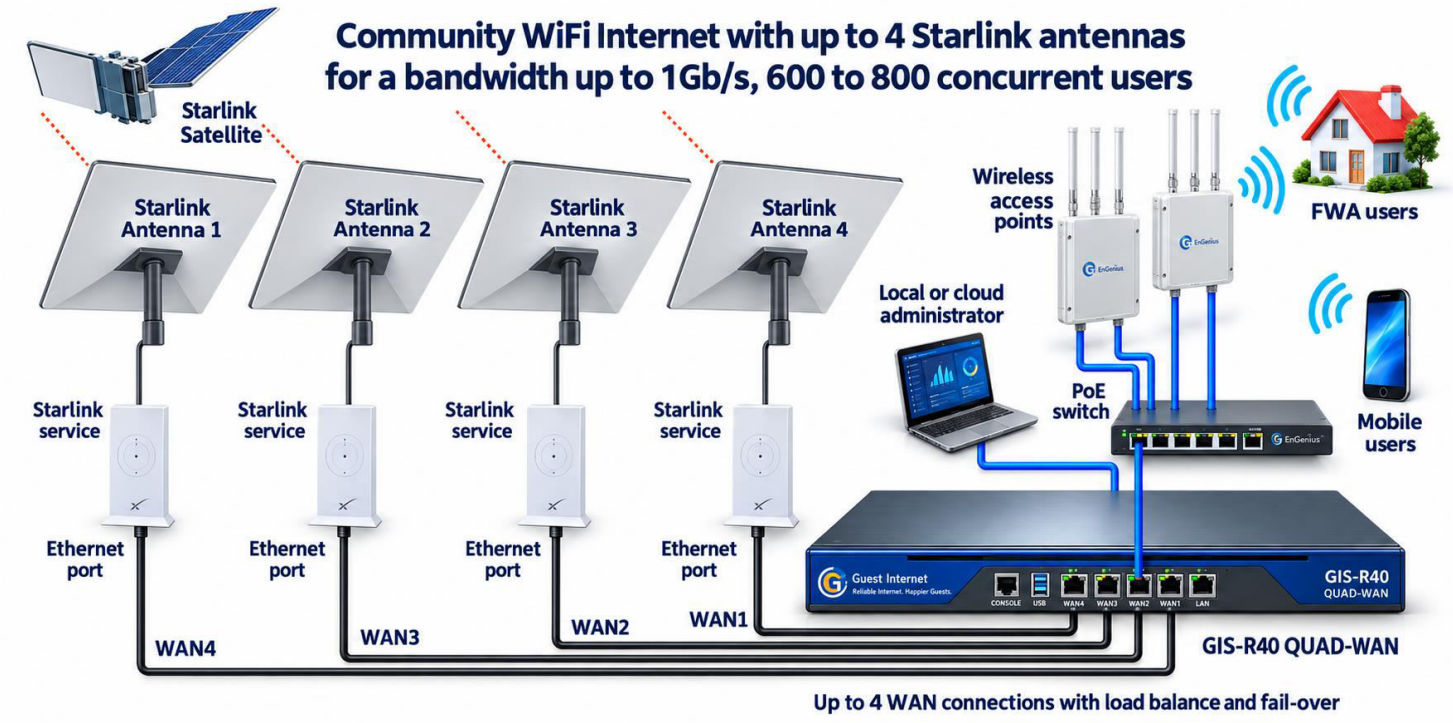
17. Internet for larger communities using multiple satellite antennas

The Internet bandwidth sets a limit to the number of concurrent Internet users. When a community is large, or a small community is growing and more people require access to the Internet, then the technology is available to expand the service to hundreds or to thousands of users.

For a community WiFi Internet service that uses the Starlink satellite service then the number of concurrent users should be kept below 100 people, each with a low bandwidth setting. However there are some Guest Internet applications where the number of concurrent users has exceeded 200, however with a reduced maximum bandwidth per user.

When the bandwidth required is greater than one Starlink antenna can provide, then 2, 3 or 4 Starlink antennas can be connected to a Guest Internet controller. Four Starlink antennas will provide a bandwidth up to 800Mb/s. The Guest Internet controller provides both load-balance and fail-over functions so that the total bandwidth is available for users. For larger installations, such as a city that has no Internet service, multiple Guest Internet controllers can be installed, each with four Starlink antennas attached.

A network installation that is suitable for 500 to 1000 concurrent users is shown in the next diagram. The wireless distribution network for both pay-on-demand and subscription customers must be proportioned for the volume of data traffic to eliminate any bottlenecks that might occur in the network. Guest Internet cloud monitoring can be configured to monitor the status of all network components to ensure a high reliability of the network.



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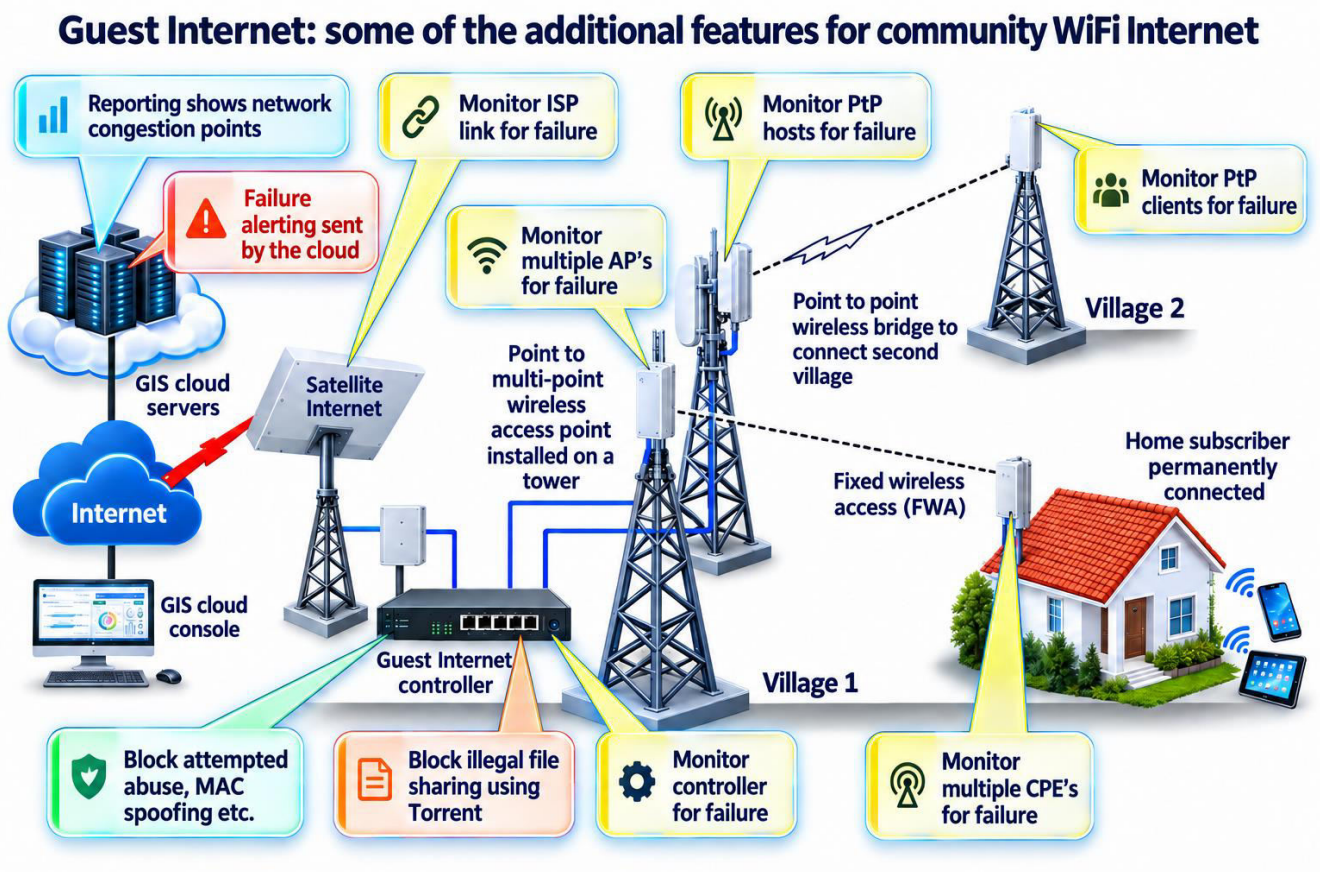
18. Additional features that ensure a reliable and compliant community service

Guest Internet technology has a long list of features that adapt Guest Internet products for any application. Some of the more important features for a community WiFi Internet service are listed below.

- Failure monitoring of several points throughout the network with failure alerting.
- Blocking of torrent file sharing, essential to comply with ISP terms of service. Starlink will cancel a service that is used to share copyrighted files.
- Prevent abuse of the service; block MAC spoofing, block mobile hotspots, etc. Blacklist abusive users.
- Performance reporting of usage and identified potential network congestion.

Guest Internet implements component failure monitoring using the controller at each site. Each controller reports the equipment status to the cloud. It is not possible to have a central host implement SNMP monitoring because ISP's such as Starlink implement carrier grade NAT (CGNAT) therefore the local network has no public IP, and the Starlink network has no port forward feature that would permit a central SNMP server to monitor the remote network.

A complete list of Guest Internet features is available on request. The features that are considered essential for a community WiFi Internet service are shown on the next figure.



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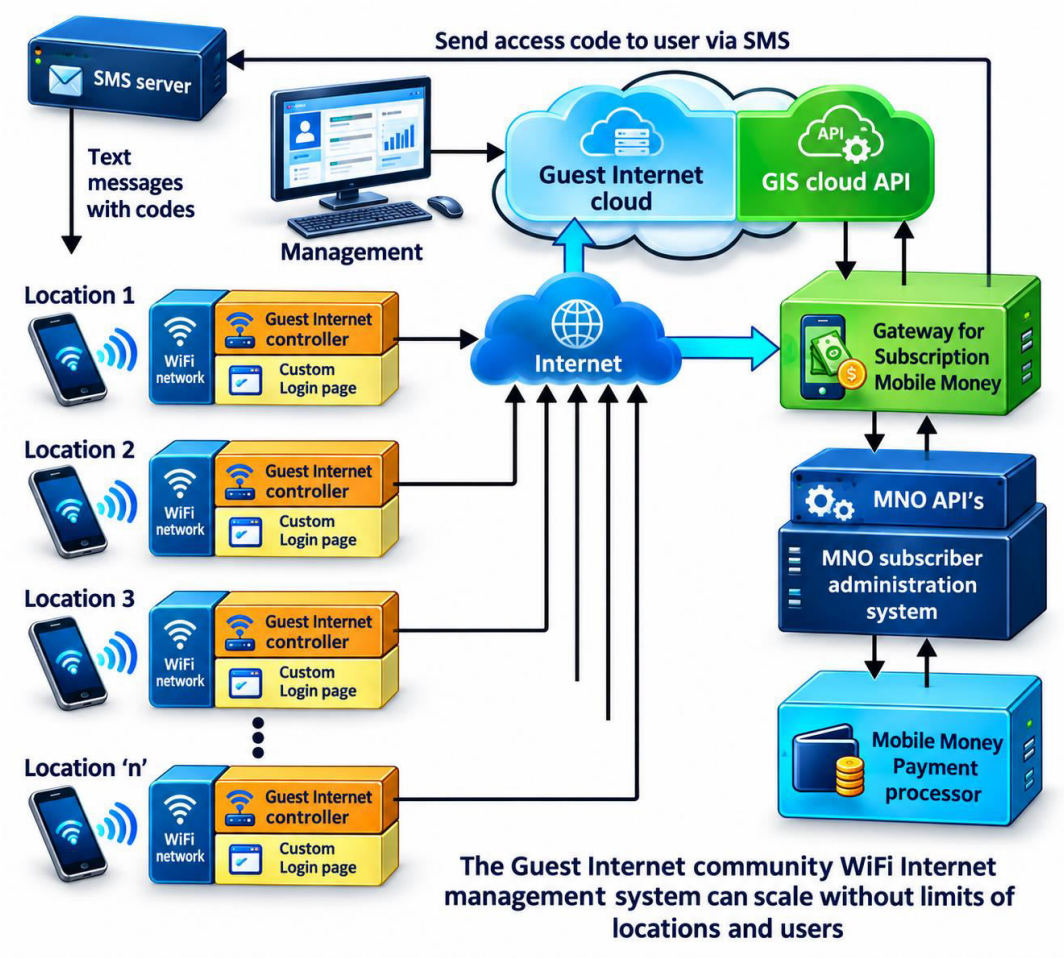
19. The Guest Internet system can be expanded for many locations and users

The Guest Internet system has no limits for use and for expansion of the system.

- Unlimited controllers per cloud group
- Unlimited cloud groups
- Unlimited locations
- Unlimited users

The only limit on user numbers at a location is imposed by the bandwidth available from the ISP connection at each location. If the ISP is Starlink then the maximum bandwidth downlink is limited to approximately 150Mb/s and the uplink bandwidth to approximately 25 Mb/s. The actual numbers depend on several factors. The type of Guest Internet controller model is chosen for each location based on the data speed and concurrent users of the Internet service.

The number of concurrent users that can be supported at each location depends on (a) ISP down and up data speed, (b) down and up data speed limits set for each user, and (c) duration of access for each user with a pay-on-demand service. More concurrent users can be added when each user has lower maximum limits.



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20. Telecom Company investment schedule for a rural community data service

In order to have a community WiFi service operational, the Telecom Company has to deploy the system in two steps.

STEP 1: Customize the gateway software and host on the Telecom Company infrastructure; there are two gateways to customize

Mobile Money gateway: (a) Prepare the custom login screens that show the offer for the Mobile money purchase; code duration and rate plan. (b) Implement the API interface for the mobile network operator Mobile Money interface (MNO API). (c) The Guest Internet cloud API interface is part of the gateway software and does not change during deployment.

Subscriber administration gateway: (a) Prepare the user interface with the parameters that the Telecom Company will use to activate and de-activate subscribers, the Guest Internet cloud enables FWA subscribers using the CPE MAC address therefore the user interface may take the subscriber account numbers from the Telecom Company administration system and assign the MAC address to the customer account number when required. (b) Implement the API with the Telecom Company subscriber management system with commands to activate and de-activate a FWA subscriber, based on the subscriber payment history. (c) The Guest Internet cloud API interface is included with the gateway software and does not change during deployment.

STEP 2: Deploy the infrastructure at each location where the WiFi Internet service is required, the infrastructure with approximate cost is listed in the tables below.

Base Station: users connect with mobile devices

Item	Qty	Function	Installation	Value
Starlink	**1**	**Satellite Internet antenna + service plan**	**On tower**	**$300 antenna**
Star-8 kit	**1**	**GIS-R4 controller + AP1200W wireless AP**	**Cloud account is included**	**$450.00**
Tower	**1**	**Height required for Starlink and AP1200W AP**	**Minimum for visibility**	**$2000.00**
Power	**Option**	**Solar power of 500W when grid power N/A**	**Base of tower**	**$2000.00**
Install		**Man-hours installation service**	**Work at the site**	**$5000.00**
			Total base station	**$9750.00**

Home connection: fixed wireless access (FWA)

Item	Qty	Function	Installation	Value
Star-4 kit	**1**	**Home equipment, CPE + wireless router**	**In home**	**$110.00**
install		**Technician installation 2 hours**	**Add truck roll**	**$125.00**
			Cost per home	**$235.00**

Operating cost: monthly

Item	Qty	Function	Period	Value
Starlink	**1**	**Service agreement per satellite antenna**	**Per month**	**$150.00**
Maintain	**1**	**Service and maintenance budget per site**	**Per month**	**$150.00**
			Add extra for transport	**$300.00**

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21. New and expanded opportunities for Telecom Companies

Telecom Companies have worked with two cost restrictions when planning network expansions to large rural areas and communities for mobile and data services.

- The cost of a 4G/5G tower, minimum of $250,000 investment.
- The Telecom Company network backbone to the tower location connection.

These investments are only viable with a clear ROI, that is determined by the population density in the tower coverage area; of 5,000 to 10,000 potential users.

Guest Internet has developed a low cost method for a Telecom Company to provide a data-only Internet service for communities.

- The cost of the WiFi community network infrastructure is less than $10,000
- The backhaul data connection to the Internet is via satellite, such as Starlink where approved.
- Each community WiFi Internet system can be managed through the Telecom Companies subscriber management system.

Although the community WiFi network installation described in this document will not provide mobile network voice and text services, there is a very strong demand for data only services as apps can be used that provide voice and text services (e.g. WhatsApp).

The Telecom Company can use the community WiFi Internet installations to add subscribers to the network, expanding the customer base, where the subscribers can connect a mobile to the 4G/5G service when in range of a tower, and to the community WiFi service when that is the only service available. Rural community members have limited financial resources and so the option to purchase Internet access on demand for a limited time at a low cost will attract customers who might otherwise be outside the typical customer profile.

The Guest Internet multiple-controller cloud management system has been developed to address several Telecom industry requirements for small community Internet service networks; the requirements are listed below.

- Provide Authentication, Authorization, and Accounting (AAA) processes for small to medium community WiFi Internet services. A small community is identified as less than 100 concurrent users, while a medium community is identified as less than 1000 concurrent users.
- Manage a WiFi community service for 100+ concurrent users when connected to any type of ISP that provides a bandwidth greater than 100Mb/s, where ISP's include fiber, copper, wireless PtP and satellite services, including Starlink (LEO) and VSAT (geo-stationary).
- Manage a large scale system of multiple community WiFi Internet locations with a minimum of 100+ locations and connected to 100+ different ISP's

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- Integrate the community WiFi Internet service with the Telecom Company mobile service so that one mobile device can connect to both the mobile 4G/5G network and also to the community WiFi Internet service, with one subscriber account.
- Provide an option for customers to purchase limited-duration WiFi Internet access via a pay-on-demand service (also called a no-contract-prepaid-service, or a pay-as-you-go service), with Mobile Money as one of the credit payment options available, with the possibility of adding other credit payment options as required.
- Support fixed wireless access (FWA) for residential and business users who wish to connect to the community network, using either a subscription account, or with a pay-on-demand account.
- The cloud service must have high limits for (a) the number of users, (b) the number of controllers assigned to a group (c) the number of groups assigned to an account.
- The management system must be capable of branding the user interface where groups and controllers can be individually branded.
- Each community WiFi Internet installation must provide a one-click user access to the Telecom Company customer CRM portal, even when the user is not authenticated onto the network and has no Internet connection.
- Provide customer roaming between locations so that a payment for Internet access at one location will provide Internet access at other locations within the group of controllers.
- Provide failure monitoring of all network components at each community WiFi Internet installation and also monitoring of the cloud service, with failure alerting that can be interfaced with the Telecom Company Network Management System (NMS) or Operations Support Systems (OSS) platform. All monitored components at the community WiFi installation will include the Guest Internet controller, all wireless access points, and all FWA CPE devices.
- Provide all features for a very low installation and operational cost, with a target installation cost for the community WiFi Internet service of less then $10,000, not including residences connected via FWA, with a residence FWA installation cost of less than $250.
- Provide a system that is very easy to install and maintain, including by Telecom Company staff and contractors with limited technical knowledge, and provided with full installation, maintenance and user documentation.
- Provide technical support during the integration phase of the Guest Internet system with the Telecom Company systems.
- Provide the Telecom Company with an option to host a customized Guest Internet cloud service for an annual negotiated fee to include license, installation and support.

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A Telecom Company that provides small rural communities with WiFi Internet services via satellite can also gain additional benefits when offering the service, some are listed below.

- Provide telecommunications access in regions where it is currently not possible with existing 4G-LTE/5G technologies due to geographical and cost constraints. Begin building customer relationships in regions where customer acquisition is not currently possible.
- Monitor the data traffic and customer use at each community location to identify locations that will justify the installation of a 4G-LTE tower to provide voice and text services in addition to data services. Calculate the tower ROI based on the current and projected user traffic.
- Fast deployment of the Guest Internet infrastructure within communities with minimum support required. Fast user adaptation to the WiFi Internet service.
- Quickly increase the Telecom Company customer installed base with additional FWA customers and also mobile phone subscribers who use the data service; for a very low additional investment cost.
- A mobile subscriber can access both the 4G-LTE networks and any community WiFi Internet networks.

Guest Internet is currently working with customers located in African and Oceania countries where Starlink is approved for operation. Projects range from the size of small communities to citywide WiFi Internet services. The Guest Internet system was designed to be highly scalable and so can expand from one small community to many small and large communities using the identical management methods.

22. Next steps

Guest Internet provides several sources of information to familiarize prospective customer with the Guest Internet technology for community WiFi Internet systems. Documents include,

- Report: Telecom systems manage rural satellite Internet (this document).
- PowerPoint presentation: Telecom systems manage rural satellite Internet.
- Short market messages: social media channels.
- Technical articles published via Linkedin.
- Video presentation published via YouTube.

A Telecom Company representative or Telecom Company vendor can request a Zoom call with a Guest Internet engineer to discuss the viability of a community WiFi Internet project.

Guest Internet has consulting partners in Africa and Oceania who are currently using Guest Internet products and can provide local project support.

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Guest Internet has many technical reports that provide detailed information for specific subjects, such as the implementation of Mobile Money billing and the design of community network infrastructure.

For further information, please contact us at the email address shown below.

Contact us today to discuss your Telco community WiFi Internet opportunity

Guest Internet makes the leading products to manage community WiFi Internet, please contact:

support@guest-internet.com

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