

The Telkonet iWire System™

Built-in Network Management Enables Remote Monitoring and Maintenance

Telkonet's versatile system provides powerful remote network management tools.

A key benefit of the Telkonet iWire System is that network management is built in. Unlike other systems that require additional equipment to be purchased to support network management and other functions, Telkonet's Gateway includes embedded management tools, enabling monitoring and maintenance of multiple devices in multiple networks from a single Network Operations Center (NOC), if desired. Telkonet's intuitive GUI is simple to understand and navigate – your customer care staff will become experienced within a very short timeframe. These remote management capabilities significantly reduce or eliminate the need for truck-rolls to your deployed sites.

With the Telkonet Gateway's centralized GUI, traffic through the Telkonet Gateway, the Telkonet eXtender™ and individual Telkonet iBridges™ can be monitored remotely, without any set-up required. Detailed status and statistics tools are provided to capture a wide variety of usage data, easing network management and providing an empirical means of planning network growth. The network can be viewed virtually in real time to view statistics such as the Telkonet Gateway, Telkonet eXtender, individual user bandwidth utilization, the number of users on line, connection speed of every user and bandwidth usage of prioritized traffic versus data traffic (if QoS is enabled).

Each individual Telkonet iBridge has a MAC address. Telkonet iBridges can be remotely restricted from coming onto the network or can be removed from the network, such as in a situation when a virus is detected on the network.

Because the communications between the Telkonet Gateway and Telkonet iBridge takes place at Layer 2, it is possible for the system administrator/customer support professional to "see" all the way to the end-user's laptop or other IP node on the site WAN. This is invaluable in helping to resolve wireless access point issues, remotely configure WAPs, servers, etc.

The Telkonet Gateway includes a system log, which is resident on the unit itself, or can be sent to an external SMTP server.

The system log, when used in conjunction with the available Telkonet MIB, enables the system administrator/customer support professional to develop their own specialized alerting systems.

A remote IP Ping utility is included, enabling the execution of a ping from the deployed site to any target (via IP address or URL), which is useful in localizing any ISP issues. There is a provision for accessing an external TFTP server, so records of your customer's configuration may be stored at a central NOC facility and downloaded to each site.

The system includes two firmware banks (one active and one standby), which allows for immediate rollback. The system administrator may specify which bank will automatically reload if the site experiences a power outage.

The management interface provides the system administrator with robust and detailed options and information.

- MAC addresses and "Alias" names of each PLC device on the network
- Snapshot-based displays and editing of the PLC device
- PLC Link status and speed
- PLC Link target (which Telkonet Gateway or Telkonet eXtender is linked to the Telkonet iBridge)
- Next-best PLC Link target
- Ethernet Link status (per Telkonet iBridge)
- Whether the Telkonet iBridge is using default or custom settings
- Throughput (in Bytes, useful for locating end-users who are flooding the network due to compromised laptops, Trojans, etc.)
- System summary, statistics, status in either overview or detailed formats
- Defining whether (and which) Telkonet iBridges may communicate with each other (supporting corporate LAN architectures)

To support sites with pre-existing ISP contracts whose terms do not provide a static IP address, provisions have been incorporated to support Dynamic DNS (see www.dyndns.org for additional information).

Key Network Management Features

VLAN Tagging

Telkonet provides virtual local area network (VLAN) tagging. VLANs provide a method to logically-segment a local area network, allowing smaller networks of computers to exist within a larger network. Devices that comprise the VLAN, such as servers, PCs and printers, can reside in different sections of a physical LAN but are also be linked together logically to form an isolated, separate network. With VLAN tagging, a VLAN can be configured for increased security, network efficiency, simplified management of specific user groups, or to set access restrictions to specific users and resources.

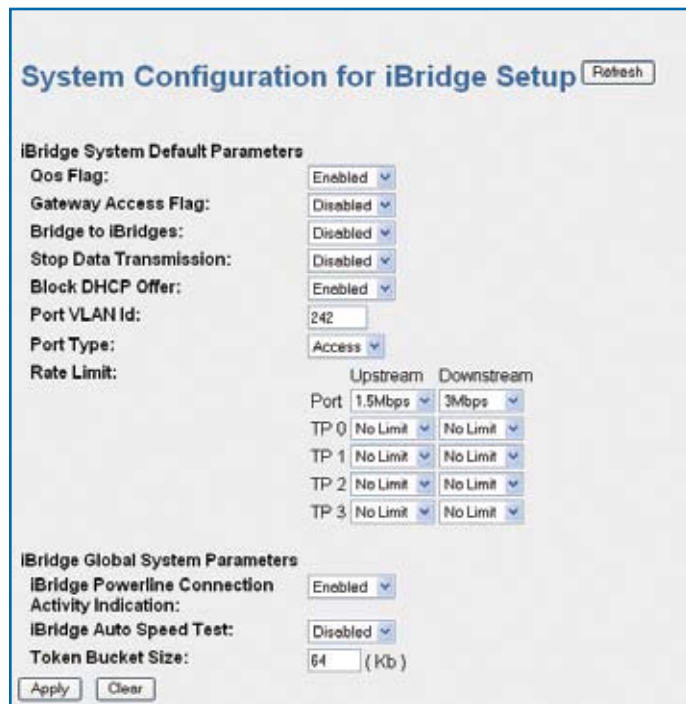


Figure 1. This screen shows the configuration default setup for the Telkonet iBridges, settings for VLAN and the capability to throttle bandwidth based on traffic priority and direction.

The VLAN architecture supports VLAN IDs from 1 to 4,094. Each Telkonet iBridge may be assigned a unique VLAN ID. When the Quality of Service (QoS) Feature Key is invoked, VLAN IDs may be employed as a method to prioritize traffic flow. As an example, VLANs can support multiple

internal groups of users, as seen Figure 2. Users in sales, for example, can not directly access those in support or finance across the PLC network. This enables users within a VLAN to remain logically separated. Of course, access may still be permitted via a network connection on the LAN beyond the Telkonet Gateway if desired – the segmentation takes place only within the PLC cloud.

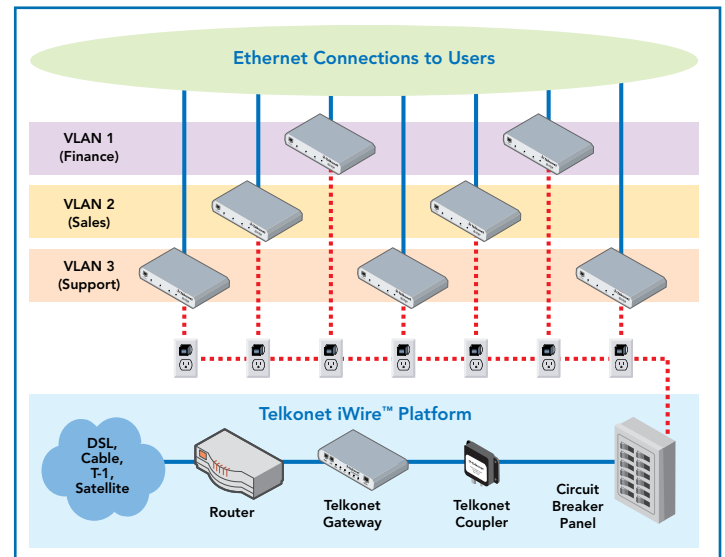


Figure 2. Multiple operational groups can each be assigned their own VLAN with inter-group access, while controlling access to each other's information.

Bandwidth Control

Another key network management feature is the ability to easily control port bandwidth utilization. For example, the upload and download bandwidth rate for individual Telkonet iBridges can be controlled by setting specific limits. These limits may be set independently for upstream and downstream traffic. In addition, when the QoS Feature Key is invoked, independent upstream / downstream limits may be set per port and per Traffic Priority simultaneously.

Below are some uses for this functionality.

- Enables implementation of a "tiered service plan" within a hotel or MDU property.
- Ensures that LAN utilization does not exceed the available WAN circuit.
- Prevents "uncontrolled" nodes – such as a hotel guest's laptop – from saturating the network if infected with a Trojan or virus.

Managing Traffic

Simple Network Management Protocol

Simple network management protocol (SNMP), the common network management interface, is provided as a native feature of the system, eliminating the need for network management software to be connected to a switch or other external device. Network administrators may elect to capture SNMP information to an outboard server, enabling logging of system data. This data may then be parsed by a reporting tool (e.g. Crystal Reports®). Telkonet also provides a customized management information base (MIB) for users who wish to build their own reporting mechanisms.

The Telkonet iWire System is engineered to help combat most common IT fiascos that can happen – relieving the strain of IT. Specific safeguards have been engineered into the Telkonet software to disallow DHCP broadcasts from Telkonet iBridges. These safeguards help ensure that a “rogue” DHCP source, such as a misconfigured end-user router attempting to offer DHCP into the Telkonet iWire System network, cannot flood the network with DHCP traffic.

For simple installations where no detailed per-user configuration or remote administration (e.g. single-site) is necessary, the Telkonet iWire System is literally “plug and play.” The system will perform literally out-of-the-box, with no software configuration needed. For more complex installations, or for sites where detailed control of users is required, the Telkonet software allows a tremendous number of options.

QoS for Traffic Prioritization and VoIP

With Telkonet’s QoS software enhancement, the system is fully-capable of prioritizing specific types of traffic to ensure best performance. This feature is especially important in supporting a voice network on the same backbone that serves up IP Internet access. The QoS feature enables prioritization of voice traffic over data on the powerline and allows detailed control over how VoIP traffic on the powerline is interfaced with the rest of the LAN/WAN. The feature enables individual upstream and downstream recognition of QoS via VLAN (IEEE 802.1q), Differentiated Services (DiffServ), or Layer 4 Ports (e.g. Layer 4 traffic in the ISO model). These options allow the optimization of the PLC network to account for specifics of the larger LAN/WAN deployment.

A proprietary Concatenation system may be invoked if desired, allowing fine-tuning of performance in the QoS environment,

where small packet sizes are prevalent. This Concatenation system allows for increased efficiency of data transport within the PLC system.



ID	MAC Address	Alias	Total Gw/Xs	Gw Id	Gw Speed	Gw Rate	NBGw Rate	Link Status	PL	Eth	Idle Time	Action
1	00:0A:80:20:17:84	Trisipia_25C	1	3	0.0	4.0	0.0	🟢	🟢	🟢	0	Reboot Go
3	00:0A:80:20:1E:64	DEPETER_7L	2	4	0.0	12.3	0.9	🟢	🔴	🟢	0	Reboot Go
5	00:0A:80:20:1F:22	JAMES_9A	1	1	0.0	7.9	0.0	🟢	🟢	🟢	0	Reboot Go
6	00:0A:80:20:80:62	ROSE_6E	1	4	0.0	2.3	0.0	🟢	🟢	🟢	0	Reboot Go
7	00:0A:80:20:80:62	Chirco_5b	1	4	0.0	5.6	0.0	🟢	🟢	🟢	0	Reboot Go
8	00:0A:80:20:81:1E	ortiz_4k	1	5	0.0	11.5	0.0	🟢	🔴	🟢	0	Reboot Go
9	00:0A:80:20:81:56	katz_9c	1	1	0.0	2.6	0.0	🟢	🟢	🟢	0	Reboot Go

Figure 3. This screen shows the MAC address, the number of Telkonet Gateway/eXtenders, throughput speed and negotiated speeds. It also shows the PLC and Ethernet Link status for each device.

Router Functionality

With Telkonet’s Router Mode software enhancement, the Telkonet Gateway can also provide Small Office/Home Office (SOHO) router functionality, removing the need for an external router. Telkonet’s Router Mode enhancement provides typical router functionality including firewall capability, IP routing and DHCP.

With DHCP options, the system administrator can define the DHCP address range and set an arbitrary “lease time” for any offered addresses. Telkonet iBridges may be configured to accept or reject any offered DHCP addresses at their Ethernet ports – a feature designed to ensure that “uncontrolled” wireless or other devices do not inject incompatible DHCP addresses into the network.

The firewalling options consist of a robust configurable Access Control List, so the system administrator can define Service Port Forwarding and to block Private Ports and/or Private IP addresses.

An integrated “splash page” option allows the implementation of an Acceptable Use Policy at the site. When activated, users are presented with a page enumerating the AUP and must click an “I Agree” button before being passed to the router/WAN/Internet.

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