This guide describes the deployment process when using the SiteManager LogTunnel functions for pushing and/or pulling log data from devices to a central server.

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Applicable to GateManager and SiteManager version 7.3 or newer
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1. Introduction

With distributed industrial equipment, there is often a requirement for persistent connections to the remote devices from a central log server or SCADA system.

LogTunnel enables you to establish such persistent connections to the same or other SiteManager controlled devices using simple drag-and-drop operations in the GateManager portal. This function works concurrently and independent of the standard LinkManager “on-demand” access.

LogTunnel is built upon the existing Static Server and Device Relay mechanisms using the same secure data transport mechanism and suitng the same purposes. LogTunnel is, however, considerably easier to configure, and can be used on both Cloud based and own/private GateManagers.

On the SCADA or log server side, you must install a SiteManager as a LogTunnel Master, while on the device side, you simply use your existing SiteManagers to setup LogTunnel Clients for each device.

The remote log components, the LogTunnel Clients, can be either SiteManager hardware or software (SiteManager Embedded with an Extended license).

The solution requires a central LogTunnel Pull Master to be a hardware SiteManager, while a LogTunnel Push Master, can be either a hardware or software based SiteManager Embedded with an Extended license.

**NOTE:** LogTunnel will require both the GateManager and the SiteManagers to be using release 7.2 or later. For Cloud based GateManagers, there may be special terms for your use of this feature based on potential server load when using LogTunnel for constant transmissions of large amounts of data, such as video streams. Consult your GateManager hosting provider for details.

1.1. Advantages of LogTunnel over other solutions

- Setup is done by simple drag-and-drop in the central GateManager portal. No routing, firewall or tunnel configuration is required.
- Logging and Programming access (by LinkManager) is supported concurrently and independently of each other.
- No need for public addresses exposed on the Internet. Both Master and Client devices can be installed behind corporate firewalls.
- No dependency of static IP addresses. Both Master and Client devices can have dynamically assigned IP addresses.
- No problem with conflicting IP subnets at remote sites, which is a common problem with VPN based solutions (even the central site can have same subnet as the remote sites)
- All data usage is logged centrally on the GateManager (Enabled with the LogTunnel/Usage Statistics activation license).
- An operator on the SiteManager can locally control disabling of LinkManager on-demand access, while retaining the static LogTunnel connections for uninterrupted surveillance.
- Easy setup of logging direction (Pull and/or Push) and port/IP restrictions, for maintaining a high level of security.
- LogTunnel allows full data tunneling for optimum freedom, where most non-VPN logging solutions rely on predefined values to be collected and submitted (web post)
- On hardware SiteManagers, LogTunnel can access devices on both the SiteManager Uplink and DEV side. Typically, VPN solutions would only allow access to the DEV side (aka the LAN interface).
- SiteManager Embedded allows both logging on the device on which SiteManager Embedded is installed, and on devices in the same network (Note that LogTunnel requires a SM-E Extended license)

1.2. Ordering (Enabling) LogTunnel

LogTunnel is enabled by ordering the LogTunnel/Usage Statistics upgrade from your point of purchase. Refer to the Enabling and working with Usage Statistics Guide for details on ordering the upgrade. The same guide gives details on the benefits of Usage Statistics in general.

Note that even without the license, you can still configure your entire LogTunnel setup per the following, but no traffic will be forwarded until upgrade is active.

2. SiteManager connection methods

A Hardware SiteManager can be installed in two ways:

1. **Separation**, where the log server accesses the DEV side of the SiteManager and the SiteManager’s Uplink side is connected to the Internet (either via a corporate network, or directly via the SiteManager’s Uplink2 broadband connection)

2. **Uplink only**, where the Log Server just accesses the Uplink side of the SiteManager, and the SiteManager uses the corporate network to access the Internet. In this case the SiteManager DEV port is not used.

This would be the same setup for a SiteManager Embedded working in LogTunnel PUSH mode.
3. Configuring LogTunnel PULL mode

The PULL scenario is based on a central log server or SCADA system, actively collecting data from remote devices.

The principle is that the LogTunnel Master agent creates alias Device addresses on either the DEV or Uplink port that represents the remote devices, and the log server just connects to these addresses locally.

Example: The agents and values in the following will establish this scenario that you can return to for better understand the principles:

A pair of IP addresses with the same colour depict the LogTunnel Device address (the alias) and the corresponding (real) Device address at the remote site.

For instance: The log server connects to 172.16.16.23 (aka the LogTunnel Device Address) and the connection is forwarded to address 172.16.16.101 (aka the Device Target address)
3.1. **LogTunnel Client Pull mode enabling**

LogTunnel Clients for PULL mode can be enabled on both SiteManager hardware and software models (SiteManager Embedded with Extended license).

There are two methods for enabling LogTunnel Client mode in the SiteManager:

3.1.1. **LogTunnel enabling for an existing Ethernet agent**

This type of agent could be used for LinkManager access also:

![GateManager Agents](image1)

3.1.2. **LogTunnel enabled by dedicated LogTunnel agent.**

This type of agent is used solely for logging, and cannot be accessed by Link-manager clients.

Note that the agent will stay “not connected” (N/C) until it is eventually linked to a LogTunnel Master on the GateManager, after which it will go IDLE.

![GateManager Agents](image2)

In the examples in the following, we will be working with two SiteManagers named “EasyLog Client1 and Client2” respectively, with the following agents configured:

**SiteManager: “EasyLog Client1”**

![GateManager Agents](image3)

**SiteManager: “EasyLog Client2”**

![GateManager Agents](image4)
3.2. Configuring the LogTunnel Master (Pull) Agent

1. Enter the SiteManager Agents menu and create a **Generic > LogTunnel Master (Pull)** agent; give it a meaningful Device Name (in this case called “PullMaster”) and select the Parameter details icon:

2. Complete the configuration:

   ![Diagram showing configuration steps](image)

   1. Enter the IP address of the log server. This must be a static IP address. DNS names cannot be used.

   Only the specified Log Server Address will be allowed access to the remote devices, and is a security precaution for preventing unauthorized access.

   2. Configure the range of “alias” addresses that should represent the remote devices.

   Make sure that no other equipment is using any of the IP addresses in the range, as it may result in unpredictable network behaviour.

   In case you do not have enough free addresses in the local network of the server, you may have to ask your IT department to create a VLAN or via a router place the SiteManager in a different subnet, and ensure that the log server has a route to that network.

   3. You will need to configure the specific ports or port range for TCP ports and/or UDP ports for the LogTunnel Master to listen on. You can combine single ports with ranges like this: 23,80,5000-5010. The mandatory indicator * just means that values must be filled in at least one of the fields UDP or TCP.
You can specify whether the address range should be created on the **Uplink** or the **DEV** port. (See section 2. SiteManager connection methods). Note that device address range you define must match a valid subnet on the selected port.

Idle timeout value in seconds. If left blank the default values will be 120 seconds for TCP connections and 30 seconds for UDP connections. Note that if entering a value, this value will apply for both UDP and TCP.

3. When clicking Save, Back and Refresh a couple of times you will notice that a warning informs you to attach it on the GateManager. This is a Security precaution to avoid accidental activation of undesired LogTunnel Device addresses.

4. Login to the GateManager Portal and locate the LogTunnel Master agent (here named “PullMaster”):
3.3. Linking LogTunnel Device addresses to LogTunnel Clients

You have different methods for linking the LogTunnel Master (Pull) Device Addresses to the LogTunnel Client agents. Try them out and use your preferred method.

3.3.1. Method 1: Auto assigning LogTunnel Device addresses

1. Drag and drop the LogTunnel Client agent to the LogTunnel Master in the tree view. It will automatically assign the first free address in the LogTunnel Device Address range:
3.3.2. Method 2: Assign specific LogTunnel Device Address

2. Stand on the LogTunnel Master and expand the list of available LogTunnel Device addresses, by clicking the symbol:

**Hint:** If you have linked a client to a wrong LogTunnel Device Address, you can either delete the link with the icon and start over, or you can simply drag-and-drop the client to another free address.
Drag and drop the LogTunnel Client agent onto the field next to the IP address you want to assign as LogTunnel Device address for this agent:

3. Finally click **Save**, and you will see the complete list of linked agents:

**Hint:** Notice that the icons for linked agents change colour from 🔄 to 🔄.
3.3.3. Method 3: Linking from LogTunnel Client view

4. While standing on the LogTunnel Client, drag and drop the pin onto the LogTunnel Master (Pull) agent, or simply drag and drop the client agent onto the LogTunnel Master in the tree:

5. The LogTunnel Master agent configuration view will automatically expand and indicate the linked client:
3.3.4. Method 4: List selection from LogTunnel Client view

6. As above, while standing on the LogTunnel Client agent, select the available LogTunnel Master:

7. A list of unassigned LogTunnel Device IP addresses will appear to select from:
8. With all clients linked, the final view on the LogTunnel Master agent will look like this. You can always edit the IP assigning by editing the fields directly.
4. Configuring LogTunnel PUSH mode

The PUSH scenario is based on remote devices connecting to a central log server or SCADA system for delivering log data. An example of such data is SNMP traps.

A LogTunnel Master for Push mode can be either a hardware SiteManager, or a SiteManager Embedded activated by an Extended license.

The principle is that the LogTunnel Master instructs the LogTunnel Clients to establish IP aliases (aka LogTunnel Server Addresses) and listening ports on the DEV and/or Uplink ports on the SiteManager (or the IP address of a host device having SiteManager Embedded installed), which the industrial devices will regard as the log server destination.

Example: The agents and values in the following will establish this scenario that you can return to for better understand the principles:

The red coloured IP addresses on the right side depict the log server IP aliases (aka LogTunnel Server addresses) and the corresponding (real) server address (aka Log Server address) at the remote site on the left side.

For instance: PLC1 connects to 172.26.2.35, and the connection is forwarded to address 172.16.16.191 (aka Log Server Address)
4.1. LogTunnel Client Push mode enabling

LogTunnel Clients for Push mode can be enabled on both SiteManager hardware and software models (SiteManager Embedded with Extended license).

1. Create a unique LogTunnel Agent (Generic > LogTunnel Client); give it a meaningful full Device Name and select the Parameter details icon.

2. Complete the configuration

1. Enter the IP address of the device that should access the log server to deliver data. Only one address is allowed per LogTunnel Agent, so you have to create an agent per device.

2. Configure the LogTunnel Server Address that the devices should access for being forwarded to the real log server address.

If left blank the DEV address will be assumed as default, but you can configure any address in the same subnet as the DEV or Uplink port, and the SiteManager will create that "IP alias" as LogTunnel Server Address. You can also specify the Uplink address, and then this will be used as LogTunnel Server Address.
Note that this field is only available on hardware SiteManagers. SiteManager Embedded uses the socket interface of the host platform and it would be the IP address of the host platforms network adapter matching the subnet of the entered Device Address that should be used as LogTunnel Server Address.

3. When pressing Save, note that the agent will stay “not connected” (N/C) until it is eventually linked to a LogTunnel Master on the GateManager, after which it will go IDLE.

In the examples in the following, we will be working with two SiteManagers named “EasyLog Client1 and Client2” respectively, with the following named agents:

**SiteManager: “EasyLog Client1”**

**SiteManager: “EasyLog Client2”**
4.2. Configuring the LogTunnel Master (Push) Agent

1. Enter the SiteManager Agents menu and create a Generic > LogTunnel Master (PUSH) agent; give it a meaningful full Device Name and select the Parameter details icon:

   ![GateManager Agents](image)

2. Complete the configuration:

   ![Log Tunnel Server Addresses](image)

   - **Enter the IP address of the log server. DNS names are not supported.**
     Only the specified Master Address will be allowed access to, by the remote devices. This is a security precaution for preventing unauthorized access to the network of the log server.

   - **You will need to configure the specific ports or port range for TCP ports and/or UDP ports to listen on. You can combine single ports with ranges like this "23,80,5000-5010". Note that the mandatory indicator * just means that values must be filled in at least one of the fields UDP or TCP.**

   - **Idle timeout value in seconds. If left blank the default values will be 120 seconds for TCP connections and 30 seconds for UDP connections. Note that if entering a value, this value will apply for both UDP and TCP.**

3. When clicking Save, Back and Refresh a couple of times, you will notice that the agent informs you to attach it on the GateManager. This is a Security precaution to avoid accidental access by remote devices.
4. Login to the GateManager Portal and locate the LogTunnel Master (Push) agent, and attach it:
4.3. Linking LogTunnel Clients to LogTunnel Master

4.3.1. Drag-and-drop Clients onto LogTunnel Master

1. While standing on the LogTunnel Client agent, either drag the pin onto the LogTunnel Master Agent, or simply drag the client agent in the tree onto the LogTunnel Master.

2. The LogTunnel Master will automatically indicate the newly linked client:

   Hint: Notice that the icons for linked agents change colour from 🟢 to 🟢.
3. Continue doing step 1 for all LogTunnel Clients that should access the server. The last linked agent is highlighted with green.
5. Push and Pull for the same devices

The fundamental principle and use case for LogTunnel is that either the server end, or the device is initiator for the connection.

The LogTunnel concept does, however, allow both Pull and Push connections for the same devices. It will just require:

a. The central SiteManager to have both a Push and a Pull LogTunnel Master agent configured,
b. The Remote SiteManagers having two LogTunnel enabled agents for each device needing both Push and Pull.

For instance, this setup has both Push and Pull enabled for the WebCAM and PLC2 respectively (Red indicates Push specific information, and Blue/Green indicates Pull specific information)

5.1. Configuration on SiteManagers

Configuration on “LogTunnel Client 1”:

```
<table>
<thead>
<tr>
<th>Status</th>
<th>Disable</th>
<th>S/N</th>
<th>Device Name</th>
<th>Device Type</th>
<th>Device IP &amp; Parameters</th>
<th>Tunnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDLE</td>
<td></td>
<td>#01</td>
<td>WebCAM Pull</td>
<td>GENERIC</td>
<td>192.168.0.3</td>
<td></td>
</tr>
<tr>
<td>N/C</td>
<td></td>
<td>#00</td>
<td>WebCAM Push</td>
<td>GENERIC</td>
<td>192.168.0.96</td>
<td></td>
</tr>
</tbody>
</table>
```

Configuration on “LogTunnel Client 2”:

```
<table>
<thead>
<tr>
<th>Status</th>
<th>Disable</th>
<th>S/N</th>
<th>Device Name</th>
<th>Device Type</th>
<th>Device IP &amp; Parameters</th>
<th>Tunnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDLE</td>
<td></td>
<td>#01</td>
<td>PLC2 Pull</td>
<td>Schneider Electric</td>
<td>172.26.2.231</td>
<td></td>
</tr>
<tr>
<td>N/C</td>
<td></td>
<td>#00</td>
<td>PLC2 Push</td>
<td>GENERIC</td>
<td>172.26.2.231</td>
<td></td>
</tr>
</tbody>
</table>
```

Configuration on “EasyLog MasterA” (after agents are attached):

```
<table>
<thead>
<tr>
<th>Status</th>
<th>Disable</th>
<th>S/N</th>
<th>Device Name</th>
<th>Device Type</th>
<th>Device IP &amp; Parameters</th>
<th>Tunnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDLE</td>
<td></td>
<td>#01</td>
<td>PushMaster</td>
<td>GENERIC</td>
<td>172.16.16.191 iq=172.16.16.24-25 lcp=80,443,80</td>
<td></td>
</tr>
<tr>
<td>IDLE</td>
<td></td>
<td>#00</td>
<td>PullMaster</td>
<td>GENERIC</td>
<td>172.16.16.191 tcp=21 udp=162</td>
<td></td>
</tr>
</tbody>
</table>
```
5.2. Configuration on GateManager

Before linking agents on the GateManager the setup looks like this:

![GateManager setup before linking agents](image1)

When the “Pull” client agents have been linked to the “PullMaster” ref. the descriptions in section 3.3 Linking LogTunnel Device addresses to LogTunnel Clients, it looks like this:

![GateManager setup after linking agents](image2)

Notice that the icons for the agent have changed colour from 🔄 to 🔄.
When the “Push” client agents have been linked to the “PushMaster” ref. the descriptions in section 4.3 Linking LogTunnel Clients to LogTunnel Master it looks like this:
APPENDIX A. Tech Hints and Known Limitations

Generally, you should consider the LogTunnel connections being connections for specific ports or limited port ranges. Do NOT expect simulating a traditional VPN connection using EasyLog.

Larger LogTunnel Device address ranges (Pull mode)

A LogTunnel Device address range (IP aliases) will always support the last octet regardless of the class. E.g. a class B subnet range of 192.168.1.100 - 192.168.2.250 / 255.255.0.0 would consist of 404 available addresses, but the SiteManager will only create 254 addresses. If the full range should be support, you must create two LogTunnel Master (Pull) agents; one with the IP range 192.168.1.100-254 and the other with IP range 192.168.2.1-250.

Address range entry formats

Address ranges can be entered in three different formats:

1. 192.168.200.11 (single address)
2. 192.168.200.11-75 (65 IP addresses starting from .11)
3. .11-75 (same as above but will always match DEV1 subnet)

Port range formats

Port range can be entered in three different formats:

1. 8001-8100 (100 ports starting from 8001)
2. 8001-100 (100 ports starting from 8001)
3. 0-65536 (all ports)

Limitations of Listening port and connections

Hardware SiteManager

For SiteManager Hardware models there is a limit of max. 16 single ports and/or port ranges. If wanting to open for all ports, enter 0-65536.

SiteManager Embedded

On SiteManager Embedded there is a limit to a total of 16 ports. If e.g. specifying TCP ports 23,80,5000-5100 effectively only the ports 23,80,5000-5013 will be opened only.

Also, note that TCP ports have preference over UDP ports. So, if TCP ports 23,80,5000-5010 is configured together with UDP port 8000-8010, then all the TCP ports will be opened but only UDP port 8000-8003.

As SiteManager Embedded relies on the native socket API of the OS on which it is installed, SiteManager Embedded is limited with regards to the number of concurrent connections. There is a hard limit of max 20 connections per agent (e.g. a web browser would create multiple connections on the same port 80/443). The total number of connections (agents x 20 connections) may also be limited of the hosting OS. For instance, on Microsoft Windows, the current limit is 256.

You can check the log of the SiteManager to troubleshoot if you encounter issues that you suspect may be caused by these limitations.
Devices requiring the “real” log server address as destination

In case a PLC would require (or is programmed for) accessing the genuine IP address of the log server (e.g. 172.16.16.191) but its own address is in another subnet (e.g. 192.168.0.96), you will need to configure the log server address as LogTunnel Server address on the LogTunnel Client agent of the remote SiteManager. For the SiteManager to create the LogTunnel Server alias with another subnet than the SiteManager’s DEV port, you will need to manually create the Alias in the SiteManager:

Note that this is only support on a hardware SiteManager. Also note that the device connecting to the log server must have the SiteManagers DEV1 IP address as default gateway.

FTP data connections

SiteManager and SiteManager Embedded support both Active and Passive mode as long as the initial FTP control connection is on port 21. SiteManager is “FTP aware”, which means you do not have to configure additional ports associated with the FTP protocol (such as port 20 or > 1023).
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