

LogTunnel decision making



Use this guide if you need help deciding which SiteManager setup you need for data logging.

This guide also covers some of the terms used in LogTunnel technic.

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Table of Contents

Change log	3
Introduction	3
1. Deciding for the right solution	3
1.1. First decision	3
1.2. Second decision	3
2. Nice to Know	4
2.1. TCP source IP and port	4
2.2. Exceeding the 20 sessions	4
3. Scenario Tree	5
3.1. LogTunnel Pull - Scenario#1	5
3.2. LogTunnel PUSH – Scenario#2	6
3.3. Static Server Relay – Scenario#3	7
3.4. Static Device Relay (Same IP Address) – Scenario#4	8
3.5. Static Device Relay (Same TCP port) – Scenario#5	9
3.6. GateManager backbone with Static Device Relay – Scenario#6	10
3.7. GateManager backbone with Static Server Relay – Scenario#7	11
3.8. Many to Many - Scenario#8	12
4. Appendix X – Introduction to the terms and components	13
4.1. PUSH or Pull mode	13
4.2. Initiating a connection/session	13
4.3. Logging vs. streaming	13
4.4. LogTunnel vs Static Relay	13
4.5. SiteManager vs SiteManager Embedded	13
4.6. Concurrent connections vs number of ports vs number of agents	13
Notices	15

Change log

Version	Change log
0.9	Initial version

Introduction

This guide will prepare you for selecting the right SiteManager data logging system in relation to:

- LogTunnel or Static Relays
- SiteManager Hardware or SiteManager Embedded
- SiteManager or GateManager
- Cloud or not Cloud
-

This guide also covers a few items that is necessary to understand to be able to get all the way to the perfect setup:

- [PUSH or Pull mode](#)
- [Initiating a connection](#)
- [Logging vs. streaming](#)
- [LogTunnel vs Static Relay](#)
- [SiteManager vs SiteManager Embedded](#)
- [Concurrent connections vs number of ports vs number of agents](#)
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1. Deciding for the right solution

1.1. First decision

As very first you should know what setup type, from below list, your setup is referring to:

- **One to Many** (usually a harvesting server collect data from many remote sites)
- **Many to One** (usually remote devices dump alerts to a central database)
- **Many to Many** (usually when remote devices need to communicate with all the other remote devices)

It all depends on who connect to the other side. Is it "One" Harvesting server that connect to "Many" remote devices.

Is it "Many" remote devices that connect to "One" central server/device.

Alternative could be all devices talk to all the other devices - "Many to Many".

1.2. Second decision

Next is to select the product. Is it SiteManager hardware, software or can you use the GateManager backbone. The following list should bring you closer to select the right product for your setup.

		#1	#2	#3	#4	#5	#6	#7	#8	#9
A	Many to One		X	X				X		
B	One to Many	X			X	X	X			
C	Only a cloud solution because a hardware is not possible to install		X	X	X		X	X		
D	Can your "harvesting server" use one IP address for all remote devices and differentiate on the port number?				X		X			
C	Does your setup require that each remote device is seen as each a different IP address?	X				X	X			
E	If you have the need for "Many to Many" you are limited to as many remote devices as the number of Agents on the SiteManager. A SM1129 have 5 agents and can configure up to 5 remote devices in the setup. SM3529 have 100 Agents and can handle 100 remote sites.								X	
F	If streaming is required and the number of remote sites are high like >100.						X			
G										
H										
I										
J										

2. Nice to Know

Some information is not necessary related to specific setups but should be taken in mind when constructing the setup.

2.1. TCP source IP and port

The SiteManager will try to use the same source port as the remote device initially used. If that is not possible it will use a random source port.

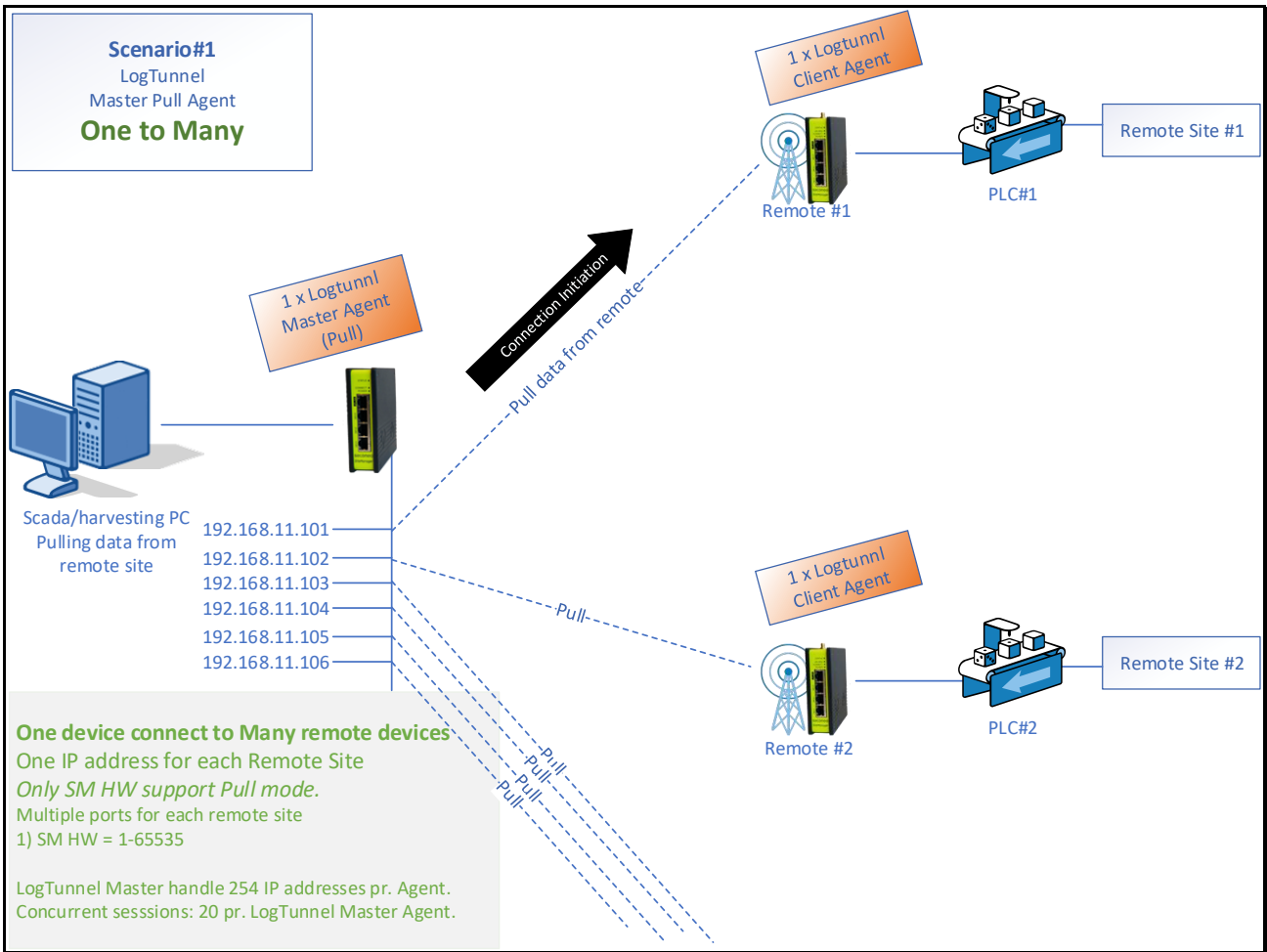
2.2. Exceeding the 20 sessions

If example the harvesting server try to setup a connection number 21 knowing that there is already 20 established connections running it will succeed. The SiteManager will buffer up to 5 connections in case one of the 20 established connections will release very soon.

For some harvesting systems this could make trouble and you should consider adding an additional LogTunnel Agent or setting the idle time lower.

3. Scenario Tree

3.1. LogTunnel Pull - Scenario#1



Scenario#1

A LogTunnel Master Agent is configured on the central SiteManager (hardware) and a LogTunnel Client on each of the remote SiteManagers (hardware or software).

A central server, in this case a Scada/harvesting PC, is reading data from multiple remote devices, here called PLC#1. Each PLC is represented by the IP addresses 192.168.11.101-106. The PLC can have any IP address, it can also be the same IP on all the PLC's in the setup.

The server can also write data to the PLCs, it just has to be the server initiating the connection.

Concurrent connections; The Scada/harvesting PC can connect to 20 of the remote PLC's at the same time. This is in most cases enough. If more concurrent connections are needed, we can configure yet another LogTunnel Master agent and attach half of the remote SiteManagers to that agent.

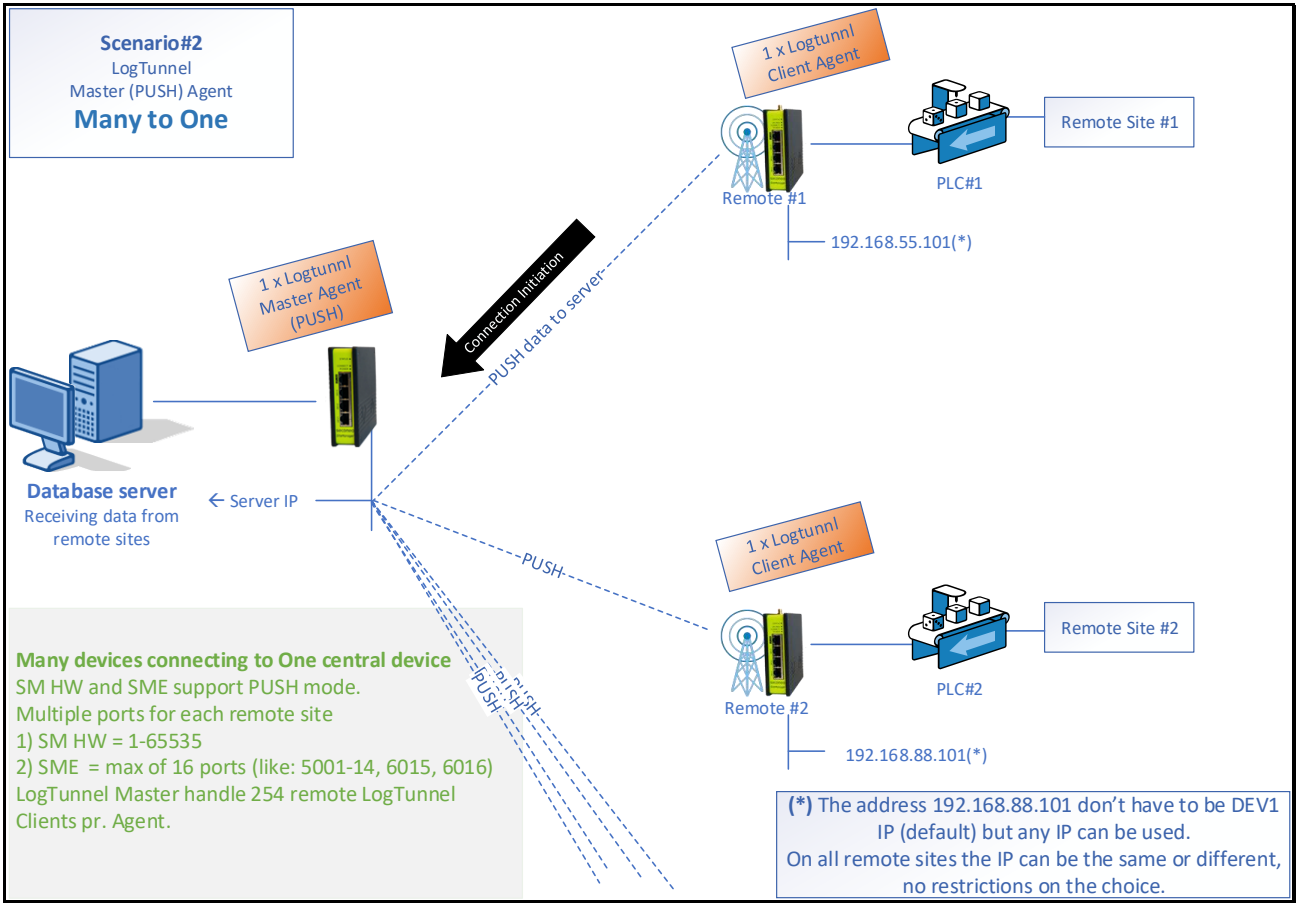
Number of remote sites; one LogTunnel Master can have 254 LogTunnel Clients remote devices. Each SiteManager can have multiple LogTunnel Masters depending on the number of agents for that mode.

Port numbers; there are no limitations on the number of TCP or UDP ports for this setup.

SiteManager Embedded; LogTunnel Master in Pull mode is not supported for SME, this is likely to be added in later firmware releases.

Cloud; Currently there is no cloud solution for LogTunnel Master Pull yet.

3.2. LogTunnel PUSH – Scenario#2



Scenario#2

A LogTunnel Master(PUSH) Agent is configured on the central SiteManager (hardware og software) and a LogTunnel Client on each of the remote SiteManagers (hardware or software).

Multiple remote PLC's are transmitting alerts/transferring data to the central database server. As default the PLC will see the central server as having the DEV1 IP address, this can be changed to any IP address.

The central Database Server will see all the remote PLCs as coming from one and the same IP address namely the DEV1 address.

Concurrent connections; Max of 20 remote PLC's can transmit to the central Database server at the same time.

The remote PLC's share the same Master Agent on the central SiteManager meaning that they all share the 20 connection-limit of the Master Agent. If more concurrent connections are needed, we can configure yet another LogTunnel Master Agent and attach half of the remote SiteManagers to that agent.

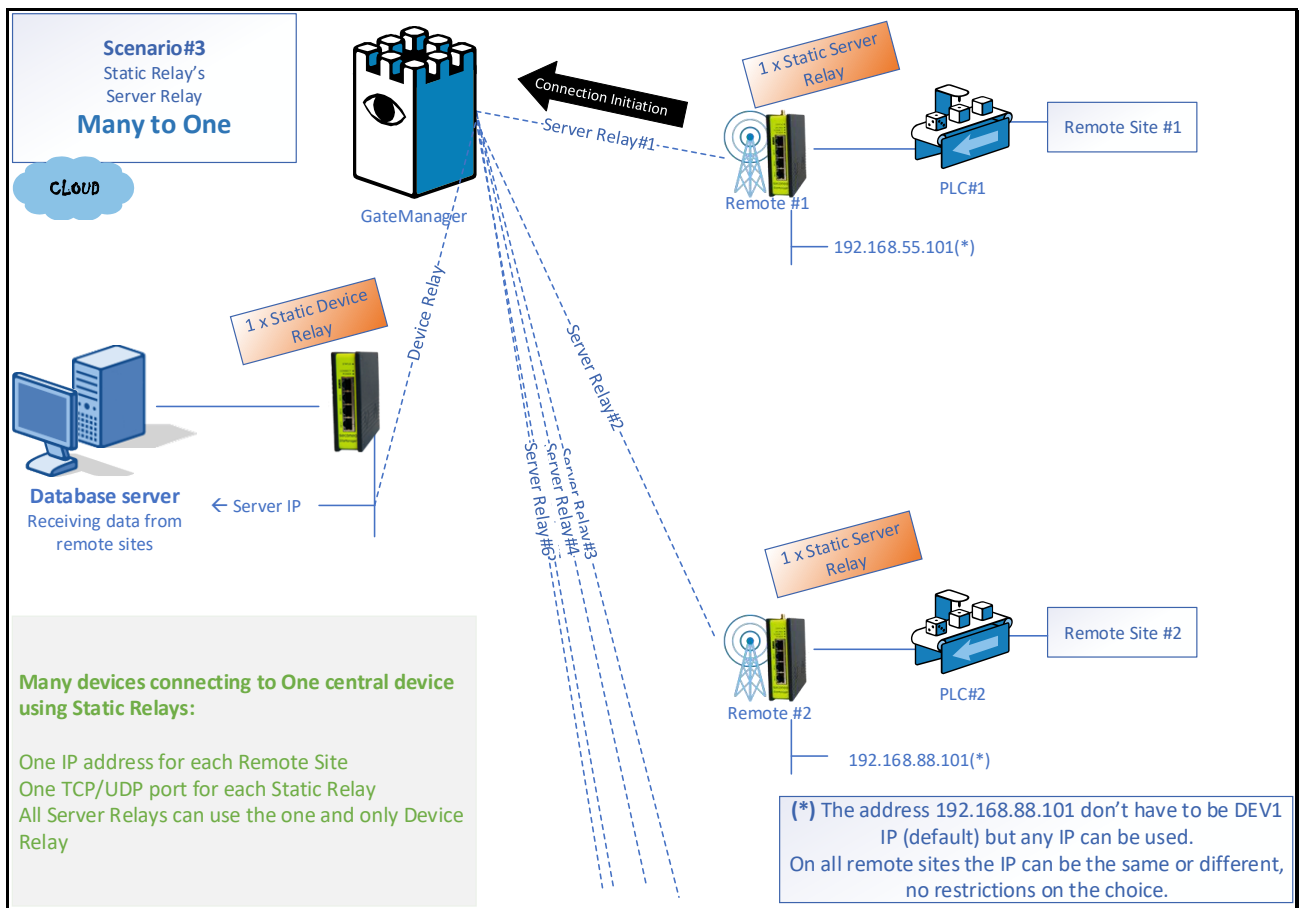
Number of remote sites; one LogTunnel Master (PUSH) can have 500+ LogTunnel Clients attached. Each SiteManager can have multiple LogTunnel Masters depending on the number of agents for that model.

Port numbers; there are no limitations on the number of TCP or UDP ports for this setup.

SiteManager Embedded; LogTunnel Master in PUSH mode is supported for SME but limit the setup to handle 16 different TCP ports where the hardware SiteManager has no limit.

Cloud; If the number of ports needed are 16 or less this could also be a Cloud solution.

3.3. Static Server Relay – Scenario#3



Scenario#3

A data logging setup like Scenario#2 but based on Static Relays.

Multiple remote PLC's connects to a central Database Server using the same Device Relay on the central SiteManager and one Server Relay on each of the Remote SiteManager's.

The remote PLC will as default see the central server as having the DEV1 IP address, this can be changed to any IP address.

The central Database Server will see all the remote PLCs as coming from one and the same IP address namely the DEV1 address.

Concurrent connections; Max of 20 remote PLC's can transmit to the central Database server at the same time.

The remote PLC's share the same Device Relay on the central SiteManager, meaning that they all share the 20 connection-limit of the Device Relay. If more concurrent connections are needed, we can configure yet another Device Relay and attach half of the remote SiteManagers to that relay.

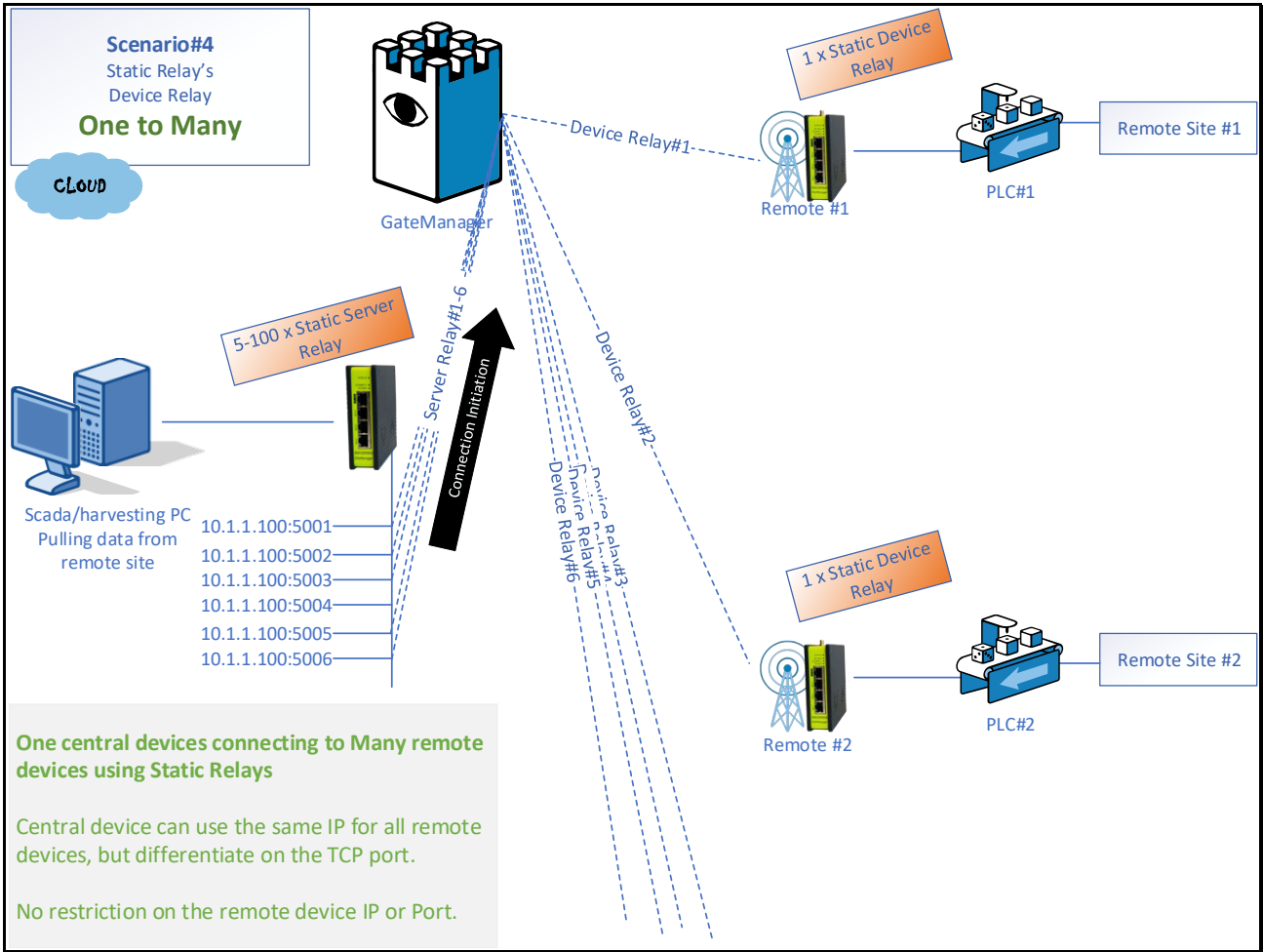
Number of remote sites; one Static Device Relay can have 1000+ Server Relay attached. Each SiteManager can have multiple Static Device Relays depending on the SiteManager model.

Port numbers; One port one relay - the Static Server Relay is set to one TCP port. This means if the setup communicates on several ports we need one relay pr. port.

SiteManager Embedded; A SiteManager hardware will automatically create an IP Alias if it is different from the DEV1 IP. This is a manual process on a SiteManager Embedded.

Cloud; This could also be a solution in a cloud-based environment.

3.4. Static Device Relay (Same IP Address) – Scenario#4



Scenario#4

A data logging setup like Scenario#1 but based on Static Relays.

One Static Server Relay is configured on the central SiteManager for each one Device Relay on the remote SiteManager. For each remote device in the setup it is required to have one Server Relay in the central SiteManager.

A central server, in this case a Scada/harvesting PC, is reading data from multiple remote devices, here called PLC#1 and PLC#2. Each PLC is represented by a unique TCP port number, but they are all using the same IP address, in this case 10.1.1.100.

The server can also write data to the PLCs, it just has to be the server initiating the connection.

On the remote site the PLC#1 or PLC#2 can have a different IP address or port number, it is not restricted to the IP 10.1.1.100 or the port range 5001-5006.

Concurrent connections; The Scada/harvesting PC can connect to all of the remote PLC's at the same time.

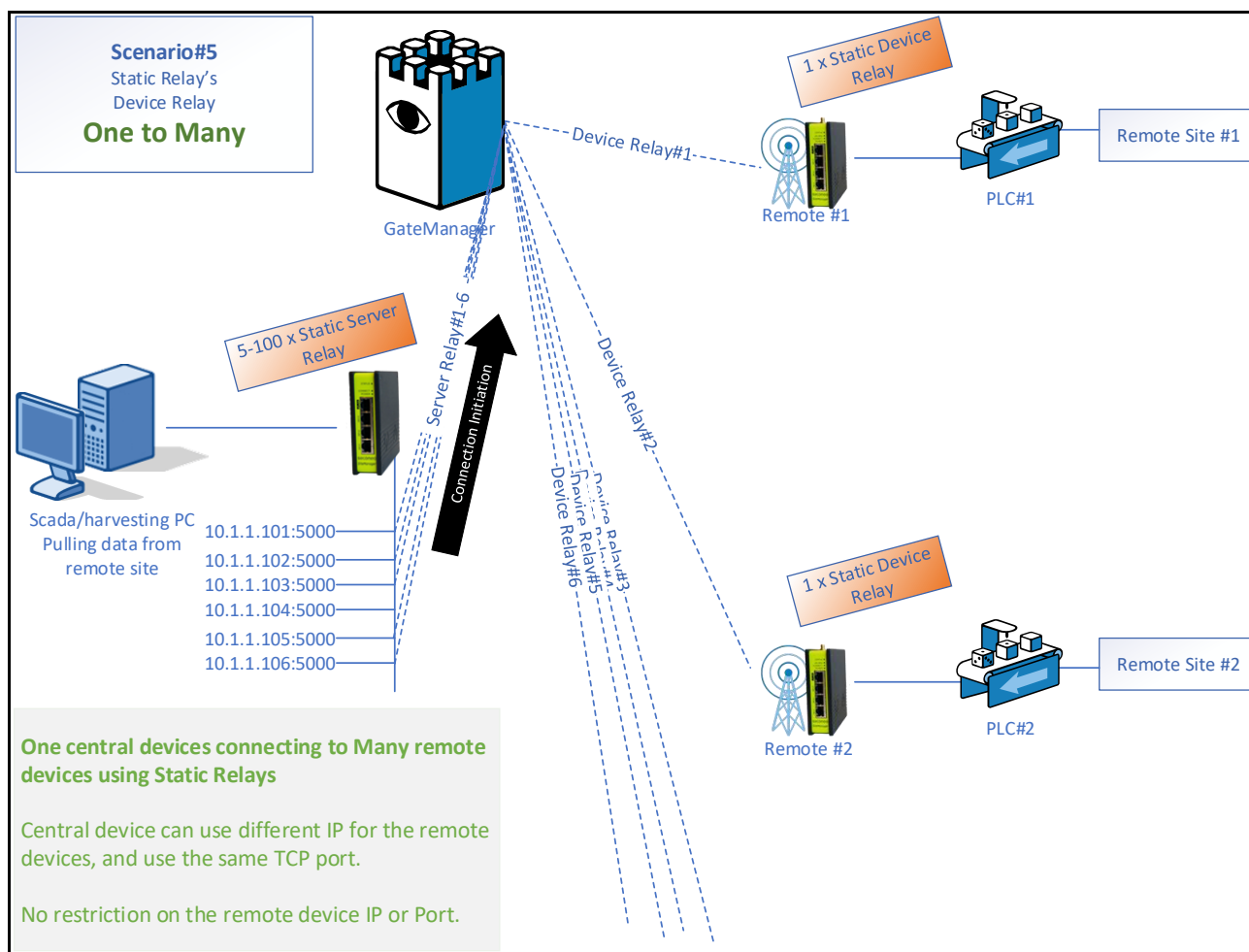
Number of remote sites; The number of remote sites is limited to the number of Relays on the central SiteManager. The range are from 5 relays to 100 relays.

Port numbers; Any port can be used for the Server Relay on the central SiteManager and it don't have to be in sequence.

SiteManager Embedded; The Extended license will enable 100 relays on both Windows and Linux version.

Cloud; Because SiteManager Embedded is an option in this setup it will also be scenario for a cloud-based setup.

3.5. Static Device Relay (Same TCP port) – Scenario#5



Scenario#5

A data logging setup like Scenario#4 but based on different IP addresses and using the same port number.

One Static Server Relay is configured on the central SiteManager for each one Device Relay on the remote SiteManager. For each remote device in the setup it is required to have one Server Relay in the central SiteManager.

A central server, in this case a Scada/harvesting PC, is reading data from multiple remote devices, here called PLC#1 and PLC#2. Each PLC is represented by a unique IP address, but they are all using the same TCP port, in this case port 5000.

On the remote site the PLC#1 or PLC#2 can have a different IP address or port number, it is not restricted to the IP 101.1.101-106 or the port 5000.

Concurrent connections; The Scada/harvesting PC can connect to all of the remote PLC's at the same time.

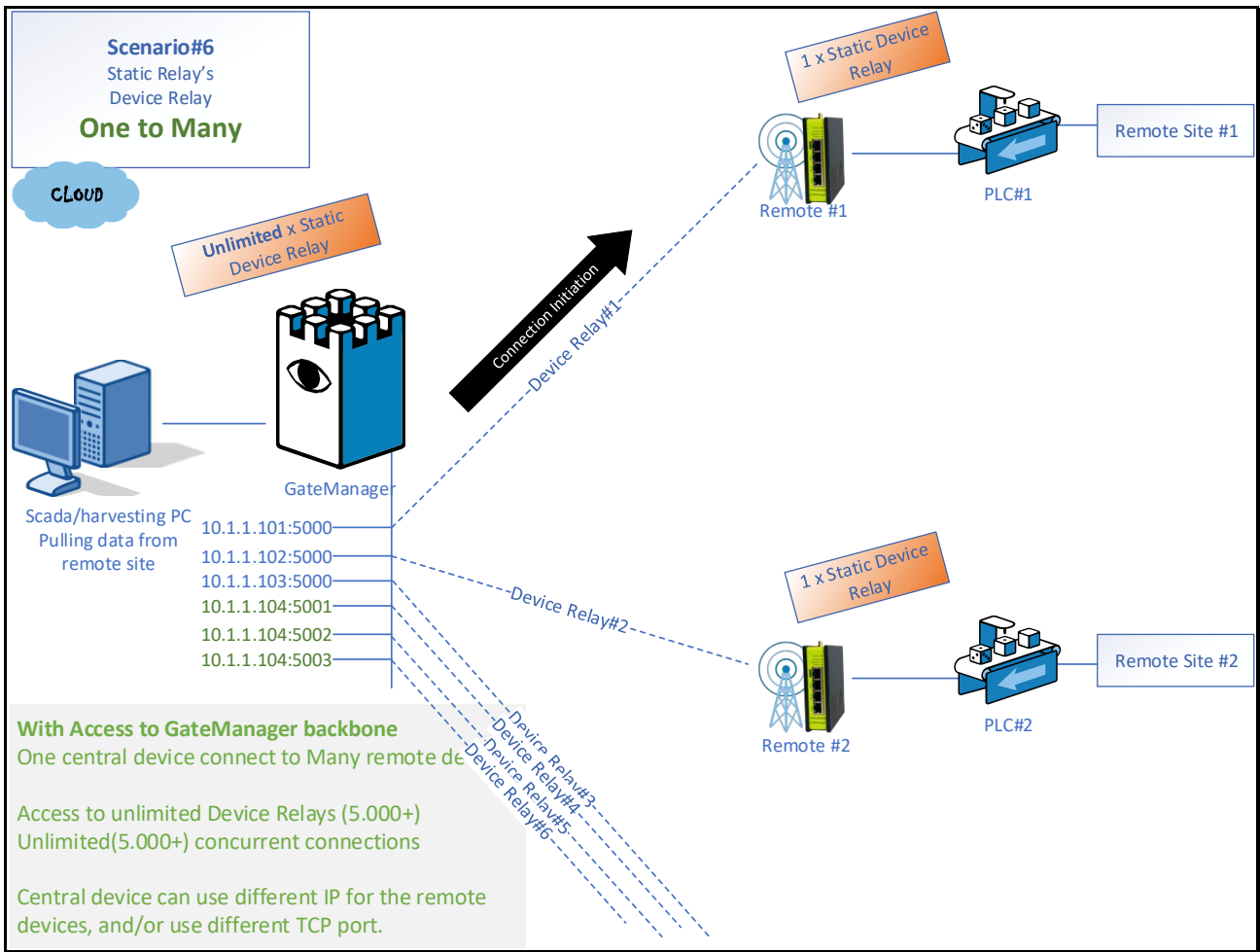
Number of remote sites; The number of remote sites is limited to the number of Relays on the central SiteManager. The range are from 5 relays to 100 relays.

Port numbers; Any port can be used for the Server Relay on the central SiteManager and it don't have to be in sequence.

SiteManager Embedded; The Extended license will enable 100 relays on both Windows and Linux version.

Cloud; Because SiteManager Embedded is an option in this setup it will also be scenario for a cloud-based setup.

3.6. GateManager backbone with Static Device Relay – Scenario#6



Scenario#6

Access to the GateManager backbone means access to the GateManager local network and direct access to all the Static Device Relays on the remote SiteManagers.

A central server, in this case a Scada/harvesting PC, is reading data from multiple remote devices, here called PLC#1 and PLC#2. Each PLC is represented by a unique IP address, unique port or a combination. The Scada/harvesting PC can connect to all of the remote PLCs at the same time and is not limited by a LogTunnel Master.

On the remote site the PLC#1 or PLC#2 can have a different IP address or port number, it is not related to the settings on the GateManager backbone.

Concurrent connections; The Scada/harvesting PC can connect to all of the remote PLC's at the same time.

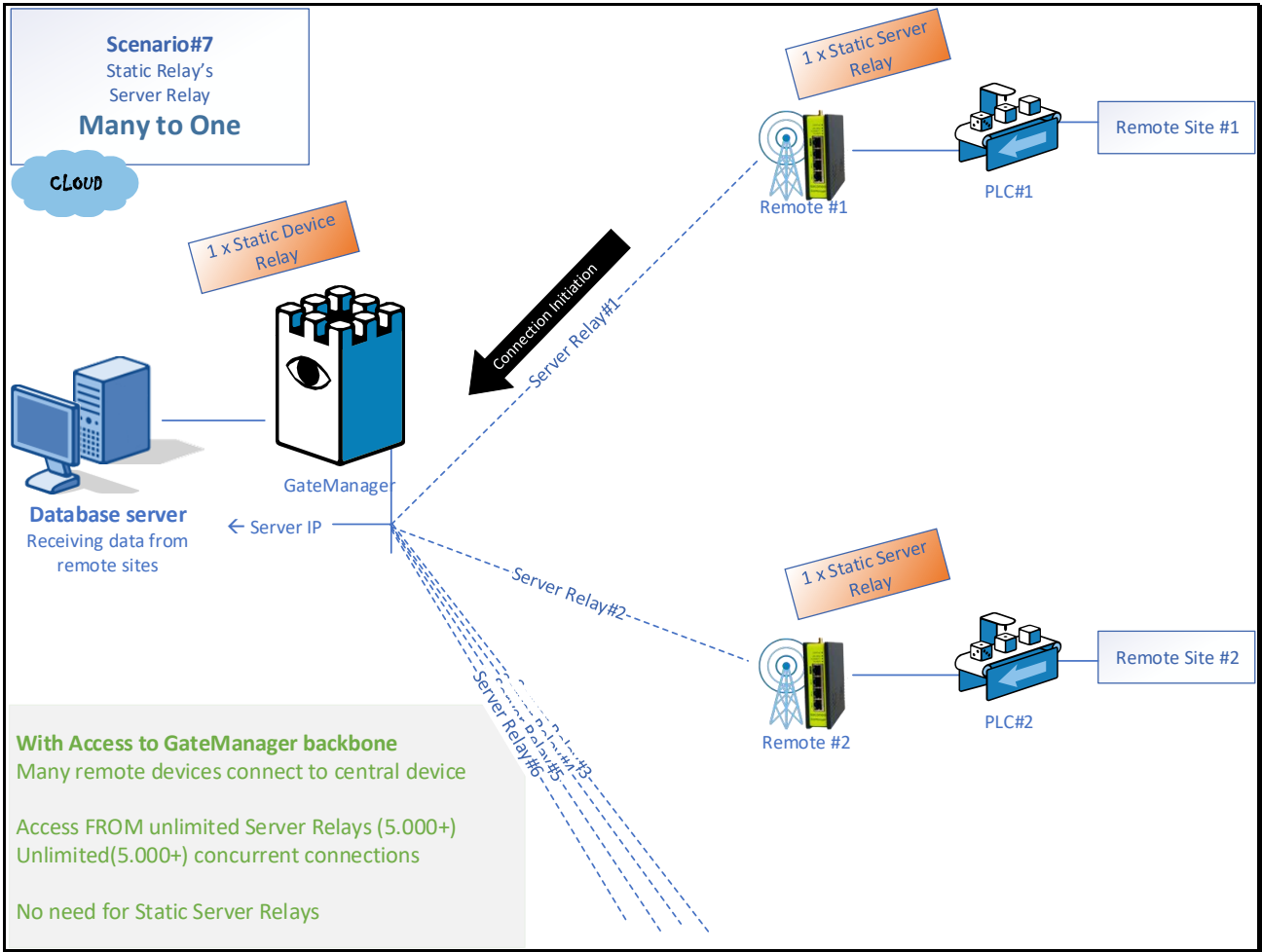
Number of remote sites; The number of remote sites is only limited to the number of remote SiteManager in the setup meaning 10.000+.

Port numbers; Any port can be used for the Device Relay and it don't have to be in sequence. Only one TCP/UDP port pr. Device Relay.

SiteManager Embedded; The remote SiteManager can be SiteManager hardware or SiteManager Embedded. No need for a SiteManager Embedded on the GateManager backbone site.

Cloud; Because this setup will use different IP addresses for the Device Relays on the GateManager it might not be all cloud providers that allow or give access to multiple IP aliases on the GateManager interface. Only a test will clear that question. The Scada/harvesting PC must be able to access these IP addresses.

3.7. GateManager backbone with Static Server Relay – Scenario#7



Scenario#7

A data logging setup like Scenario#3 but based on direct access to the GateManager backbone.

Access to the GateManager backbone means access to the GateManager local network and direct access from all the Static Server Relays without the need for a central SiteManager with a Device Relay.

Multiple remote PLC's connects to a central Database Server that is direct connected to the GateManager backbone or backbone network.

The remote PLC will as default see the central server as having the DEV1 IP address, this can be changed to any IP address.

The central Database Server will see all the remote PLCs as coming from one and the same IP address namely the GateManager local interface address.

The central Database Server don't have to be centrally located. The server can be anywhere just GateManager can route to the server. Note that the data from GateManager to the server is not encrypted by the GateManager.

Concurrent connections; All the remote PLC's can transmit to the central Database server at the same time.

Number of remote sites; The number of remote sites is only limited to the number of remote SiteManager in the setup meaning 10.000+.

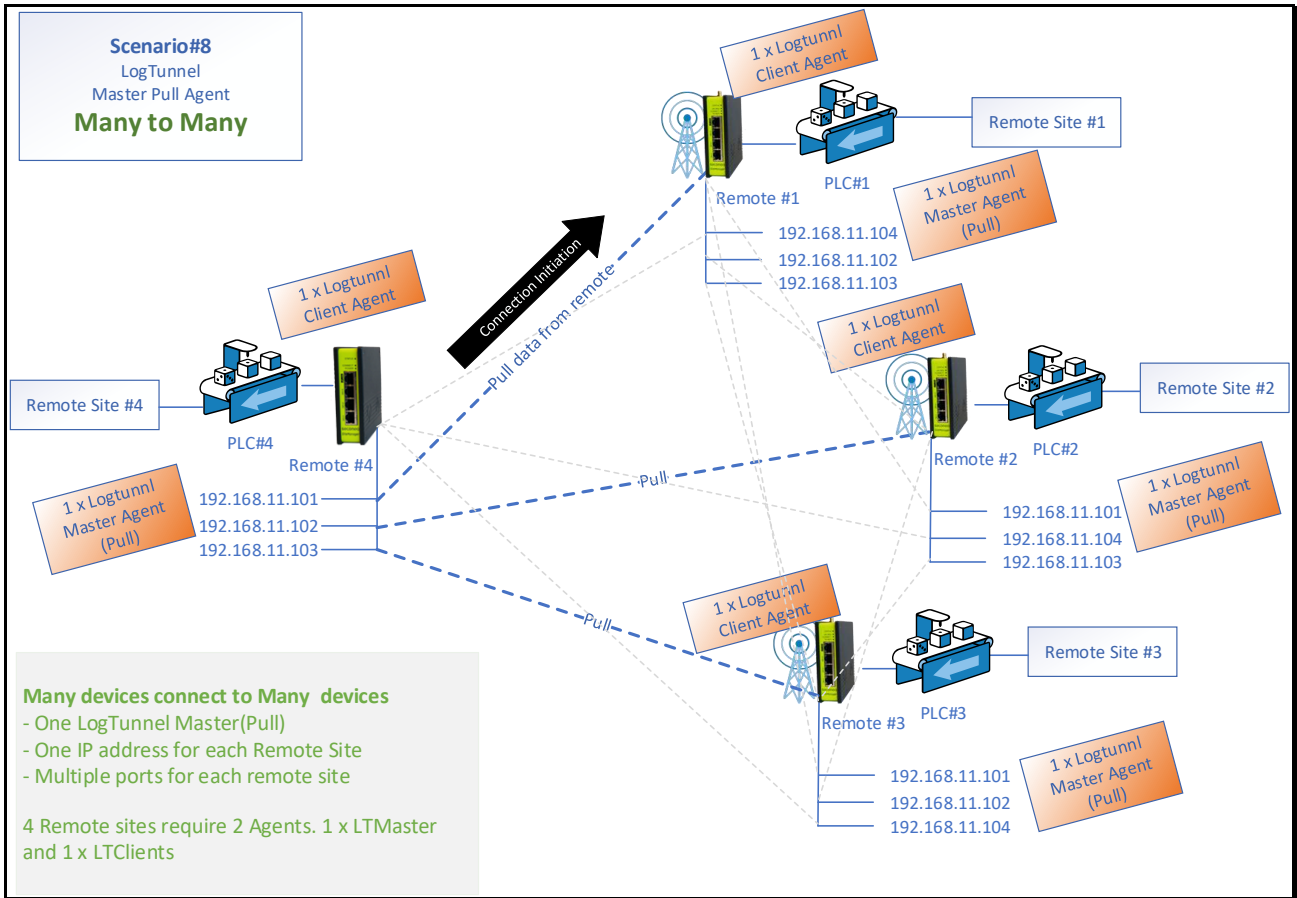
Port numbers; Any port can be used for the Server Relay and it don't have to be in sequence. Only one TCP/UDP port pr. Server Relay.

SiteManager Embedded; A SiteManager hardware will automatically create an IP Alias if it is different from the DEV1 IP. This is a manual process on a SiteManager Embedded.

SiteManager Embedded; The remote SiteManager can be SiteManager hardware or SiteManager Embedded. No need for a SiteManager Embedded on the GateManager backbone site.

Cloud; Because this setup will only use the GateManager local interface as outgoing interface there will be no issue for a cloud based solution.

3.8. Many to Many - Scenario#8



Scenario#8

Many to many setup, where all remote sites need to communicate with each other. In the example above the PLC#1 is seen as 192.168.11.101 from both PLC#2,3 and 4. The IP address don't have to be the same it is all configured on each of the LogTunnel Master agents. All the PLC's in the setup will now be able to pull data from each other.

Requirements; One LogTunnel Master(Pull) on each of the SiteManager's and one LogTunnel Client to be shared with all the LogTunnel Masters in the setup.

Concurrent connections; Each of the PLC's in the setup can connect to the max of 20 remote PLC's at the same time.

Number of remote sites; The LogTunnel Master can handle up to 254 remote LogTunnel clients.

Port numbers; On a SiteManager hardware there is no port number limit. A SiteManager Embedded will limit the number to 16 different ports.

SiteManager Embedded; Currently (Release 8.3) there is no LogTunnel Master in Pull mode support for SiteManager Embedded. This is likely to be included in later releases.

Cloud; The solution is based on a SiteManager hardware and there for not suitable for a Cloud base environment.

4. Appendix X – Introduction to the terms and components

4.1. PUSH or Pull mode

The reason for LogTunnel Master called PUSH mode is that in most cases this agent is selected when remote site pushes data to the central database. And the LogTunnel Master called Pull mode is in general used when the central server sometimes called the harvesting server pulling data from each of the remote sites.

Pushing and pulling data is when we talk about general use cases; the real world is much simpler. PUSH mode is when many remote devices connect to one central device let's call it "Many to One". Pull mode is when one central device connects to many remote devices let's call it "One to Many".

4.2. Initiating a connection/session

How do we identify if it is "Many to One" or "One to Many". The trigger is who start a connection. "One to Many" is when one device connects to each of the remote devices and reading data from the remote device example reading an alarm OR it could just as will writing data to the remote device example writing a configuration.

4.3. Logging vs. streaming

- LogTunnel and Static Relay is one and the same system just made in a slightly different way, especially on the setting up part. Common for both is that it is made for logging, meaning device transfer data to another device and disconnect. Usually a setup can have several hundred devices but only a few is connected and the same time.

- Streaming is likely to have a connection between device that never stops or at least stay on/connected for several minutes or more.

- LogTunnel and Static Relays are made for logging and not for streaming. One LogTunnel Master agent is limited to 20 concurrent connections. So, if the need is streaming and the number of concurrent screaming clients are below 20 it is ok. Alternative is to configure an extra LogTunnel Agent, meaning adding another 20 sessions to 20 other clients.

4.4. LogTunnel vs Static Relay

- One Static Relay (server or device) handle one IP and one port (TCP/UDP). LogTunnel on the other hand can handle multiple ports pr. LogTunnel Agent.

- One LogTunnel Master can handle 254 IP addresses and multiple ports (TCP/UDP:1-65535 ports for SM HW)

4.5. SiteManager vs SiteManager Embedded

- SiteManager hardware don't have a limit of ports in the LogTunnel. On SiteManager Embedded there is a limit of 16 ports configured. Example if your setup is using 16 different ports like 5001-5016. Limited due to respect to the host system. If more ports are needed you must create additional LogTunnel Master.

- Combining SM and SME, it is important in setup with a need for more than 16 different ports to note that the SM Hardware version will accept all ports but the SiteManager Embedded will automatically limit the configuration to the first 16 ports.

-

4.6. Concurrent connections vs number of ports vs number of agents

The terms of connections, ports and agents can be confusing.

-
- Number of agents are simply limited by the SiteManager model and could be like 5 Agent and therefore no more than 5 LogTunnel Masters can be created.
 - The number of ports is the number of ports that can be configured on each of the agents. If using SiteManager Hardware there is no limit on the number of ports, it can be all ports (65535) or a specified number of ports like 80, 443 and 5001. On a SiteManager Embedded the number of configured ports is limited to 16. If more ports are configured it will automatically limited to 16. See also chapter SiteManager vs SiteManager Embedded.
 - Number of Concurrent Connection are the number of connections or sessions ONE agent is set to handle at the same time. Any Agent like the LogTunnel Master agent is set to 20 concurrent connections and will reject the number 21 connection until another connection is closed/released.
The number of needed connections is depending on the software. Browsing a web site might take up several connections. Normally a logging system only use one connection for each alert or data transfer.

Need for more connections; 2 agents can have $2 \times 20 = 40$ concurrent connection or remote devices transmitting data at the same time. The connections cannot be shared between agents. Releasing one connection from Agent#1 will not allow Agent#2 to have 21 connections.

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