

Release 7.3: Forwarding Agent

- The **Forwarding Agent** have been extended with Dynamic DNS and other features.

This guide will target the new additions and changes to the Forwarding Agent in the SiteManager Hardware release 7.3 (17393).

Version: 1.2, September 2017

Table of Contents

Change log	3
Forwarding Agent Release Overview	3
1. Example Scenario	4
2. Dynamic DNS	5
2.1. Configuring the Agent	5
2.2. Initial DNS lookup	5
2.3. Subsequent DNS changes	6
2.4. Retry/recheck intervals	6
3. GUI changes	7
3.1. Agent List screen	7
3.2. Parameter Details screen	7
3.2.1. Rule box sizes	7
3.2.2. Errors in red	7
3.2.3. Unverified	7
3.2.4. Not found	7
3.2.5. Multiple addresses	7
4. Log entries	8
4.1. Starting the Forwarding Agent	8
4.1.1. Spawn	8
4.1.2. Started (agent)	8
4.1.3. Initial values	8
4.1.4. Started (rules)	8
4.2. Status changes	9
4.3. IP Address change	9
5. Other information and limitations	10
5.1. Reload	10
5.2. UPLINK failover	10
5.3. Debug logging	10
5.4. GateManager appliances	10
5.5. Model limitations	10
5.6. Capital letters	10
5.7. Setup Assistant	10
5.8. Identical lines	10
5.9. Empty lines	10
5.10. GateManager state	10
5.11. Logging DNS unavailable	11
5.12. DNS and syntax errors	11
5.13. Multiple Forwarding Agents	11
Notices	12

Change log

Version	Change log
0.9	Initial version
1.0	Edits for limited release
1.1	Edits for public release
1.2	Release for 7.3

Forwarding Agent Release Overview

The **Forwarding Agent** in the SiteManager Embedded Hardware product line have been extended and enhanced in release 7.3.

These are the major additions to the agent:

- Dynamic hostname resolving.
- Support for DNS names on both sides of the “>/>”.
- Several changes to the GUI to enhance the user experience and improve troubleshooting and overview.
- Extended logging to let an external syslog server track changes to DNS names.

Prerequisites for this guide includes a basic knowledge of how to create the agent, and how to configure the individual rule lines in each agent under parameter details. Knowledge about basic DNS functionality is also required.

For information on the Forwarding Agent rule configuration, please see this guide:

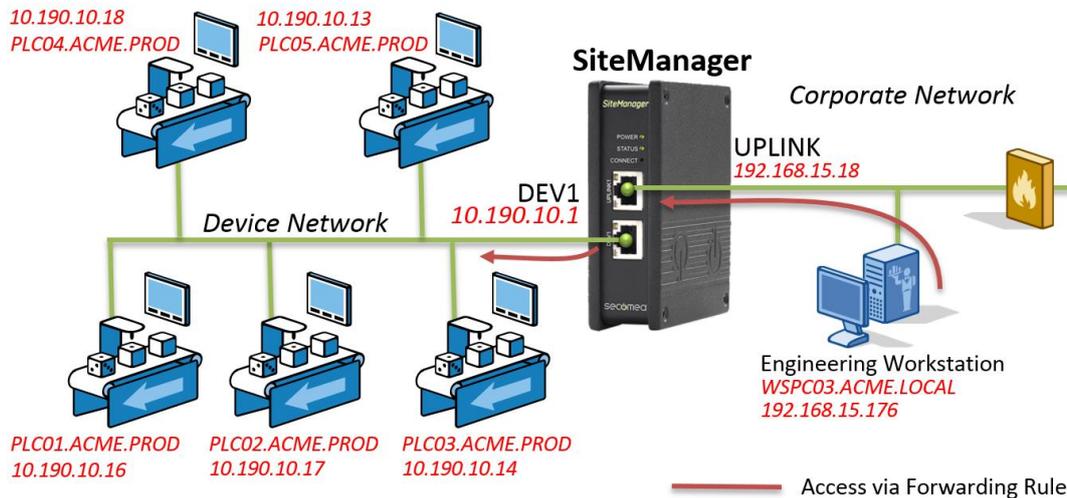
https://support.secomea.com/wp-content/uploads/2016/09/Using_the_Forwarding_and_SCADA-Routing_Agents.pdf

1. Example Scenario

This guide will use an example scenario where a SiteManager is installed on the shop floor with 5 machines connected to the Device port.

All machines are in the same network placed behind the Device port, and a workstation on the corporate network will be servicing the PLC's through a web interface at TCP port 80 and a VNC connection through TCP port 5900, both through the Uplink address of the SiteManager.

The Device Network is not known on the Corporate Network and cannot be routed.



The IP Addresses on the Device Network are changing but reachable through DNS. The same holds true for the Engineering Workstation.

When the Engineering Workstation tries to reach each PLC, it does so on port 80 and 5900, but the ports will be mapped through ports 81-85 and 5901-5905 on the Uplink side to reach the intended PLC.

This will yield 2 forwarding rules for each PLC that looks like this:

```
UPLINK:TCP:wspc03.acme.local:81>>DEV1:plc01.acme.prod:80
```

```
UPLINK:TCP:wspc03.acme.local:5901>>DEV1:plc01.acme.prod:5900
```

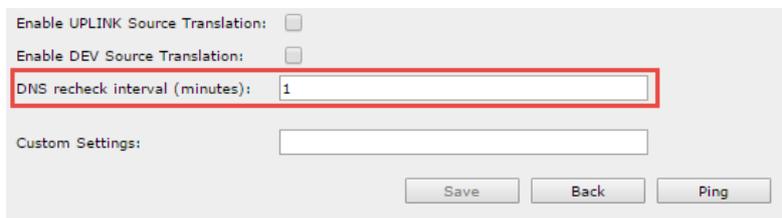
There will then be one rule for each PLC and associated port. Note the ">>" notation as it will enable DEV1 to UPLINK translation (NAT).

A Forwarding Agent is created with 10 rules, two for each PLC.

2. Dynamic DNS

2.1. Configuring the Agent

The Forwarding Agent has been extended with a DNS recheck interval in the parameter details:



If this recheck interval is set to “blank” it will default to 0 and the dynamic DNS check will be turned **OFF**.

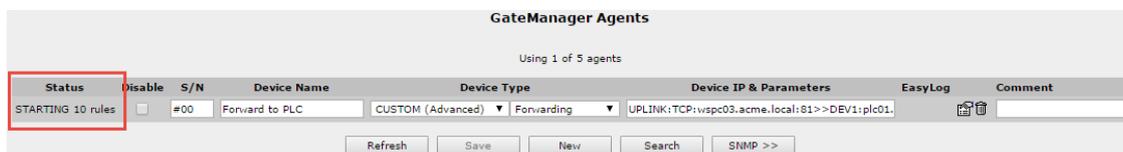
In the above example, the “DNS recheck interval” has been set to 1 minute, this will instruct the Forwarding Agent to check the DNS server every 1 minute and resolve the DNS name to see if the IP address has changed.

Choose this value carefully, as every rule line will be dealt with separately. If there are multiple agents with multiple rule lines containing multiple DNS names, it could put a strain on the DNS server.

There are **10 rules** in each Forwarding Agent, and every rule has a maximum of **120 characters**.

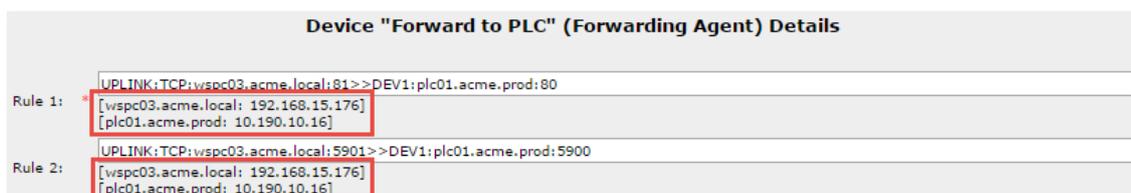
2.2. Initial DNS lookup

“Initial DNS lookup” is the first lookup the agent makes when starting up. It will then cache the IP addresses. The “DNS recheck interval” only has effect if the “Initial DNS lookup” has occurred.



Status	Disable	S/N	Device Name	Device Type	Device IP & Parameters	EasyLog	Comment
STARTING 10 rules	<input type="checkbox"/>	#00	Forward to PLC	CUSTOM (Advanced) Forwarding	UPLINK:TCP:wspc03.acme.local:81>>DEV1:plc01.		

The IP address will be displayed under each rule where there are DNS names on either side of the “>/>>”:



Rule	Device IP & Parameters
Rule 1: UPLINK:TCP:wspc03.acme.local:81>>DEV1:plc01.acme.prod:80	[wspc03.acme.local: 192.168.15.176] [plc01.acme.prod: 10.190.10.16]
Rule 2: UPLINK:TCP:wspc03.acme.local:5901>>DEV1:plc01.acme.prod:5900	[wspc03.acme.local: 192.168.15.176] [plc01.acme.prod: 10.190.10.16]

If the DNS name is not found on initial lookup, it will be marked in the agent list:



Status	Disable	S/N	Device Name	Device Type	Device IP & Parameters	EasyLog	Comment
UP (6 DNS errors)	<input type="checkbox"/>	#00	Forward to PLC	CUSTOM (Advanced) Forwarding	UPLINK:TCP:wspc03.acme.local:81>>DEV1:plc01.		

Each rule will be marked as “not found” in red below it, until the initial DNS resolving has occurred:



2.3. Subsequent DNS changes

If the DNS name cannot be resolved by the DNS server, after previously being successfully resolved, it will change to “unverified”:



Please note that this is not an error state, and therefore not displayed in red.

If the IP address changes, it will be displayed with both the old and the new IP address:



State changes will be logged to the internal logging system, which is also available to a syslog server.

2.4. Retry/recheck intervals

On initial DNS lookup, the names will be resolved on agent start-up. There are two scenarios in which this can fail – either the DNS server is not responding, or the DNS name is not found in the DNS database. The second scenario are depending on value of the “DNS recheck interval” (RI).

When the RI is set, it is used to determine if the IP address has been changed. If it is not set (RI=0) it will never check for changing IP addresses.

The following table shows the timeout values:

Forwarding Agent			
Initial Check		Recheck	
DNS server down	DNS entry missing	DNS server down	DNS entry missing
30 seconds	RI = 0 → 5 min.	RI = 0 → No check RI = x → x min.	
	RI > 5 → 5 min.		
	RI ≤ 5 → RI min.		

The table above shows the timeout values for the different scenarios of the Forwarding Agent. Please note the special case where an initial check is made and the DNS server responds, but the DNS entry is not found (missing).

This will make the Forwarding Agent check if there is a “DNS recheck interval” set (RI). If it is larger than 0, it will use this value, unless it is above 5 minutes. In that case, it will be changed to a maximum of 5 minutes.

All the above values will be used until the DNS name can be resolved again. There are no limitations as to how long the agent will try to keep resolving the IP address.

3. GUI changes

The 7.3 version adds differences in the GUI on both the Agent List screen and the Parameter Details screen.

3.1. Agent List screen

The number of DNS failures will be recorded on the Agent List screen:



3.2. Parameter Details screen

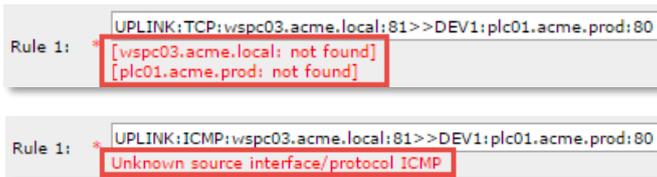
3.2.1. Rule box sizes

The size of the rule boxes has been changed to encompass the new 120-character limitation:



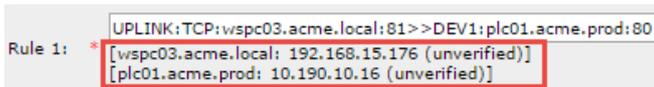
3.2.2. Errors in red

Errors are now displayed in red to ease troubleshooting of the rules:



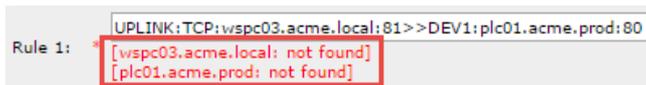
3.2.3. Unverified

When IP addresses that have previously been resolved, but is subsequently unresolvable, they will be used from the cache and be marked as "unverified":



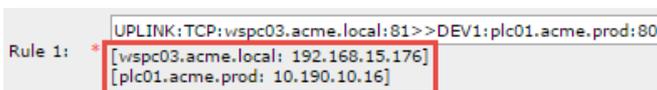
3.2.4. Not found

IP addresses, that have not been resolved earlier (not found in cache), will be marked as "not found":



3.2.5. Multiple addresses

When DNS names are used on both the left and right side of the ">/>>", they will be displayed underneath each other:



4. Log entries

When the SiteManager is in non-Debug mode (SiteManager GUI -> Log -> Setup -> Log Debug Messages -> No), it will log several Forwarding Agent related messages. Including state changes and initial DNS values.

4.1. Starting the Forwarding Agent

When the forwarding is started, it will go through some initial steps.

4.1.1. Spawn

The first stage is spawning the agent. There will be one entry for each Forwarding Agent. This is displayed in the log like this:

```
[DATE/TIME] cron.info ACM[NUMBER]: Spawning Agent #[X] Forwarding ([FORWARDING RULE 1 BODY] .. [FORWARDING RULE X BODY])
```

Example:

```
May 31 07:59:00 cron.info ACM[934]: Spawning Agent #1 Forwarding (UPLINK:TCP:wspc03.acme.local:81>>DEV1:plc01.acme.prod:80 DNSPOLL=1)
```

4.1.2. Started (agent)

When the agent module has been launched, it will report itself as started. There will be one entry for each Forwarding Agent. This is displayed in the log like this:

```
[DATE/TIME] daemon.info Forwarding[NUMBER]: Started Forwarding agent v. [BUILD#] ([FORWARDING RULE 1 BODY] .. [FORWARDING RULE X BODY]) #0
```

Example:

```
Jun 1 13:55:37 daemon.info Forwarding[936]: Started Forwarding agent v. 17216 (UPLINK:TCP:wspc03.acme.local:81>>DEV1:plc01.acme.prod:80 DNSPOLL=1) #0
```

4.1.3. Initial values

When the agent resolves the DNS names for the first time, it will display them in the log. Each DNS name for each rule line will be displayed.

```
[DATE/TIME] daemon.info Forwarding[NUMBER]: DNS host "[DNS NAME]" initially set to "[IP ADDRESS]"
```

Example:

```
May 31 07:59:20 daemon.info Forwarding[936]: DNS host "plc01.acme.prod" initially set to "10.190.10.16"
```

4.1.4. Started (rules)

When the agent module has been launched, it will report itself as started. There will be one entry for each Forwarding Agent. This is displayed in the log like this:

```
[DATE/TIME] daemon.info Forwarding[NUMBER]: Started Forwarding agent with [X] rules, [1] distinct DNS name and retry interval of [X] mins
```

Example:

```
May 31 07:59:23 daemon.info Forwarding[938]: Started Forwarding agent with 10 rules, 1 distinct DNS name and retry interval of 1 min
```

4.2. Status changes

When the agent is running, IP changes are logged.

4.3. IP Address change

When the IP address changes on the DNS server, it will be logged as:

[DATE/TIME] daemon.info Forwarding[NUMBER]: DNS host "[DNS NAME]"
changed from "[IP ADDRESS]" to "[IP ADDRESS]"

Example:

```
Jun  1 14:21:21 daemon.info Forwarding[937]: DNS host "plc01.acme.prod"  
changed from "10.190.10.16" to "10.190.11.16"
```

5. Other information and limitations

5.1. Reload

The Forwarding Agents could be reloaded in some cases. If the WAN link status changes to “down” the Forwarding Agent(s) will reload.

5.2. UPLINK failover

If the UPLINK fails over to UPLINK2 (or vice versa), the agents will remain active throughout the failover and will not reload.

In the case where the SiteManager fails over to UPLINK2 with 3G, please be aware that local DNS/host-names might not be resolvable from UPLINK2 anymore.

5.3. Debug logging

If the SiteManager is in Debug mode (SiteManager GUI -> Log -> Setup -> Log Debug Messages -> Yes), it will log status every time the agent list screen is viewed and every time the refresh button is pressed on that page.

Generally, when running in a production environment with log tracking through syslog servers, debug log messages should be turned off.

5.4. GateManager appliances

In this version, the GateManager will not display Forwarding and SCADA (routing) Agents at all.

If agents are present from an earlier version, they should be deleted.

5.5. Model limitations

Forwarding Agents are not present on the software version of the SiteManagers (SiteManager Embedded), only hardware SiteManagers can use Forwarding Agents.

5.6. Capital letters

Even though it is possible to use upper case letters in the DNS names, they should be limited to lower case only, to ensure backward compatibility with the DNS naming standard.

One limitation exists: the first letter must be lower case for the rule to work.

5.7. Setup Assistant

The setup assistant (SiteManager GUI -> SETUP), will only show agents with syntax errors in the rule lines. It will not show names that fails DNS resolving.

5.8. Identical lines

Identical rule lines are allowed, and there will be no check for duplicates.

5.9. Empty lines

Empty rule lines will be truncated when saving the agent.

5.10. GateManager state

The Forwarding Agent is not affected by the GateManager when connected, reconnected or disconnected.

5.11. Logging DNS unavailable

If a DNS name has been resolved, but are no longer available, a cached IP number will be used and the state changes to “unverified”. This is not reflected in the log; neither is the recovery from this state.

5.12. DNS and syntax errors

If a Forwarding Agent has a syntax error in a rule line, it will not display IP addresses for DNS names, nor any DNS related status information.

5.13. Multiple Forwarding Agents

One Forwarding Agent is limited to 10 rules. If more rules are needed, multiple Forwarding Agents can be configured.

As stated above, there a no check for rule overlapping. The last rule will rule.

Notices

Publication and copyright

© **Copyright Secomea A/S 2017**. All rights reserved. You may download and print a copy for your own use. As a high-level administrator, you may use whatever you like from contents of this document to create your own instructions for deploying our products. Otherwise, no part of this document may be copied or reproduced in any way, without the written consent of Secomea A/S. We would appreciate getting a copy of the material you produce in order to make our own material better and – if you give us permission – to inspire other users.

Trademarks

SiteManager™, LinkManager™ and GateManager™ are trademarks of Secomea A/S. Other trademarks are the property of their respective owners.

Disclaimer

Secomea A/S reserves the right to make changes to this publication and to the products described herein without notice. The publication of this document does not represent a commitment on the part of Secomea A/S. Considerable effort has been made to ensure that this publication is free of inaccuracies and omissions but we cannot guarantee that there are none.

The following paragraph does not apply to any country or state where such provisions are inconsistent with local law:

SECOMEA A/S PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE

SECOMEA A/S SHALL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, CONSEQUENTIAL, OR OTHER DAMAGE ALLEGED IN CONNECTION WITH THE FURNISHING OR USE OF THIS INFORMATION.