

Cinterion[®] SensorLogic Agent

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1 Document History

New document: "SensorLogic Agent User Guide" Version 01.

Chapter	What is new
---	Initial document setup.

2 Introduction

The Cinterion® SensorLogic (SL) Module Services are a set of tools that enable IoT solution providers to remotely manage Cinterion cellular module deployments through a web-portal, greatly simplifying the operation of cellular IoT applications and maximizing the device uptime.

The SensorLogic Agent (SL Agent) is a thin software client that runs on IoT devices and maintains a secure connection to the SensorLogic device cloud to enable the Module Services. The agent can be configured and activated via a set of AT commands for easy integration in IoT solutions where the embedded application resides in an application processor.

This document is a guide to customers who wish to leverage the SL Agent in their projects.

2.1 Related documents

- [1] EHSx Java Users Guide, v07
- [2] SensorLogic – Module Services Users Guide, v01

To visit the Gemalto M2M Website you can use the following link:

<http://www.gemalto.com/m2m>

2.2 Abbreviations

Abbreviation	Meaning
SL	SensorLogic
AEP	Application Enablement Platform
M2M	Machine-to-machine
MNO	Mobile Network Operator

Table 1. Abbreviations used in this document.

3 Release Notes

	New features	Known limitations	Recommendation
SL Agent v1.0.0	Initial release, including module and network diagnostics, file management, application management.	Firmware over-the-air (FOTA) updates not functional. TLS disabled in factory delivery.	Update to SL Agent v2.0.0
SL Agent v2.0.0	Firmware over-the-air updates. ELS61 compatibility. Optional SMS wake-up. Minor stability fixes.	FOTA on EHSx not released. TLS disabled in factory delivery.	-

The following Cinterion products are currently supported by the SL Agent:

Product Name	Part Number	Supported SW Revision
BGS5 Rel.1	L30960N3300A100	01.100 ARN 00.000.21 and above
EHS5-E Rel.3	L30960N2800A300	03.001 ARN 00.000.31 and above
EHS5-US Rel.3	L30960N2810A300	03.001 ARN 00.000.31 and above
EHS6 Rel.3	L30960N2950A300	03.001 ARN 00.000.31 and above
EHS6-A Rel.3	L30960N2960A300	03.001 ARN 00.000.31 and above
EHS8 Rel.3	L30960N2900A300	03.001 ARN 00.000.31 and above
EHS5T RS485	L30960N2730A100	03.001 ARN 00.000.31 and above
EHS5T-US RS485	L30960N2760A100	03.001 ARN 00.000.31 and above
EHS6T LAN	L30960N2750A100	03.001 ARN 00.000.31 and above
EHS6T USB	L30960N2740A100	03.001 ARN 00.000.31 and above
ELS61-E Rel.1	L30960N4400A100	01.000 and above
ELS61-E2 Rel.1	L30960N4450A100	01.000 and above
ELS61-US Rel.1	L30960N4455A100	01.000 and above
ELS61-AUS Rel.1	L30960N4460A100	01.000 and above
PDS5-E Rel.1	L30960N4000A100	03.001 ARN 00.000.31 and above
PDS5-US Rel.1	L30960N4010A100	03.001 ARN 00.000.31 and above
PDS6 Rel.1	L30960N4020A100	03.001 ARN 00.000.31 and above
PDS6-J Rel.1	L30960N4020B100	03.001 ARN 00.000.31 and above
PDS8 Rel.1	L30960N4030A100	03.001 ARN 00.000.31 and above
Concept Board	L30960N0050A100	03.001 ARN 00.000.31 and above

4 Getting started

The SL Agent is part of the Cinterion module¹ delivery and disabled in the factory default configuration. This means that it does not execute any action or establishes any connection to an outside server, unless the user explicitly enables it. Once enabled, the setting is non-volatile and will be kept as long as the configuration is not changed.

The agent collects diagnostic information about the wireless module and cellular network according to the programmed reporting rate and sends it periodically to the SensorLogic Platform, where it can be visualized for further analysis.

4.1 Setting up the connection

Before activating the Agent, the Internet connection needs to be set up using one of the two methods explained below. In all cases, the application developer is responsible to arrange a data plan with the mobile operator of choice. The data consumption of the SL Agent will vary depending on the configuration.

Users may set-up a PDP / PDN context manually, indicating the APN. The SL Agent will scan the available contexts at start-up and use the first valid one. The PDP / PDN context can be set-up by issuing the following AT command:

```
AT+CGDCONT=1, "IP", "<APN>"
```

It is not possible to set the PDP / PDN context user and password for SL Agent in this way. If the chosen connectivity provider requires them, the method below has to be used.

The second method requires to create a configuration file in the PC and write them to the module's flash file system to configure the SL Agent to manage the PDP / PDN context activation directly. This is done through the *SimAndNetwork.config* configuration file. The file can be written into the module by AT command as explained in the following sections.

4.2 Activating the agent

The SL Agent is not active by factory default. It can be activated by issuing the following AT command which has a non-volatile setting (reboot persistent) and makes the SL Agent run immediately and on every module startup:

```
AT^SRVCTL= "SLAE", "Start"
```

The SL Agent can be deactivated issuing the following AT command and it will be stopped immediately and not run anymore on module startup:

```
AT^SRVCTL= "SLAE", "Stop"
```

To configure the SL Agent the configuration files have to be put direct into the root of the flash file system drive **a:** of the wireless module. On start of the SL Agent it moves the configuration files to the destination where they will be used from.

It is also possible to write the configuration files to their destination by AT commands:

¹ Not all Cinterion modules support this feature. Please check the module datasheet or contact Gemalto for details.


```
AT^SRVCFG= "SLAE","Write",<FileName.config>"
```

The configuration files parameters can be displayed by AT commands:

```
AT^SRVCFG= "SLAE","Read",<FileName.config>"
```

4.3 Communication protocol

Communication to SensorLogic is realized using a resource-efficient protocol specifically designed by Gemalto in order to keep the energy and data usage to a minimum. The protocol behaviour may be influenced by means of configuration.

Depending on the type of application, the user may trade off responsiveness by resource consumption (energy, data). The agent establishes a connection to the platform on a periodic basis as configured by the connection rate and disconnects after the connection is idle for the configured idle timeout. If the SMS optional package is included the subscription, the device can be asynchronously woken up by the SL Platform through a wake-up SMS.

In the default configuration, communication with the SensorLogic Platform occurs once every four (4) hours. In most cases there is no need to modify the default configuration.

4.4 Diagnostic information and alarms

Diagnostic information and alarms related to the modem and cellular network are sent according to the user preferences. By default, the reporting rate is set to four (4) hours. This may be increased (but not decreased) either by local configuration by AT command or remotely through the Module Services front-end. The collected information is queued locally until the next scheduled connection to the platform is established.

Additionally, device management functionality is enabled by the agent, including remote flash file system management, Java application management, module firmware over-the-air updates (FOTA) and remote configuration.

The SL Agent also generates alarms when a specific module or network parameter changes or exceeds a threshold. Alarms will be sent to the platform as soon as possible disregarding the connection interval.

Area	Supported diagnostic information
Module	Firmware revision of the wireless module
	International Mobile Equipment Identity (IMEI)
	SIM ID (IMSI number of currently used SIM card)
	Manufacturer
	Model
	Total flash file system space: non-volatile memory
	Available flash file system space
	Supply voltage
	Board temperature
	System time
Cellular Network	Link quality

	Signal strength
	Jamming detection status
	Re-attach rate
	Network information: operator name, MCC, MNC LAC, Cell ID

4.5 Notifications via Unsolicited Result Codes (URC)

The SL Agent is successfully started:

^SRVCTL: "SLAE", "Start", 0

The SL Agent is successfully stopped:

^SRVCTL: "SLAE", "Stop", 0

The SL Agent is already started when trying to start it:

^SRVCTL: "SLAE", "Start", 1, "Warning: Service Already Started"

The SL Agent is already stopped when trying to stop it:

^SRVCTL: "SLAE", "Stop", 1, "Warning: Service Already Stopped"

The SL Agent could not be started (maybe it is not installed):

^SRVCTL: "SLAE", "Start", 1, "Service start failed."

5 SL Agent configuration

In most cases there is no need to modify the default configuration, but when the application requires it, it is possible to modify it by defining a new profile inside of a configuration file, and copy it into the module using the `AT^SRVCFG="SLAE","Write"` command.

5.1 Configuring the connection rate

The connection rate determines the interval at which the SL Agent establishes a connection to the back-end. Reducing the connection rate will improve response time to actions executed from the Module Services front-end, but will increase data and energy consumption. It is recommended to stay with the default configuration, and only change it if your application really requires it.

```
# Minimum and maximum connection rate for power saving mode in seconds
# Allowed range for both values [600, 2147483647] seconds.
CONNECTION_RATE_MIN = 14400
CONNECTION_RATE_MAX = 14700
```

5.2 Configuring the reporting rate

The reporting rate determines the interval at which the SL Agent sends diagnostic information about the modem and cellular network to the SensorLogic Platform. By default, the reporting rate is set to four (4) hours. This may be increased (but not decreased) either by local configuration or remotely through the Module Services front-end.

As an example for the link quality, in `ModuleServices.config`:

```
# Link quality indicator reporting rate in seconds
LINK_QUALITY_REPORTING_RATE = 14400
```

5.3 Enabling the wake-up SMS feature

Wake-up SMS is the mechanism that allows the SensorLogic Platform to immediately contact the device in order to deliver a message to it. The wake-up SMS option is disabled by default and may be enabled here:

```
# Enable SMS wakeup when module is in POWER_SAVING mode
# (listening to SMS in multiple AT channels isn't possible in some models)
SMS_WAKEUP = false
```

Important note: when enabling the wake-up SMS functionality, your application won't be able to receive any SMS. If you use SMS for your application in some way, you have to keep this setting disabled.

5.4 Other configuration options

As explained above, the standard configuration should work for most applications, but in case a modification of the default configuration is necessary, this can be achieved locally by AT command. Most configuration parameters can also be modified remotely via the Module Services front-end.

There are three configuration files:

- SensorLogic.config (SL Platform connection related, URL, Port, TLS)
- ModuleServices.config (module & network information reporting rates & alarms, QoS)
- SimAndNetwork.config (SIM PIN, APN, username, password)

The default configuration uses TLS encryption for communication with the SL Platform. The default reporting rates of these diagnostic information and also the connection interval are set to 14.400 seconds (4 hours), except for the system time report which is set to report every 86.400 seconds (24 hours). Alarms are enabled using default thresholds except for MNO information change alarms that are disabled by default to prevent excessive data use. The Cell-ID based location is only reported once on startup.

To minimize the data and power consumption it is recommended to use largest acceptable reporting rates and connection rate. All commands sent from the SL Platform to the device will be queued in the server until the device connects the next time. The device can be forced to connect to SL Platform anytime remotely by SMS.

6 Installing and updating the SL Agent

In some Cinterion module models, the **AT^SRVCTL** and **AT^SRVCFG** commands are not yet available. As long as the product is included in the compatibility list (Section 3 of this document), the SL Agent may be installed manually and activated using the regular **AT^SJAM** commands.

Alternatively, the SL Agent may also be updated using the Module Services application. For details, see [2].

6.1 Installing the SL Agent (AT^SRVCTL not supported)

If your module does not support the **AT^SRVCTL** and **AT^SRVCFG** commands, the latest SL Agent package may be installed and started manually by executing the following steps.

First, get the latest SL Agent package from your local Gemalto sales representative. Extract the package, and if needed, modify *SimAndNetwork.config* to match your SIM PIN, APN, user and password. Then copy all files (JAD, JAR, configuration files) into the module file system's root folder **a:/** (for instance using the Module Exchange Suite – MES – tool). Afterwards, install it using a terminal program and the following AT command:

```
AT^SJAM=0,"a:/SLAE.jad", ""
```

Finally, activate the SL Agent like this:

```
AT^SJAM=1,"a:/SLAE.jad", ""
```

The agent will automatically start everytime the module is rebooted. The configuration files and some internal elements will be copied over to the **a:/slae** folder. Please, do not modify those.

After installed, the SL Agent may be updated using the Module Services application.

6.2 Updating the SL Agent (AT^SRVCTL supported)

The recommended mechanism to update the SL Agent in modules where **AT^SRVCTL** is supported is to use the Module Services application. For details, see [2].

About Gemalto

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